RISK PREFERENCE IN HEALTH INSURANCE: IS THERE EVIDENCE OF ADVANTAGEOUS SELECTION?

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ABSTRACT

The health insurance industry is faced with risk selection issues affecting insurers' sustainability and enrolment of consumers in an insurance programme. Inefficient selection results in the insurer having a pool of severely unhealthy participants who are costly to insure. Thus, this study was conducted to examine the current profiles of policyholders and to investigate the presence of advantageous or propitious selection. The specific objectives were to compare the profiles of insureds and uninsureds, and to determine the factors affecting an individual's decision to own personal health insurance. More importantly, the study was to demonstrate empirically whether the selection of risk is favourable and advantageous to insurers by examining the association among risk attitude, health risk level and ownership of health insurance. The fundamental theories used were the Theory of Asymmetric Information and the Theory of Propitious Selection. The data in this study was obtained from the National Health and Morbidity Survey 2011 and analysed using bivariate analysis tools and Logistics Regression. The analysis reveals that insureds are generally younger, employed in the government and the private sectors as well as self-employed, with low health risk levels and high risk aversion. The empirical analysis suggests three main findings. First, ownership of personal health insurance is predicted by age and gender. Second, individuals with low health risks and individuals who are risk-averse are more likely to own personal health insurance. Third, health risk level is negatively correlated with risk aversion. The findings suggest that there is evidence of advantageous selection in the Malaysian health insurance market. The study concludes that the selection of insureds has been effective and favourable to insurers, suggesting greater ability to counter the effect of adverse selection.

Keywords: health insurance, risk selection, advantageous selection, Theory of Propitious Selection, Theory of Asymmetric Information

ABSTRAK

Industri insurans kesihatan berhadapan dengan isu-isu pemilihan risiko yang memberi kesan kepada kemampuan penanggung insurans untuk membolehkannya kekal dan mengambil peserta dalam program insurans. Ketidakberkesanan pemilihan menyebabkan penanggung insurans mempunyai kumpulan peserta yang sangat tidak sihat yang mahal untuk diinsurankan. Oleh itu, kajian ini dibuat untuk memeriksa profil individu yang memiliki insurans dan menyelidiki kewujudan pemilihan yang menguntungkan. Secara khususnya, objektif spesifik kajian adalah untuk membandingkan profil individu yang memiliki dan tidak memiliki insurans serta bagi menentukan faktor-faktor yang memberi kesan kepada keputusan individu untuk memiliki insurans kesihatan peribadi. Lebih penting lagi ialah kajian ini akan menerangkan secara empirikal sama ada pemilihan risiko yang dibuat menguntungkan dan memberi kebaikan kepada penanggung insurans melalui pemeriksaan kaitan di antara sikap terhadap risiko, tahap risiko kesihatan dan pemilikan insurans kesihatan. Teori asas yang digunakan ialah Teori Asimetri Informasi dan Teori Pemilihan Yang Menguntungkan. Data diperolehi daripada Tinjauan Kebangsaan Kesihatan dan Morbiditi 2011 serta analisa dibuat menggunakan Analisis Bivariat dan Regresi Logistik. Hasil analisa mendedahkan yang pemilik insurans pada umumnya adalah muda, bekerja di sektor-sektor kerajaan, swasta, dan bekerja sendiri dengan tahap risiko kesihatan yang rendah serta tahap keengganan mengambil risiko yang tinggi. Analisa empirikal mencadangkan tiga penemuan utama. Pertama, pemilikan insurans hayat peribadi boleh diramal melalui umur dan jantina. Kedua, individu yang tahap risiko kesihatannya rendah dan individu yang enggan mengambil risiko diramalkan lebih berkemungkinan untuk memiliki insurans hayat peribadi. Ketiga, tahap risiko kesihatan menunjukkan korelasi negatif dengan yang tidak mengambil risiko. Penemuan-penemuan ini mencadangkan terdapatnya bukti wujudnya pemilihan yang menguntungkan di pasaran insurans kesihatan di Malaysia. Oleh itu, dapatlah dirumuskan yang pemilihan peserta insurans adalah berkesan dan memberi keuntungan kepada penanggung insurans sekaligus menunjukkan kemampuan industri untuk melawan kesan pemilihan yang merugikan.

Kata kunci: insurans hayat, pemilihan risiko, pemilihan menguntungkan, Teori Pemilihan yang Menguntungkan, Teori Asimetri Informasi

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LIST OF ABBREVIATIONS

AAA	: American Automobile Association
ADB	: Asian Development Bank
APS	: Attending Physician's Statement
AIHW	: Australian Institute of Health and Welfare
BNM	: Bank Negara Malaysia
EB	: Enumeration Blocks
EPF	: Employees Provident Fund
GDP	: Gross Domestic Product
IPH	: Institute for Public Health
LQ	: Living Quarters
MHI	: Medical and Health Insurance
MNHA	: Malaysia National Health Accounts
NHI	: National Health Insurance
NHMS	: National Health Morbidity Survey
OECD	: Organisation for Economic Co-operation and Development
SAHS	: Self-Assessed Health Status
OOP	: Out-of-Pocket
SOCSO	: Social Security Organisation
WHO	: World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Introduction

The government of a country has the responsibility to ensure the attainment of the highest possible level of health for its people (World Health Organization, 1978). Ensuring equity of access to (public) healthcare has always been the objective although the government is aware of the continued increase of healthcare spending every year. In a two-tier health system with heavy subsidy from the public sector, as in the case of Malaysia, the government shapes the optimum financing strategy. The government's commitment to financial resources charts the provision and distribution of healthcare services to wider regions. Encouragement initiatives by the government enlarge private sector involvement through insurance programmes to facilitate public access to private healthcare services.

Private health insurance serves the different healthcare environments differently such as in substitutive, complementary, or supplementary environments (Olivella & Vera-Hernández, 2013). In complementary and supplementary environments, private health insurance provides access to services not fully or sufficiently provided by the public sector. In countries where private healthcare is a substitute to public services such as in Malaysia, private health insurance has the larger overall impact on the access to healthcare although there are arguments such as by Thomson and Mossialos (2004) that private health insurance in a substitute

environment widened the gap of access to healthcare, especially for the poor, the older, and lower income individuals.

The private health insurance market in Malaysia will continue to play a major role in financing the healthcare needs of Malaysians. While it recorded steady growth over the years, growth is still low compared to more advanced nations. The penetration rate of health insurance was 18 per cent in 2008 (Institute for Public Health, 2008) and insurance contribution to the overall funding of healthcare was 6 per cent in 2013 (Ministry of Health, 2015a). At the same time, the industry has not been spared from the same challenges as those faced by its counterparts in the rest of the world. The biggest challenge is to maintain the balance between commercial viability and providing greater access to healthcare services.

In providing continuous access to healthcare, it is also essential to ensure that health insurance providers run actuarially sound business through the collection of fair premium and the ability to pay claims. Insurers are advised to continue to look for new ways to improve selection of insureds and reduce claims cost. The recommendation to use lifestyle-based analytics is an example of a suggestion to improve prediction on claims (Shreve, 2006).

In the enrolment of an insured, in a market where information failure exists, it is technically difficult to make accurate risk assessment of a potential insured; furthermore, it is costly to administer. Consequently, insurers are motivated to enrol only lower than average health risk individuals and leave out the rest. Alternatively, health insurers may enrol the higher than average risk individuals and impose

additional premium on them or limit the coverage such as by excluding pre-existing conditions or imposing expense participation through deductibles or co-insurance.

The current manner of selection which is based on underwriting criteria may not be sufficient to fully predict healthcare utilisation among the insured, which is the determining factor for health insurance claims. Other criteria such as risk preference of individuals have been found to have impact on the ownership of insurance.

Inefficient selection of insureds relates to the issue of information failure. Adverse selection (anti-selection) and moral hazard are the consequences of information failure that have been discussed widely in previous studies. The adverse selection theory suggests positive relationship between health risk level and purchase of health insurance. The implication is that a higher-risk individual will be more likely to purchase health insurance. Since health insurers are not aware of the health status of insurance applicants due to asymmetric information (Akerloft, 1970), insurers will set premium at average price instead of differentiating based on risk level. This results in higher-risk individuals getting a bargain by purchasing at the lower than expected price while low-risk individuals are less likely to buy at the average offer price.

While the adverse selection theory predicts people with high health risk are more likely to own health insurance, a competing theory, propitious (advantageous) selection, proves the positive correlation between insurance purchase and risk avoidance activity (Hamenway, 1990). Since health insurance premium is not related to risk preference, a test of the importance of a number of risk preference factors

related to health insurance ownership will be pivotal for consideration in risk selection as risk avoidance behaviour may lead to increased health insurance purchases.

Much uncertainty still exists about the relationship between individuals' riskiness, their risk preference and health insurance ownership, particularly in different healthcare markets. In the Malaysian context, up to now, far too little attention has been paid to the problem of insurance selection, with the exception of Abdul Rahman and Mohd Daud (2010), and Kefeli@ Zulkefli and Jones (2012) who suggested that there was no evidence of adverse selection. Using datasets from National Health and Morbidity Surveys (NHMS) of 1996 and 2006, Kefeli@ Zulkefli and Jones (2012) did not find strong evidence for adverse selection when comparing the health conditions variables.

The findings from this study will provide insights into risk status and lifestyle behaviour of Malaysians and the impact of their preference on health insurance ownership. This will serve the industry and policymakers with the opportunity to relook the strategies towards broadening the participation of the population in health insurance through appropriate initiatives and incentives. Increase in health insurance ownership will reduce the over-reliance on public healthcare facilities and offer more access to private healthcare institutions.

1.2 Background of Study

Southeast Asia is a growth area in healthcare development. Roland-Berger reported that the healthcare spending for the region increased by 250 per cent to USD 68

billion between 1998 and 2010 (Roland-Berger, 2013). The development of the market varies by countries. Malaysia and Thailand are the more advanced countries trailing behind Singapore, while the rest of the countries in the region are at a lower maturity.

In the same report, Roland-Berger (2013) estimated the growth of the sector in the region to reach USD270 billion in 2020. Private health insurance accounted for 6 per cent in 2013, an increase from 4 per cent in 2010. The total premium for personal accident and health insurances is expected to increase to USD24 billion in 2020 from USD6 billion in 2010. Malaysia, Singapore, Thailand and Indonesia will remain as the largest markets until 2020. The development in the region is shaped by steady population growth, steep increase in medical costs and increase in per-capita consumption of healthcare services.

Strengthening health systems and services is one of the major areas to be improved as highlighted by the Asian Development Bank (ADB) (2015). The world body suggested improvements in health systems for better access, equity, effectiveness, efficiency, and quality, with the involvement of the private sector.

1.2.1 Malaysian Healthcare System

Malaysia has a long-established healthcare system providing access to a comprehensive package of healthcare services. The development of the healthcare system in Malaysia started in 1950s with the establishment of a few main health centres, health sub centres, midwife clinics, and maternal and child health clinics. The current healthcare system comprises two sectors: the public and the private sectors.

The public sector provides primary, secondary, and tertiary levels of promotive, preventive, curative and rehabilitative services. The public healthcare system is highly subsidized and financed mainly through general taxation. Private sector participation in the healthcare services is mainly curative care and rehabilitative. Private sector healthcare services are financed through a combination of employee medical benefits, out-of-pocket (OOP) payments or medical insurance (Wan Abdullah and Eng, 2009). Other sources of financing are Employees Provident Fund (EPF) and Social Security Organisation (SOCSO) (Yu, Whynes & Sach, 2008).

In 2015, the Malaysian government allocated RM23.3bilion for public health expenditure, representing about 8.5 per cent of total government spending. Of this amount, 93 per cent was allocated for operating expenditure and the balance was for development. This was an increase of about 5.2 per cent from the 2014 allocation of RM22.1 billion (Ministry of Health, 2015b). Malaysia is not a high-spending country on health. The total expenditure on health as a percentage of GDP in 2012 and 2013 was 4.5 per cent and 4.53 per cent respectively. The expenditure is in the middle range compared to the high and middle-income countries in the Asian region.

Despite progressive improvement in the public healthcare system, the demand for private care has increased over the years. This can be seen in the growth of private hospitals. There were only 50 private hospitals in 1980 in the entire country providing a total of 1,171 beds. By 2014, there were 184 private hospitals providing 13,038 beds or 32 per cent of total hospital beds in the country (Ministry of Health, 2015b).

The continuous improvement in healthcare services in Malaysia has contributed significantly to the health status of the Malaysian population. The life expectancy (at birth) for males improved steadily from 71.9 years in 2010 to 72.5 years in 2014 and for females it improved from 76.6 years to 77.2 years for the same period (Ministry of Health, 2015c).

As the Malaysian government continues with its large expenditure on health-care provision, there are concerns regarding the sustainability of the government continuing to fund healthcare services. In addition to the factors that influence regionally the increase in healthcare expenditure, Malaysia faces the additional challenge of changes in the socio-demographic structure. The change in demographic structure where the number of the older population aged 65 and above increased from 3.9 per cent in 2000 to 5.6 per cent in 2014 indicated a steady increase in an older and less healthy population (Ministry of Health, 2015c). Individual healthcare costs would increase as a person depreciated in the health stock due to ageing (Grossman, 1972). The increase in population has created an increase in the number of visits to health-care facilities. It was reported that there was a 3 per cent increase in admissions to government hospitals in 2010 (Ministry of Health, 2010).

The total expenditure on health (public and private) amounted to RM42.3 billion in 2012 and RM44.7 billion in 2013. The government spent 51.96 per cent of its total expenditure in 2013 on healthcare as compared to 53.19 per cent the year before (Ministry of Health, 2015b). The expenditure for inpatient care amounted to RM12.1 billion or 50 per cent of the total curative care expenditure in 2013. The amount reflected 27 per cent of the total health expenditure for 2013 (Ministry of

Health, 2015a). In the 2011 health and morbidity survey, 6.9 per cent of respondents experienced hospital admission (Institute for Public Health, 2011a).

Unlike in the private sector, the utilisation of public healthcare services is almost free with minimum OOP payment charged for certain expenses. In contrast, the utilisation of private healthcare requires a larger share of OOP expenses or health insurance or co-payment with the insurer. Private health insurance mainly provides coverage for inpatient benefits and insureds who seek treatment at public health facilities are given incentive in terms of cash daily income.

The effect of the low penetration of health insurance in the country is seen in the comparison of the amount of OOP expenses against the total expenditure on health. In 2013, OOP expenses were 39 per cent of the total health expenditure while private health insurance contributed 6 per cent of the total funding of health expenditure (Ministry of Health, 2015a). Over reliance on OOP expenditure can negatively impact on treatment-seeking behaviour. The adverse impact of OOP expenditure on access and healthcare utilisation has been documented in the study by Onah and Govender (2014).

The increase in overall healthcare cost, change in the population demography, and change in the healthcare delivery system with the emergence of managed care, has led to the dependence on health insurance for greater access to healthcare providers.

The provision of healthcare and health-seeking behaviour in Malaysia has attracted multidimensional studies. For example, Kefeli@ Zulkefli and Zaidi (2013) studied behaviour towards the use of healthcare services based on socio-economic differences; Abu-Bakar, Samsudin and Suhadah (2016b) on profiling the insured and health utilization; Wan Abdullah and Eng (2009) on the impact of private health insurance on utilisation of healthcare; Abu-Bakar, Samsudin, Regupathi, and Aljunid (2016a) on the role of private health insurance in healthcare-seeking behaviours; and Kefeli@ Zulkefli and Jones (2012) on moral hazard. Abdul Rahman and Mohd Daud (2010) studied the behaviour of health takaful participants towards healthcare utilisation. Others studied the macro perspective of healthcare; for example, Yu, Whynes and Sach (2008) studied financing progressivity; Almualm, Alkaff, Aljunid and Alsagoff (2013) studied support for national health insurance.

1.2.2 Medical and Health Insurance (MHI) Industry in Malaysia

Contrary to some other countries, Malaysia does not have compulsory health insurance. Individual medical and health insurance (MHI) products have been offered in the market by life and composite companies since the 1970s. The growth of individual MHI in Malaysia is expected to more than triple by 2020 to US$5 billion from US$1.5 billion in 2010 (Roland-Berger, 2013). The expected growth is driven by the increase in awareness among the population of the need to make adequate provision for their personal healthcare expenditure to meet the preference for better health through private providers.

Medical and health insurance may be designed as a stand-alone policy or as a rider to a life insurance policy. A rider is a supplementary benefit that is attached to a

life insurance policy. Examples of riders are accidental death, critical illness, and permanent and total disability. The difference between a stand-alone and a rider lies in the structure of the policy. A stand-alone policy is a “term” policy which will expire at the end of a period which is normally one year. The policy may be renewed annually and the premium on renewal will be higher due to increase in age. Life insurance is not a term policy and the rider will not expire as long as the life insurance policy is enforced. For a stand-alone policy, the premium is only to cover the medical benefits whereas for a rider to life insurance, the premium covers both the medical benefits and life insurance. In both categories, the premium will depend on the benefits of the policy. These are normally associated with the type of room and board, surgical fees or annual limit of claims.

The traditional products of individual MHI are medical expense (hospitalisation and surgical) insurance, and critical illness (dread disease) insurance. Medical expense insurance covers the cost of hospitalisation and surgery, while critical illness insurance gives a lump sum benefit if the insured is diagnosed with any of the illnesses stated in the policy (InsuranceInfo, 2007). Some insurers offer newer products such as disability income insurance which pays the insured income stream to replace part of the income received during the pre-disability period. Hospital income insurance pays the insured daily, weekly, or monthly allowance if the insured is hospitalised (InsuranceInfo, 2007). The majority of private individual health insurance plans in Malaysia are offered by the life insurance industry as riders to life insurance plans.

The MHI product that continues to be dominant in the market is the hospital and surgical insurance policy which covers medical, surgical and hospitalisation expenses, and accounted for 63 per cent of total premium written. The critical illness policy was second, accounting for 28 per cent of total premium written, and hospital income and long term care policies made up the rest (Bank Negara Malaysia, 2005).

Unlike in the United States where insurance is substantially regulated by the state, Malaysian insurers are regulated centrally by Bank Negara Malaysia (BNM). Even though insurance is a private contract between the insurer and the insured, insurance is a concern to the public. Regulation is enforced to ensure that public interest is protected. For the MHI sector, the role of BNM is to ensure improvement in the functioning of the private health insurance market that focuses both on the economic aspects of supporting the sustainability of health insurance providers and promoting policy objectives of higher accessibility of higher-risk individuals (Bank Negara Malaysia, 2005).

1.2.3 Issues in Health Insurance

A healthcare system is a network of entities that work towards the common goal of achieving optimum health of a population. The system entities include providers of personal healthcare, preservers of a healthy environment, suppliers of expertise and new information, and providers of financing. Arrow (1963) suggested that an ideal system is one where insurance is available to cover against all conceivable risks. Health insurance is needed to lessen the risk when one is ill and to recover from illness. The absence of suitable insurance for the risks indicates the loss of welfare as

the risks cause not only discomfort but also loss of productive time, death or long deprivation of normal function (Arrow, 1963).

Health insurance is important for several reasons. Having timely access to medical care is crucial as the consequences of not having access can be distressing. Buchmueller, Fiebig, Jones, and Savage (2013) recorded five reasons for people in Australia having health insurance. Almost half of respondents cited sense of security, peace of mind and having protection. An almost equal number stated being treated as private patient, having greater choice and less wait. Another 20 per cent mentioned financial reasons, including getting tax incentives. Continuing to have health insurance was another reason given and finally, anticipating the need for medical care due to age or medical condition was stated by 4 per cent of respondents as a reason for having health insurance. The summary of the findings of a study by Haley and Zuckerman (2003) revealed that those who did not have insurance were unable to get early treatment and were only treated for serious diseases. Often, if they managed to get treatment, they received less post-treatment care. The study also noted that the rate of mortality could be reduced by 10 to15 per cent if individuals had health insurance.

While health insurance serves as the key enabling factor for access to health-care services, the issues surrounding health insurance can have profound effect on insurers and consumers. The most widely discussed issues in the health insurance market are the problems of moral hazard and adverse selection. A considerable amount of literature has been published on these issues in several health insurance markets, which may affect the profitability of insurance companies. The problem of

adverse selection may lead insurers to face the possibility of enrolling an unbalanced share of people who are costly to insure.

The market in which the insurance industry operates exerts continual pressure to achieve and maintain high performance through lowering administrative costs, improving efficiencies, managing healthcare costs and growing the business (Accenture, 2009). Additionally, Accenture (2009) noted that health insurers were facing low return, especially in the individual health insurance markets. The profits generated are mainly from specific market segments and from the return on investments of the pool of premium collected prior to the pool being used to pay claims.

The financial shape of health insurers is measured by the loss ratio which is the total health benefits paid divided by premium income. In 2008 for example, the loss ratio for major publicly traded health insurers in the U.S. was between 70.7 per cent and 89 per cent (Austin & Hungerford, 2010). In Malaysia, premium is decided after a mark-up of 30 per cent to 50 per cent, depending on the loss ratio (Wan Abdullah & Eng, 2009). Looking specifically at the underwriting profitability of individual policies, Harrington and Weiner (2014) found that health insurance companies in the U.S. lost 3.1 cents for every dollar of premium collected with the cost of claims accounting for 85 per cent of the premium due to the escalating costs of healthcare. In Malaysia where individual health insurance is offered as a rider to a life insurance policy, the life insurance industry paid a total of RM2.7 billion in medical claims, an increase of 37 per cent from the previous year. The increase was contributed mainly by the strong growth of medical health insurance and partly by the

increase in medical costs (Life Insurance Association of Malaysia, 2014). In 2004, the Malaysian government approved an increase of 14.4 per cent in private medical fees, resulting in the increase in health insurance premium (The Star Online, 2014).

Austin and Hungerford (2010) in their report for US Congress acknowledged that the increase in the cost of medical and healthcare to about 80 per cent of premium income would lead to increase in premiums paid by participants. PwC Health Research Institute (2014) studied the trends of medical costs and predicted that healthcare costs would continue to increase due to changes in the costs of medical products and services and increase in the number of services used.

Further, in their study on the underwriting cycle, Kipp, Cookson, and Mattie (2003) noted that besides healthcare cost trends that directly influence the changes in health insurance premiums, other factors such as competition, legislation, regulation and difficulty predicting future costs were all contributors to the repeating pattern of gains and losses within the insurance industry. Similarly, Accenture (2009) outlined other challenging areas facing health insurers, including pay-for-performance and data transparency, operation efficiency, and consumer and uninsured growth. In ensuring the objectives of health insurance plans which are to maintain and improve the health status of subscribers through efficient financing of healthcare are achieved, increase in costs and other influences exert pressures for insurers to balance the above objectives with sufficient revenue generation for continued sustainability.

Insurance ownership may sometimes cause unnecessary consumption among insureds. The over consumption occurs when people who are more sick buy more

insurance and insureds consume more than the optimal. The insurance market is likely to suffer the adverse impact if risks that have a higher chance of loss are selected. The resulting outcomes of inefficient selection are two important phenomena in insurance: adverse selection and moral hazard. It is beyond the scope of this study to examine the issue of moral hazard as the central theme is the problem of risk selection and its relation to the issue of adverse and advantageous selection.

Since the seminal work by Akerlof (1970) on information asymmetry and on equilibrium models (Rothschild & Stiglitz, 1976), studies have been conducted to determine the presence of adverse selection in individual health insurance markets. Equilibrium is a state of balance in a system that is produced and maintained by a variety of forces. In insurance this only exists when there is a perfect market full of identical people. A separating equilibrium is when individuals with different characteristics choose different actions. For example, high-risk individuals and low-risk individuals will choose different insurance contracts. A pooling equilibrium is when individuals with different characteristics choose the same action such as choosing the same insurance contract. Browne (1992) tested and confirmed the hypothesis that in a market that was characterised by asymmetric information, low-risk individuals would purchase less insurance. However, in a study of medical and health takaful in Malaysia, Abdul Rahman and Mohd Daud (2010) could not prove substantial presence of adverse selection.

Rejda (1998) defined adverse selection as strategic behaviour by the more informed partner in a contract, against the interest of the less informed partner(s).

Faden, Vialle-Valentin, Ross-Degnan, and Wagner (2011) described adverse selection as follows:

> *"An economic term which, in the context of health insurance, refers to the scenario in which people with higher risk (in terms of current or predicted need for health services) buy insurance. Asymmetric information between the insurer and consumer is necessary for adverse selection to occur i.e. the consumer knows his health status and the insurer does not."*

The existence of adverse selection makes it difficult for the contracting party to distinguish between high and low risk transactions (Belli, 2001). This occurs when one party in a contract has private information not known to the other party. In an insurance contract, information asymmetry will affect demand whereby demand for insurance will be positively correlated with the individual level of risk of loss. In a health insurance market, if there is asymmetric information in favour of the applicant, insurers will sell the insurance product at the price of an average applicant. The outcome as suggested by Akerlof (1970) is that "bad" risk will drive "good" risk from the insurance market.

If information on health risks is not revealed to the insurer or the insurer has no means of knowing the illness history, there is a possibility that someone in the greater risk group will buy health insurance at the same price as people in the lower risk group. Another reason for the inability to observe the difference can be due to regulation such as that which requires insurers not to deny coverage to people with risky health status. In jurisdictions where no such regulations are enforced, underwriting failure to screen applicants and set premiums may also result in adverse selection.

Donnely (2011) described adverse selection (anti-selection or negative selection) as one of the greatest threats to a life insurance company as it brings four adverse consequences to a life insurer, namely 1) the insurer pays higher claim pay-outs to the high-risk group; 2) the high-risk group purchases more insurance because they pay a relatively lower price; 3) to cover the costs, the insurer raises rates for everyone; 4) due to increase in price, customers with lower risk will leave the company and buy insurance from other companies that offer a lower price.

Cutler and Zeckhauser (1998) suggested that adverse selection impacts the insurance market greatly and causes a major theoretical concern as it results in three market inefficiencies. According to Cutler and Zeckhauser (1998), the presence of adverse selection results in insureds being unable to buy insurance at the price that reflects marginal costs that give the best option based on cost and benefit; no risk spreading; and insurers tend to manipulate the product offerings to avoid higher-risk individuals.

By charging everyone the same rate, including in the case of community rating, health insurance will only be attractive to people with chronic illness and not to healthy people. Healthy policyholders will drop out, leaving only the sick people in the insurance pool. Insurers will then increase the rate to match the higher claim cost. As the rates go higher, insurance will not be attractive to almost everyone. Both insurers and the public find this unfavourable as price increase results in a fall in demand. This phenomenon, also known as health insurance death spiral, was discussed by Cutler and Zeckhauser (1998) where adverse selection potentially causes losses in efficiency, risk-sharing ability, and from trying to improve the mix of

insureds. Arguments on death spiral continue and there is no explicit solution to the adverse selection problem.

In the attempt to safeguard the company from the negative effects of adverse selection, insurers implement an underwriting policy and include provisions that will protect the company. For example, insurers will state the exclusion from coverage of pre-existing conditions which are health problems that an individual has had before coverage begins.

The effect of asymmetric information suggests positive correlation between risk and insurance ownership. In the case of adverse selection, more insurance is purchased by higher-risk individuals, whereas in moral hazard, higher-risk individuals utilise more benefits from health insurance.

1.2.4 Health Insurance Underwriting

Health insurance companies earn profit from two sources: the underwriting surplus and the investment return. The underwriting surplus is the difference between premium collected and claims paid. Between the time the premium is collected and the time payment of claims is made, the available premium collected is invested to earn investment income. Quality and careful underwriting is crucial in ensuring that the company generates sufficient underwriting surplus for allocation as profit or to be invested to generate profit for the company.

The financial survival of health insurers depends on the ability to predict the future claims cost and expenses that they will incur for individuals they cover. When

healthcare costs increase unexpectedly, the premium collected will not be sufficient to cover the claims costs. Insurers will then increase the premium to reflect the current costs and to cover the previous losses. As in other markets, competition is inevitable with new entrants joining the market and offering lower premium for the same types of cover. Some insurers fail to compete and exit the market (Kipp, et al., 2003).

Insurance companies place emphasis on careful underwriting and development of contractual provisions. The American Academy of Actuaries (1997) defined underwriting as the process of selecting and classifying insurable risks. Based on this definition, underwriters are responsible to determine which individual risks can be accepted. This is known as risk selection. The next step in underwriting is risk classification where the underwriters place the accepted applicants together into groups which comprise those who roughly have equivalent level of risk. In the pricing of health insurance, an underwriter will start the process with evaluating the degree of morbidity risks of an applicant for health insurance. The underwriter will evaluate each application and place it into one of the risk categories – preferred, standard, sub-standard, or declined. Figure 1.1 provides the basic steps involved in the underwriting process.

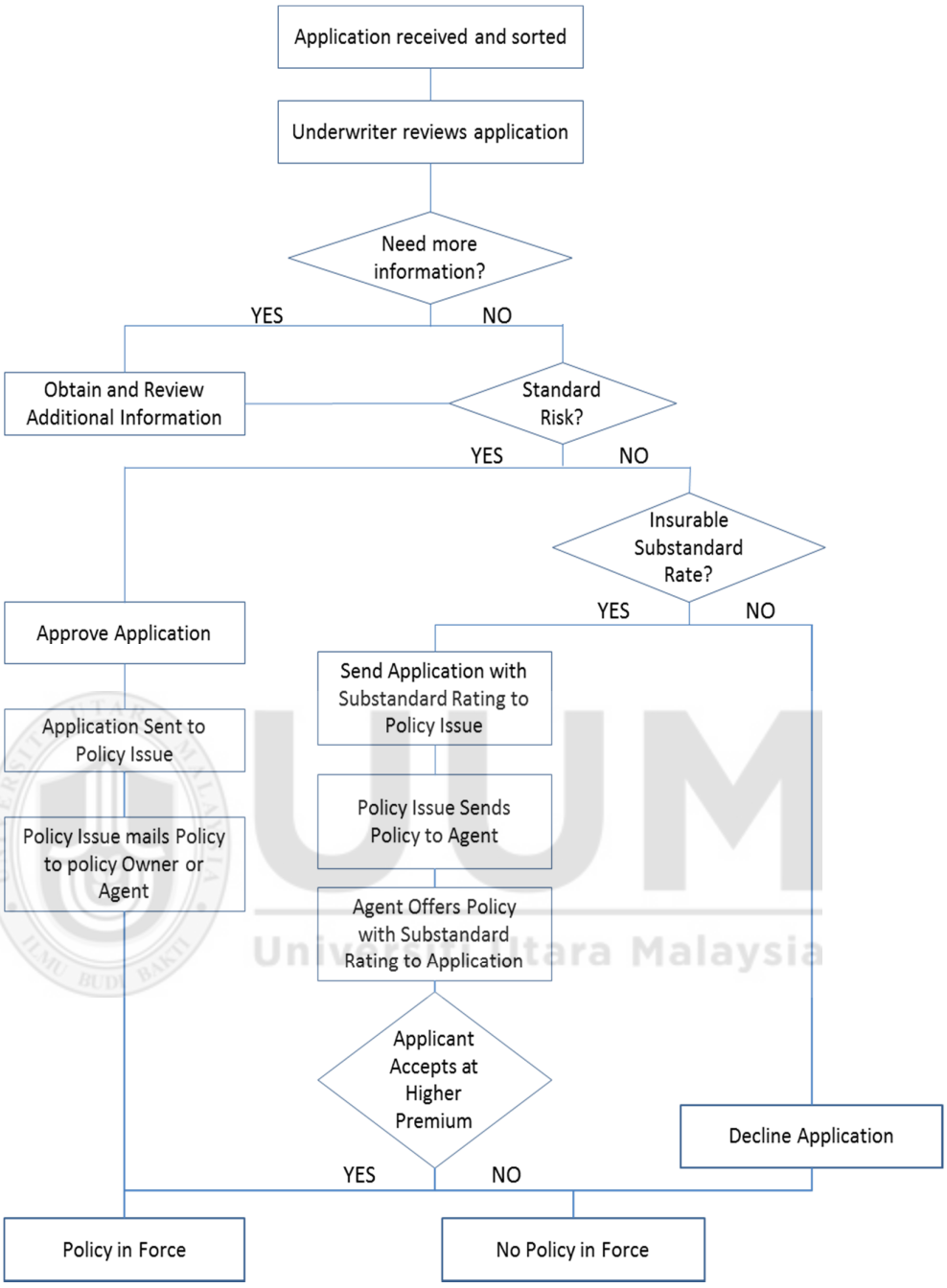

Figure 1.1. Basic Steps Involved in the Underwriting Process. Adapted from *Operations of Life and Health Insurance Companies* (2nd ed.), by K. Huggins and R.D. Land. 1999. USA: LOMA Life Management Institute.

Underwriting is not a new subject. Historically, in the 18th and 19th century, health insurance was organised on local basis and only offered to members of fraternity (fraternal insurance). Proposed prospects for health insurance were required to appear before the Board of Directors to answer questions on their health status. The board would usually have a physician among its members (Society of Actuaries, 1999). The purpose of underwriting is to evaluate the risk of potential clients and understand their health risk over a long period of time. The MHI policy is a contract that can last very long and represents a significant promise by the insurer to pay future claims.

In Malaysia, a health insurance policy can cover an applicant up to the age of 100 years and the premium will be determined based on the age of the applicant during entry. The shorter the duration to the expiry date, the higher the premium. An insurer must be financially viable to fulfil its promises. Therefore, to remain sustainable, a health insurer will need to be efficient in its administration, investment strategy, competitiveness, and effectiveness in risk selection.

The underwriting process protects the company from taking on clients who are prone to illness and conditions that make the company responsible for paying the healthcare expenses. Eventually, underwriting benefits both insurers and insureds as premium will be kept at the minimum and the risk of loss to the company will be lower. In typical underwriting, underwriters usually exclude pre-existing conditions from insurance cover. This is as not only do insurers find it difficult to assess future

cost from the existing illness, it also avoids the problem of adverse selection (Foubister, Thomson, Mossialos & McGuire, 2006).

1.2.4.1 Risk Selection

Issuing a policy to an applicant who is uninsurable is an unwise decision as it means financial loss to the company. Health insurers need to exercise care in deciding who is qualified to buy health insurance. It is the responsibility of the company underwriter to ensure each application for health insurance is reviewed in accordance with the company's standards to determine if the applicant qualifies for insurance coverage and at what premium.

In risk selection, the underwriter's attention will be on the factors that will make up the picture of the client's current health. Typically, an underwriter will use a number of sources to get the information about an applicant and to develop the risk profile. The key information will be from four sources, namely the current medical condition, personal medical history, family history and actuarial trends.

Other third party sources of information are sought when the need arises. Dearborn Financial Institute (1994) listed several sources of information, namely the application, the medical reports, an attending physician's statement (APS), the Medical information Bureau, special questionnaires, inspection reports and credit reports. The usage of the sources of information will depend largely on several factors, particularly on the size of the policy requested or other triggering questions about the applicant.

The basic source of information on insurability is from the application. Where necessary, insurers will contact an applicant's medical doctor for verification of the information stated in the form. The purpose is to establish the extent of pre-existing condition, past conditions and whether such condition may recur in the future that may impact on the finances of the insurers. Such strict approach of full medical underwriting received criticism in the past (Foubister, et al., 2006).

In an agency-based operation, an agent who acts as a field underwriter will initiate the process of underwriting through proper solicitation, ensuring of completed application, and obtaining appropriate signature for confirmation. Field underwriters assist insurers in risk selection through the screening of applicants before the decision to accept or reject the risk is made. Hall (2000) noted that field underwriting helps to detect if applicants are telling the truth about their health conditions.

The manner the information is gathered differs between companies. Usually, by using a portable communication device, field underwriters are connected to the home office all the time and they will be able to tell if the application for specific coverage is likely to be approved. The usage of an application form is still common in Malaysia. Insurance companies generally request similar information in the application form. Besides demographic information, applicants need to answer a series of questions on self and family medical history, occupation, income, and lifestyle. The information provided by the applicant in the application form will most of the time become the main source of information used by underwriters to decide whether to accept, accept with condition, or reject an application.

Quality selection through having more information on a potential insured is central to the underwriting practice. Failure on the part of the insurer by continuously underestimating the risks it assumes will result in inadequate premium rates to provide the insured with the promised benefits. Insurers will continuously look for additional information that will assist them in estimating the risk. The ability to leverage information and business intelligence are initiatives to be considered to improve predictability (Accenture, 2009). To be ahead of competitors in terms of numbers and quality of new insureds, insurers need the ability to identify new selection criteria. Couchman (2006) described one of the actuarial competitive objectives as matching price with risk. If an insurer was able to attract better risk by offering a lower price, competitors would be left with poorer risks.

Insurance works on the principles of utmost good faith and equity between policyholders (Donnelly, 2011). Under the principle of utmost good faith, applicants are obliged to reveal at their own risk any information to the insurer that may influence the decision of the company in offering coverage. However, the available information is often insufficient to price efficiently the risk protection offered to the applicants. This information asymmetry might result in adverse selection (Akerlof, 1970; Rothschild & Stiglitz, 1976).

In the study on checking service, Shreve (2006) indicated that one of the biggest challenges a health underwriter has is to be faced with insufficient information on health conditions as provided by the applicant. A checking service is provided by a third party at the request of an insurer to find more information about an applicant for

an insurance policy. Usually the checking service provider is a corporation owned by a group of insurers.

One of the reasons for insurers not getting enough accurate information is applicants find it difficult to complete the medical questionnaire, resulting in their overlooking providing relevant information needed by the underwriter. Some applicants may ignore historical medical information thinking that the condition is not worth mentioning or has been treated. The worst situation is when applicants omit information in the attempt to receive a more favourable rating or increase the insurability. In these cases, health insurers run the risk of inaccurate selection of risks, which may result in higher medical claims from the insured and affect the profitability of the company.

To improve predictability, health underwriters in the United States leverage information from an industry-wide database of pooled medical information from prior insurance applications to verify information provided by applicants (Shreve, 2006) using a checking service. However, not all regions in the world have industry-wide databases as in the United States.

1.2.4.2 Risk Classification

Risk classification is the process of grouping together applicants with similar characteristics. An underwriter will review thoroughly the application as the first source of information and classify the risk that the applicant may pose to the insurer. Persons with similar risk profiles are believed to have similar level of medical costs. Grouping applicants by homogeneous risk categories will help insurers in their

decisions to enrol, decide coverage, and charge. People in the same class will be charged a class-wide premium.

An underwriter will classify the applicant's risk based on the company's underwriting guidelines. Dearborn Financial Institute (1994) described the classification of risks as follows: "Standard risk is the risk of individuals who fit the insurer's guidelines for policy issue without special restrictions or additional rating." Substandard risk falls below the insurer's standard or average risk guidelines. An individual can be rated substandard due to poor health, dangerous occupation or habits that could be hazardous. Under this classification, the application may be rejected or accepted for coverage with an increase in the policy premium. Preferred risks are exceptionally good risks to the insurer. Individuals within this classification generally pay lower premium rates.

The typical classifying of applicants will be based on demographic criteria such as age, gender, and smoker and non-smoker. These classifying factors which apply for both health and life insurance set the first level of the pricing structure as medical costs typically increase with age and are different for men and for women. Smokers and non-smokers are charged different premium as smokers are associated with illness such as cancer. Subsequently, medical impairments are evaluated to establish if the medical condition of the applicants will impact future claims, including weight within ideal range and favourable cholesterol levels. Table 1.1 provides some examples of underwriting decision based on the impairment of health or life insurance applicants. Besides the classifying factors, the health insurance industry typically investigates other risk factors that may affect the mortality of

applicants (American Academy of Actuaries, 1999). These include occupation, dangerous sports, foreign travel, drugs and alcohol and financial needs.

Table 1.1
Portion of an Impairment Guide

Impairment	Type of Coverage	Typical Underwriting Decision
Appendicitis	Health	Unoperated – Impairment rider Operated within one month – Decline One month after successful, uncomplicated operation – probably standard
	Life	Usually standard
Asthma	Health	Mild, occasional – usually standard Moderate to severe – rate to decline
	Life	Mild – usually standard Moderate to severe – rate to decline
Burns	Health	If no impaired function – standard If possible future plastic surgery – impairment rider
	Life	Usually standard
Concussion of brain	Health	After recovery depending on severity – standard to decline
	Life	Recovered, no remaining signs – standard
Diabetes	Health	Mild – individual consideration Others – decline
	Life	Depending on age, duration and other medical factors – standard to decline
Epilepsy	Health	Individual consideration
	Life	Depends on history – rate to decline Some types, after five years - standard
Fractures	Health	According to location, severity, complications, and recovery – standard, impairment rider, or both
	Life	After recovery – standard

Note. Adapted from *Life and Health Insurance Underwriting* (2nd ed.), by M.C. Bickley, B.F. Brown, J.L. Brown, and H.E. Jones. 2007. Georgia: LOMA

1.2.4.3 Setting of Premium

The purpose of risk selection and risk classification is to ensure that the insured will be charged premium that will match the expectation of value received from the purchase of insurance. Insurers refer to pricing of risk as risk rating.

Based on the risk classification, an applicant may pay a standard rate without any exclusion or reduction in benefits. Those in the sub-standard category may be required to pay higher premium or benefits may be reduced. Risk classification will reduce the subjectivity in the above decisions. However, since insurers are free to develop their own underwriting guidelines, there is the tendency that subjectivity may occur at the industry level.

Foubister et al. (2006) listed four dimensions of price that become the basis for setting premium. The first is the scope of cover which relates to whether the cover is comprehensive, standard or budget, depending on the benefits offered. The second dimension relates to the characteristics of the applicant determined through underwriting. The pricing decision will reflect the combination of these two fundamental dimensions. At this point, the price is based on how the underwriter/actuary rates the risk of the applicant in relation to the potential cost to the insurer and comes up with fair pricing. Price also depends on the third dimension known as product options such as the choice of hospital, types of accommodation, level of cost-sharing, or the availability of discounts from non-claims. The final dimension is the "loading charge" which reflects the insurer's administrative costs and profit added into the price components.

In facing competition, some insurers will reduce premium to attract new policyholders. It must be noted that while reducing premium may attract new policyholders, insurers may put the policyholders in jeopardy if the company is left with sustainability issues. To decide on the premium that is neither too low nor too

high will require of insurers the ability to reliably forecast the level of future claims which depend largely on the risk characteristics of the insured (American Academy of Actuaries, 2009). Although insurers rely on actuaries to make projections on claims and calculate the appropriate premiums, the task of the underwriter during risk selection is vital. Data including self-reported health status, claims trend, and selected demographic data are used as predictors of future expenditures. For example, a study by Hastings, et al. (2014), using the data from elderly emergency department patients, found that 73 per cent of patients aged 65 and above had low to average risk of return while the other 27 per cent had higher than average risk of subsequent return for hospitalisation. For an underwriter, the medical history of a patient is an important consideration for deciding on classes of premium. While other variables such as number of claims and visit to pharmacy have successfully been used to predict future cost, data on illness still is the key predictor (American Academy of Actuaries, 2009).

In Australia, the setting of premium is based on community rating. This means health insurers will charge the same premium to all consumers regardless of the consumers' characteristics such as age, gender and health status (Buchmueller, et al., 2013). As the result of preventing insurers from using information on the insured in underwriting, insurers use average rate of premium and all consumers will pay the same premium regardless of risk level. For this reason, community rating encourages information asymmetry (Buchmueller, et al., 2013) and can result in low-risk buyers dropping out of the market, with only high-risk individuals remaining. Risk rating on the other hand allows health insurers to select insureds based on individual health risk factors. The insurance regulator will decide whether to allow the flexibility to insurers to choose the risk factors in the selection of insureds and decide the premium. In

Malaysia, the insurance industry is allowed the flexibility to use observable risk factors to classify risks and determine premium rates. The underwriting process and pricing can be based on factors such as age, sex, smoking status, health status or occupational status. This is also applicable in some OECD countries including the United Kingdom (Karl, 2014).

In conclusion, risk selection and risk classification can have a profound impact on consumers and insurers. It may result in an individual being uninsurable or being only offered limited benefit. Risk classification may also affect affordability if individuals are assigned to higher risk class. Lack of ability to access medical care may result in the bigger issue of health inequality. Such an impact will trigger regulators to act by introducing regulations that have profound impact on insurers. Such regulations may include the restriction of underwriting as in the United States or the practice of community rating in Australia.

The American Academy of Actuaries (2009) considered protecting an insurance programme from the impact of adverse selection was important to ensure the continuity of the programme and the ability to fulfil the promise to pay claims. For insurers, the ability to effectively select and classify insureds will enable insurers to decide on the premium to charge to level with the risks assumed. Underwriting is necessary to ensure people buy insurance as a protection mechanism and not only at the point when they are already sick and need medical care as this will impact adversely on insurers. At the same time, the ability to redefine the criteria in the selection and classification of insureds will improve demand for health insurance.

1.3 Problem Statements

The health behaviour model by Andersen (1968) addressed the issue of access to healthcare. In his model, Andersen (1968) defined "enabling component" as the "conditions which permit a family to act upon a value or satisfy a need regarding health service use". It is basically the variables that help an individual to be able to access healthcare services. Enabling factors are the family means to attain the services, which include family resources (including economic resources such as having health insurance or family savings) and community resources (including the availability of services convenient to be accessed).

Poor access to healthcare can be costly to individuals as well as to society. Failure of individuals in seeking treatment will affect society, especially if the untreated illness is contagious. The financial burden for the uninsured in getting treatment can be very high. CNBC (2013) reported that bankruptcy due to unpaid bills affected almost 2 million people in the US in 2013. Prolonged delay in seeking treatment can seriously impact a person's health. Uninsured individuals often postpone seeking care and once they are diagnosed they receive less therapeutic care (Haley & Zuckerman, 2003).

While health insurance is essential in facilitating access to healthcare, the health insurance industry is faced with the continuous issue of risk selection which affects insurers' sustainability and consumers' admission to a health insurance programme. Cutler and Zeckhauser (1998) defined the purpose of risk selection as the incentives to attract healthy insureds and repel sick insureds. Therefore the fundamental task of health insurers is to evaluate risk and pricing of risk protection. Failing to perform the

task effectively risks insurers with competitiveness and financial problem. Inefficient selection of insureds could mean the insurer will have a pool of severely unhealthy insureds that will utilise more of healthcare services and be costly to insure. Financially, the insurer runs the risk of paying high claim costs which may affect the solvency of the company.

Health insurance underwriters use similar factors as in the three sets factors (predisposing, enabling, and need) by Andersen (1968) and Andersen and Newman (1973) in their evaluation of applicants for insurance. Studies confirm the association of predisposing, enabling, and need factors with the utilisation of healthcare. These factors when administered carefully should be able to predict if an applicant will be using more or less healthcare services. Among the factors used in underwriting are health risk status and lifestyle risks. They form the basis for medical and health insurance underwriting to screen and deny individuals from MHI coverage. Responsiveness to the association between utilisation factors and underwriting factors will provide more accurate prediction of the risk status of health insurance applicants and reduce the negative consequences of the presence of asymmetric information in selection.

The issue of risk selection is often discussed in relation to the theory of adverse selection and the limitation posed by asymmetric information in insurance transactions. In the enrolment of an insured, in a market where information failure exists, it is technically difficult to make accurate risk assessment of a potential insured. Furthermore, it is costly to administer. Adverse selection (anti-selection) is the consequence of information failures resulting in inefficient selection of insureds.

The adverse selection theory suggests positive relationship between health risk level and purchase of health insurance. It has the implication that higher-risk individuals will be more likely to purchase health insurance. Since health insurers are not aware of the health status of insurance applicants due to asymmetric information (Akerloft, 1970), insurers will set premium at average price instead of differentiating based on risk level. This results in higher-risk individuals getting a bargain by purchasing at the lower than expected price while the low-risk individual is less likely to buy at the average offer price. In the long run, the problem of adverse selection will affect the financial sustainability of insurance companies.

While adverse selection has been found to exist in several health insurance markets, a competing model, propitious (advantageous) selection, attests the positive correlation between insurance purchase and risk avoidance activity (Hemenway, 1990). In other words, insureds are risk-averse and are more likely to practise healthy lifestyles, resulting in less insurance claims.

According to Finkelstein and McGarry (2006), individuals could be different in their risk types and preference for insurance in which both the information is private and not made available to insurers. Individuals with preference for insurance are more cautious and willing to spend on preventive health activities, making them low health risk individuals. This is in contrast with adverse selection where riskiness and ownership of insurance is positively correlated; in other words, individuals with bad risks are more likely to own health insurance.

Propitious selection has positive impact on health insurers. However, propitious selection that results in actuarially unfair premium paid by policyholders who are risk-avoiders may lead to reduced health insurance purchases. In addition, if propitious selection dominates the market, it may select the "wrong" insureds and individuals who will need health insurance the most will not be covered by health insurance (Hemenway, 1992).

Several studies have shown that propitious selection exists in the U.S. health insurance markets (Finkelstein & McGarry, 2006), in the United Kingdom (UK) (Olivella et al., 2013) and in Australia (Buchmueller et al., 2013). An analysis of the 2006 data of the National Health Morbidity Survey (NHMS) III by Abu-Bakar et al. (2016a) suggested that adverse selection might not be present in the Malaysian health insurance market. However, the study was descriptive in nature.

Thus, this study aims to contribute to this growing area of research by investigating the relationship between individual risk preference and riskiness and health insurance ownership. The findings from this research may offer new evidence as the health insurance market in Malaysia is voluntary and is in demand despite the fact that public healthcare is almost free.

In addition, this study provides the opportunity to use lifestyle risk variables as proxy for attitude towards risk. The variables are smoking, physical inactivity, and alcohol use. Previous studies used various measures of risk preference. The use of lifestyle variables shall contribute to the current body of knowledge in risk preference and ownership of health insurance.

In summary, this study is mainly motivated by the following problems:

1) Very little is known about the relationship between individual risk preference with riskiness and health insurance ownership. The findings offer some important insight into the existence of propitious selection in the health insurance market. Risk-avoiding behaviours of insurance applicants have not been studied in Malaysia. Such studies conducted in other countries show that individuals who are risk-averse are also subscribers to health insurance. A study on the risk preference in the Malaysian health insurance market will provide new knowledge for decision making in the selection of insureds.

2) The sustainability of health insurers depends very much on the ability to select the appropriate mix of insureds. Understanding individual characteristics and how they relate to the ownership of health insurance may qualify the current manner of selection which is based on underwriting criteria. These factors can be utilized to promote health insurance ownership as evidence suggests that health insurance ownership improves access to healthcare.

This study aims to contribute to this growing area of research by exploring the existence of propitious selection in a health insurance market where access to health-care is almost free. It extends the current researches in health insurance by providing new evidence on risk preference behaviour among insureds in Malaysia. The study also offers some important insights to insurers and policy-makers in promoting health insurance ownership.

1.4 Research Questions

The findings of this study are expected to answer the following research questions:

1) Do the profiles of individuals with and without health insurance differ?
2) What is the relationship between the different underwriting factors of health insurance (i.e. gender, age and occupation) and the ownership of health insurance?
3) What is the relationship between health risk level and ownership of health insurance?
4) What is the relationship between risk preference level and ownership of health insurance?
5) Does advantageous selection exist in the health insurance market?

1.5 Research Objectives

The research is conducted to meet the following objectives:

1) To profile individuals with and without personal health insurance
2) To determine the association between:
    a. underwriting factors (gender, age, occupation) and health insurance ownership
    b. health risk level and health insurance ownership
    c. risk preference and health insurance ownership
3) To investigate the existence of advantageous selection in the health insurance market

1.6 Scope of Study

The selection of specific and suitable datasets for the study was driven by the research questions and research objectives. Datasets were obtained from the National Health Morbidity Survey 2011 (NHMS 2011) by the Institute for Public Health (IPH). The NHMS 2011 encompasses health-related data and information for use by the Ministry of Health in reviewing health priorities and the development of programme strategies, activities, and resource planning. The range of data in NHMS 2011 is wide, which includes load of illness and disability among the population, health status, health services utilization, nutritional status and dietary practices, health risk behaviours, mental health problems, and home injury. While NHMS 2011 has an abundance of data to answer many more research questions, the access to the data was limited to those strictly needed to answer the hypotheses derived from the objectives. Three categories of information were of particular interest: socio-demographics, health insurance ownership, and health risk behaviours. Specifically, this study employed socio-demographic data of respondents, data on funding of healthcare through personal health insurance, health status of respondents, risky behaviours of smoking and alcohol use, and physical activity. Only respondents aged 18 years and above were selected as this age group is eligible to own personal health insurance. This study uses the term "personal health insurance" even though most of the literature refers to it as "private health insurance". Personal health insurance is used to differentiate between individually-owned and company-sponsored health insurance, both offered by private insurers. To avoid duplication in the funding of healthcare, information on health insurance provided by employer was excluded.

1.7 The Importance of the Study

The existence of advantageous selection has profound impact on insurers and policy-makers in that it conflicts with the classical insurance theory. In advantageous selection, the presumed implication is that those who buy health insurance are also risk-averse. However, there is no evidence in the Malaysian market that individuals with health risk take precautionary actions to control loss. Such existence if prevalent in the Malaysian market will have deep policy and industry implications. Propitious selection brings favourable impact on insurers in terms of enrolment of lower than average risk individuals. However, it may result in decreasing willingness to pay among individuals who are risk-averse. The government may view risk avoidance efforts taken by insureds as the encouraging effect on the government's initiatives to promote lessening of lifestyle-related risks such as smoking, sedentary habits, and alcohol use. Nevertheless, it may impact on the number of new insureds, especially those who believe that risk avoidance efforts are sufficient to avoid major health risks that require healthcare services and financing from health insurance.

Currently, the government's concern is the availability and the cost of health insurance considering that a large number of the population is still uninsured. The industry, on the other hand, is concerned with the competitiveness in attracting new policyholders. While health insurers seek to maximise premium income by accepting as many applicants of health insurance as possible, they are limited by the concern that substandard applicants will bring adverse impact on the insurers' ability to cover the cost of risks. Failure to enrol good-risk-insureds will hamper the efforts to achieve a higher contribution of insurers to the overall healthcare financing. Balancing the needs of access and sustainability will be an ongoing challenge for both policymakers

and insurers. The ability to identify new elements that will encourage participation in a health insurance plan will be the prescription for the challenges facing both insurers and policymakers.

Taken as a whole, this research effort will broaden the existing body of knowledge in the field of medical and health insurance underwriting, in particular, the risk preference of individuals and their demand for medical and health insurance.

1.8 Structure of Thesis

This thesis comprises five chapters. This chapter provides the background of the study. Starting with the current environment of the Malaysian healthcare system, the discussion extends to the medical and health insurance landscape of Malaysia. Following this is a discussion of the issues facing the health insurance industry to provide the background to the problems facing the industry. Reference is made to the United States and other countries where the issues have been documented quite openly. One of the main areas of concern is the practice of underwriting. The subject is discussed quite at length with a reference to the Malaysian practice.

The need for empirical study for Malaysia is discussed in the problem statements. The specific research questions and objectives are then presented. The study explores the effects of various factors including health risk level, risk preference, socio-demographic factors, and the underwriting factors on personal health insurance ownership in the Malaysian market. This study will provide further evidence to the current literature on medical and health insurance studies.

The thesis is organised as follows: Chapter 1 introduces the healthcare system including the medical and health insurance industry and presents the problems, the objectives of the study as well as the importance of the study. Chapter 2 discusses the theoretical background and reviews the literature in the field. Chapter 3 explains the theoretical framework and the research methods employed in this study. The research findings are described in Chapter 4 and the recommendations are put forth in Chapter 5 together with the conclusions.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter provides an overview of risk classification in health insurance underwriting and a review of the theoretical foundation of health insurance risk selection though Akerlof's (1970) theory of asymmetric information and Hemenway's (1990) theory of propitious selection.

An examination of relevant literature on health insurance and healthcare utilisation to reveal the references to medical and health insurance underwriting will be presented in the next section. In cases where relevant examples from other insurances are available, they may be included in the review.

This chapter is divided into three sections. Section 2.1 discusses the relevant theories in health insurance selection. Section 2.2 discusses past empirical evidence of the risk factors used in the study. Section 2.3 compares the theories from the empirical perspective, and Section 2.4 concludes.

2.2 Theories and Models Related to Underwriting of Medical and Health Insurance

This study presents two theories that form the foundation for the study of underwriting of medical and health insurance: Akerlof's theory of asymmetric

information and Hemenway's theory of propitious selection. The first theory, Akerlof's theory of asymmetric information, sets the basis for the selection of insureds for which insurers often have inaccurate information needed for decision making. Insurers need to carefully examine the variables associated with health insurance application prior to extending insurance coverage. In addition, the theory provides the underlying explanation of the selection challenges facing individual health insurers in selecting insureds. The second theory, Hemenway's theory of propitious selection, is a theory that is in contrast to the theory of adverse selection. The theory explains individual risk preference behaviours in the decision to own health insurance. Both the theories are central to the development of the research model and selection of variables for this study. The choice of the theories is based on the following assumptions:

a) Personal health insurance operates in a competitive market

Insurers will sell health insurance policies at a premium that will cover the cost as any premium lower than the cost will reduce insurers' profitability. Insurers find it is less profitable to charge high premium to high-risk individuals compared to charging the same premium to low-risk individuals. However, in a competitive market, low-risk individuals will only be willing to buy when the price is low, thus forcing insurers who are after low-risk individuals to reduce the premium. In a competitive market, risk is defined as a measure of expected benefits (Pauly & Herring, 1999) where premium will vary according to risk involved.

b) Health insurance relies on information

Under the principle of utmost good faith, "a higher degree of honesty is imposed on both parties to an insurance contract than is imposed on parties to

other contracts" Rejda (1988: 65). Applicants for insurance schemes have the duty to disclose any information they know about their risk profile while insurers have the duty to explain to applicants the nature of the insurance product being applied for (Donnely, 2011).

It is not economically viable for an underwriter to review and to check for non-disclosure and misrepresentation of the information stated in each application. The intentional concealment of material information may result in dispute which can be in the favour of the insurers. Insurers will rely on good faith of the applicants to select the applicants and set the premium rates while being aware of other methods of detecting risk to maintain their competitiveness (Macedo, 2009).

2.2.1 Theory of Asymmetric Information

The theory of asymmetric information was first postulated in the work of Arrow (1963) who emphasised that when there is uncertainty, information or knowledge becomes a commodity. In a market that is characterised by competitiveness, consumers are able to differentiate the quality of products that they intend to buy. However, according to Arrow (1963), the healthcare market does not fit the free market ideal due to, among others, the imperfect marketability of information. In medical care, much of what a buyer gets is advice from a physician and less of actual dexterity such as in surgery. In this situation buyers will not be able to put a value to the information that comes in the form of advice or skilled care bought from most physicians.

The work of Arrow (1963) was expanded by Akerlof (1970) who noted that the uncertainty due to asymmetric information causes a reduction in the quality of goods and a failure of the market. In his paper, Akerlof (1970) developed the concept of asymmetric information using the automobile market as an example. The basic premise of this theory is that buyers will use market statistics to value goods in the market and develop the average value, while the sellers know the value of specific items.

In the case example, Akerlof assumed the automobile market had four categories of cars: new car and old car and for each kind there was good car and bad car. Bad cars are commonly known as “lemons”. As suggested earlier, potential buyers will not know which car actually has a high or a low value. They will be willing to buy at the average price of good cars and lemons. For the price that buyers are willing to pay, the sellers are only willing to sell lemons and ultimately the good cars have to be withdrawn from the market since they are not getting the right price. Soon the market will be left with only lemons. In essence, Akerlof’s theory noted that:

a. Driven by larger profit incentives, people will sell lower quality goods more expensively.
b. Buyers, for not knowing the actual value of the goods, will only be willing to buy at the average price between good quality and poor quality goods and what they get will be poor quality goods.
c. Poor quality goods bring down the average price of goods.
d. Poor quality goods will drive good quality goods out of the market.
e. The market size of goods will reduce and only feature poor quality goods.

Rothschild and Stiglitz (1976) applied this theory in the accidental insurance market where potential insureds came with different risk levels. In their study that used cost and coverage as the varying factors, Rothschild and Stiglitz (1976) suggested the possibility of insurance companies facing imperfect information when different customers have different accident probabilities. Due to asymmetric information, insurers are unable to distinguish between high-risk and low-risk individuals and for that insurers will charge a higher premium on average to cover the potential claims cost of riskier individuals. Only the high-risk individuals will find the premium to be fair with their risk level and buy the cover. The lower-risk individuals find the price too high for the cover than they require and leave the market. This results in adverse selection whereby the insurance company selects insureds that are adverse to the company.

Rothschild and Stiglitz (1976) suggested that when there is imperfect information in a competitive market, a separating equilibrium could exist where individuals with different types of risk choose different insurance contracts. Separating equilibrium refers to when companies offer different insurance plans for different types of customers while pooling equilibrium refers to when insurance companies offer the same type of plan for different types of customers.

Barr (1992) suggested that adverse selection due to asymmetric information problem could be experienced by both consumers and firms. For consumers, deficiency in information could cause imperfect consumer understanding about

quality and price. For insurance firms, adverse selection could cause failure to the insurance market.

The basic understanding of adverse selection in insurance relates to the correlation between risk level and insurance coverage. In the insurance market, adverse selection occurs when the potential insured has more information about a risk than the insurers. Under this theory, the purchaser of insurance who knows to himself that his risk level is higher will buy insurance with higher coverage or lower deductibles. While the presence of asymmetry in information can be proven, the type of information must be relevant to both the insurer and the insured. Relevant information is the "common values" that is important to both parties, such as information that will help insurers to charge premium to insureds (Chiappori, Jullien, Salanié & Salanié, 2006).

This positive correlation between risk and coverage has attracted empirical works in this area. Evidence of adverse selection has been found in many studies even though the magnitude of the occurrence varies. In the Canadian automobile insurance market, Dahlby (1983) found that the prohibition of discriminating insurance coverage by gender led to reduced purchase of insurance by women drivers. Before the prohibition of charging different premium by gender, females with similar characteristics as males paid less for auto insurance premium. Statistically, females have lower risk of accident compared to males of the same age group. In this study Dahlby (1983) found that by not lowering premium for female drivers, the number of purchases for collision insurance dropped by between 2 to 10 per cent for different

ages of female customers. The study was consistent with Akerloft's hypothesis that in a market with adverse selection, low-risk individuals drop out of the market.

In the study to determine if adverse selection was present in the medical expense insurance market in the United States, Browne and Doerpinghaus (1993) found that there was also no difference in the buying behaviour of the higher and low risk individuals based on the generosity of coverage. High and low risk individuals purchased the same insurance policy. This result pointed to adverse selection as well as the presence of pooling equilibrium (Rothschild & Stiglitz, 1976).

In a natural experiment on health insurance plans offered to employees of Harvard University and Group Insurance Commission, Cutler and Zeckhauser (1998) found that both institutions experienced adverse selection that affected the plans. For example, when Harvard decided to contribute equally to all plans, the premium paid by participants for the more generous plan increased substantially. Many of the affected employees of Harvard switched to the cheaper plan and those who switched were mainly younger and healthier. As a result, the plan became difficult to maintain and adverse selection death spiral took its course when the plan was finally disbanded.

Studying Harvard University's experience, Cutler and Reber (1998) noted that in a competitive market, changes in the pricing would impact the demand for health insurance. They estimated that a one per cent increase in premium would reduce enrolment by two per cent.

In Iran, Haddad and Anbaji (2010) found the evidence of adverse selection in some types of insurance. In Iran different health insurance plans are subscribed by different groups of vocations. In the test of the association of high coverage with higher risks, the researchers found evidence that personal health insurance had the worst health status of subscribers who needed medical care and had encountered health shocks. The finding suggested positive correlation between risk and coverage, indicating the presence of adverse selection in personal health insurance for the personally insured individuals.

The general prediction of adverse selection is when there is a positive correlation between risk level and insurance coverage in the presence of asymmetric information. The presence of asymmetric information may not be proven in many studies. For example, in the study of vehicle insurance, Chiappori and Salanie (2000) found no evidence of correlation between frequency of accident and coverage. The authors concluded that asymmetric information was not present in the contract between participants and insurers because the participants, especially the younger drivers who had very little driving experience, were not more knowledgeable about their risks than the insurers.

Cardon and Hendel (2001) tested the presence of adverse selection through the link between demand for insurance and consumption of healthcare. In the study, adverse selection was only predicted if the link was characterised by unobservable information on healthcare utilisation. The authors however found that the link was based on observable information, suggesting no evidence of informational asymmetries. Therefore their model did not find the evidence of adverse selection.

The Theory of Asymmetric Information is applicable in the selection of insureds for medical and health insurance. Asymmetric information occurs when insurers are unable to distinguish between good health and poor health individuals. The underwriting process often fails to establish the overall health picture of potential insureds due to the withholding of private information or weakness in the process to confirm on the health status of the applicants. Insureds may hide certain critical information from the knowledge of insurers, resulting in the failure of insurers to determine the correct premium, which risks insurers paying excessive claims in the same class of insureds. Not knowing the actual health conditions of the applicants, insurers will charge a higher premium on average to cover the potential claims cost of poor health individuals. Increase in premium in a competitive market drives the healthier individuals out of the market, leaving only those in less good health in the market. This in turn prompts the insurer to increase the premium even more to maintain profitability. Ultimately the premium will be so high that only certain people with definite needs of health insurance will remain in the market, resulting in insurers suffering from much reduced profits. Weaker insurers will ultimately drop out of the market. Barr (1992) suggested that the problems with adverse selection could be solved if only insurers could "get inside the head" of the insureds to verify the true risk status and compare the behaviour of the insureds if without insurance.

Although evidence of adverse selection is mixed, previous literature exhibits that asymmetric information is relevant and sufficient information is important in the achievement of equilibrium in a competitive environment. The presence or absence of information that is of value and can impact the payoff of one party forms the

foundation of the applications of this theory. Akerlof's theory of asymmetric information will remain as the lead theory in the study of health insurance underwriting. This theory will be used as the foundation for the effective operation of risk selection of health insurance applicants.

2.2.2 Theory of Propitious Selection

The theory of propitious or advantageous selection was postulated by Hemenway (1990). It posits that individuals who are more likely to purchase insurance try to reduce risk at the same time, a state which Hemenway (1990) calls "propitious selection". Hemenway (1990) stated:

> *"…… the concept of propitious selection compares people with different levels of risk avoidance. Those with higher levels are more likely both to buy insurance and to exercise care. Those with low levels, or who are actually risk seeking, will tend to do neither."*

Risk seeking and risk aversion are individuals' preference resulting from their attitude towards risk. From the perspective of economists, risk preference is when the outcome of a choice is not known with certainty whereas psychologists view risk preference as a personality trait of an individual (Dave & Saffer, 2008). Depending on the personality and the possible return, individuals may choose either a risky or a less risky option, making them risk-takers or risk-averse.

In his study, Hemenway (1990) analysed the risk preference of two different groups of individuals: American Automobile Association (AAA) members and car rental clients. An AAA member will benefit from the towing services provided in case of automobile breakdown. Such membership should attract the young and more reckless drivers who will be less likely to maintain their vehicles and will rely more

on AAA services. This will be an evidence of adverse selection. However, the study showed that AAA members were older and richer individuals and were more likely to prefer to avoid the risk of breakdown, suggesting the case to be more of propitious selection.

In the same study, Hemenway (1990) tested the ownership of car rental insurance and the risk preference of the clients of a car rental company. Car rental insurance is a voluntary policy that carries the benefits of collision damage cover. At the premium of $9 per day, the cover should be worth more than having to pay claims from collision damage. Risk preference was measured on the usage of the seatbelt while driving as safe drivers tended to use the seatbelt more often. The evidence from the study was more consistent with propitious selection when 39 per cent of respondents bought insurance and 77 per cent used the seatbelt.

The findings of Hemenway (1990) suggest that individuals who are more risk-averse will take action in protecting themselves and assets from injury and financial loss through the purchase of insurance and at the same time take physical precautions. This is consistent with the general assumptions of the theory which asserts that individuals have different taste for risks that is consistent across physical and financial dimensions and they can take action whether to increase or lower their risks.

The theory of Propitious or Advantageous selection assumes that riskiness and risk aversion are negatively correlated. In other words, risk-averse individuals or risk-avoiders take more care and look for financial security including taking physical precaution compared to risk-takers who tend to be less cautious and more prone to

experience losses. The risk-seekers on the other hand do not have any reason to seek financial security such as by buying insurance.

Fang, Keane & Silverman (2008) generalised the model of advantageous selection by providing a clearer relationship between health risk, attitude towards risk and ownership of health insurance. They suggested that advantageous selection could arise if people have private information (attitude towards risk) that is positively correlated with both health risk and ownership of health insurance.

The necessary condition for the presence of advantageous selection arises when risk aversion is higher among the low health risk individuals. It is in the best advantage of health insurers if they are able to select individuals who are in the low health risk but high in risk avoidance (risk-averse) to be accepted as insured.

The adverse selection model proposed by Rothschild and Stiglitz (1976) did not take into consideration individual preferences where individuals not only differed just in their risks but also in their willingness to bear risk (Einav and Finkelstein, 2011). According to Einav and Finkelstein (2011), differences in preferences suggest different action towards ownership of insurance. In essence, individuals who are willing to pay for insurance are high in risk aversion and most likely have lower expected cost or risk.

Evidence suggests that adverse selection may not be present in the market featured by asymmetric information (Chiappori & Salanie, 2000; Cardon & Hendel, 2001). Their studies found negative correlation between risk and insurance ownership.

Buchmueller et al. (2013) suggested the presence of other information such as risk aversion that was not used in setting the prices. Chiappori and Salanie (2000) suggested that risk might not be the only possible source of asymmetry and negative correlation might be explained by the taste for risk of the individual. In different insurance markets, Wang, Huang and Tzeng (2009) found firms that purchased commercial fire insurance at the same time exercised self-protection activities and were less likely to suffer fire accidents.

The theory of propitious selection offers an alternative mechanism in the selection of insureds. The existence of propitious selection will mitigate the problem of asymmetric information and benefit insurers. Although the health insurance market may attract high-risk individuals, these individuals take extra precaution to reduce their risk exposure, thus resulting in lower claim. The theory will be a leading theory in the selection of insureds due to its ability to offset the effect of adverse selection.

2.3 Adverse Selection vs. Advantageous Selection

Adverse selection occurs when the insurer is faced with the possibility of loss due to inability to factor risk during the time of sale. The insured may hide certain critical information from the knowledge of the insurer, resulting in the failure of the insurer to determine the correct premium, which risks the insurer paying excessive claims in the same class of insureds. Cardon and Hendel (2001) suggested that adverse selection might impact market efficiency. Due to the large number of people who are uninsured, inefficiencies in health insurance market is a policy concern. There are several ways in which market efficiency is affected by adverse selection. One

common example is where insurance providers structure their products at higher premium to cover high-risk individuals. Low-risk individuals find it a problem to pay the same premium as the high-risk individuals and thus drop out of the market, leaving only the higher-risk insured in the insurance plan. This suggests that under adverse selection, insurers may attract sub-optimal buyers in voluntary market transactions.

Adverse selection in insurance is observed when potential buyers of insurance have better information about their risks than the insurers, resulting in positive correlation between risk and the amount of insurance purchased. In contrast, propitious selection compares individuals of different levels of risk preference – a higher level of risk avoidance (risk-averse) individuals purchase insurance while at the same time take precaution to avoid risk while the risk-taker will do neither.

The correlation between risk and insurance coverage has attracted empirical work in this area. The theory of adverse selection postulates that riskiness and insurance ownership is positively correlated while the theory of advantageous selection postulates that riskiness and risk aversion are negatively correlated. In the health insurance market, evidence of both adverse selection and propitious selection have been observed. Evidence of adverse selection has been found in the U.S. market (Browne & Doerpinghaus, 1993; Cutler & Zeckhauser, 1998; Cutler & Reber, 1998); in the Canadian market (Dahlby, 1983); and in the Iranian market (Hadad & Anbanji, 2010). Cutler, Finkelstein, and McGarry (2008) studied the relationship between insurance purchases and risk behaviours in five different insurance markets and found adverse selection is more likely to be present in the health insurance market. Other

studies suggested adverse selection might not be present in the markets studied, leading to support for propitious selection (Buchmueller et al., 2013; Cawley & Phillipson, 1999; Chiappori & Salanie, 2000; Cardon & Hendel, 2001; Fang, et al., 2008; Finkelstein & McGarry, 2006; Wang, Huang & Tzeng, 2009; Olivella & Vera-Hernandez, 2013). Evidence of the negative correlation between riskiness and risk aversion has been found in the long-term care insurance market (Finkelstein & McGarry, 2006) and in Medigap insurance (Fang et al., 2008) although the authors in the latter study emphasized selection was due to higher "cognitive ability". More recent evidence has been found in private health insurance in the UK (Olivella & Vera-Hernandez, 2013) and in Australia (Buchmueller et al., 2013).

Buchmueller et al. (2013) suggested the reason for no evidence of adverse selection in some studies was asymmetric information that was central to the study of insurance markets was not empirically important or because of the presence of other information such as risk aversion that was not used in setting the prices. Their argument was consistent with DeMeza and Webb (2001) who justified that there is a positive correlation between insurance purchase and precautionary activity where cautious individuals not only buy more insurance but also put more efforts into limiting risk exposure. DeMeza and Webb (2001) cited an example where 4.8 per cent of credit cards were lost or stolen every year in the UK and only 2.7 per cent of insured credit cards were lost.

Buchmueller et al. (2013) tested the presence of propitious selection in a market with strong form of asymmetric information. The Australian health insurance market is highly regulated with restrictions on using observable risk factors to select insureds.

Under this community rating requirement, the same premium will be charged for an insurance plan regardless of age, gender, or health status. Using two national household surveys, the study documented that adults with private hospital care insurance are better in self-reported health status and have lower hospital utilisation compared to those without insurance. Combining with another data set, Buchmueller et al. (2013) found the majority of the respondents who also reported slightly better health than those without health insurance cited risk aversion as the reason for buying health insurance. The study suggested the presence of propitious selection where individuals who purchase health insurance are risk-averse and at the same time are less likely to utilize healthcare.

In their study involving individuals who own long-term care insurance, Finkelstein and McGarry (2006) noted two types of individuals whose preferences were not known to insurers - those who believe that they would use more care, and those who prefer more insurance. They found that the first group had more than average use of nursing care and the second group had less. According to the authors, the second group was wealthier and willing to invest in preventive health activities. While the first group was more likely to be adversely selected, the second was more akin to propitious selection. Such offsetting equilibrium is in contrast to the standard prediction that individuals who own more insurance are more likely to be of higher risk.

The mixed evidence of adverse selection suggests that the selection of insureds in certain markets may be effective. Another reason is the presence of unobservable factors related to the risk preference of individuals (Buchmueller et al., 2013). The

negative correlation between risk level and risk aversion suggests that individuals who are more risk-averse are more likely to take precautions to reduce risk of loss, including spending on insurance. The presence of propitious or advantageous selection suggests that the effects of adverse selection are offset by healthier and risk-averse individuals buying insurance.

2.4 Risk Factors Used in Underwriting of Medical and Health Insurance

Underwriting is the process of assessing and classifying the degree of risk of an application for a specific insurance coverage and making the decision whether to accept the risk. In the process of underwriting, underwriters of health insurance will focus their attention on the factors that will make up the picture of the client's current health. These are the factors that increase the likelihood that the proposed insured will suffer loss such as ill health, disability, disease or death. According to Hamilton (2003), the identification of these risk factors and the quantification of their effects is a critical stage in the process of making accurate decisions in underwriting.

The World Health Organisation (WHO) defines risk factor as "any attribute, characteristic or exposure of an individual that increases the likelihood of developing a disease or injury". Being overweight, smoking and consuming alcohol are examples of risk factors. Risk factors are not necessarily the cause of ill health but these factors are correlated with negative outcomes. Risk factors can range from family background to broad environmental conditions. The Australian Institute of Health and Welfare (AIHW) categorises risk factors as behavioural, biomedical, environmental, genetic, and demographic. Risk factors may be classified as modifiable and non-

modifiable where factors such as age, gender or family history cannot be changed, whereas behavioural risk factors such as cigarette smoking, alcohol use, physical inactivity, poor diet and biomedical risk factors including excess weight, and high blood pressure can be modified using effective intervention and change of lifestyle. Previous studies also categorised behavioural risk factors as risk preference factors. Risk preference is the tendency to choose between higher or lower risk. An individual who understands the consequences of smoking may choose to continue or stop smoking depending on their risk preference.

Insurance companies identify risk factors used in underwriting from three main sources: the proposal form/application; external information; and internal information. Each insurer will decide which combination of information is necessary to evaluate applications and set premium rates. Bickley, Brown, Brown, and Jones (2007) identified 10 factors that need to be evaluated for application of medical expense insurance, disability income insurance and long-term care insurance. They are age and sex, health and family history, availability of existing insurance coverage, financial information, occupation, avocation, driving history, alcohol and substance abuse, foreign travel and insurance, and foreign citizenship. However, the underwriting of disability income insurance requires a more detailed review, especially of health history and occupation to avoid adverse selection especially of suspicious behaviour of buying excessive amounts of disability income coverage.

The American Academy for Actuaries (1999) noted that medical history and current physical condition are the most significant factors that influence future medical care. Other important factors include occupation, dangerous sports, foreign

travel, and drugs and alcohol. However family history is not significant in predicting short-term medical cost and therefore not used for medical expenses underwriting.

Jones and Long (1999) listed the primary factors that determine the morbidity risk of individuals as:

a) Age - As people grow older, they are more likely to become ill, and the average duration of illness will be longer and the time to recuperate will increase.

b) Health – current and health history - Many illnesses have the tendency to recur and future illness is strongly affected by past and present illness or injuries.

c) Sex - Females generally have a higher morbidity rate than males of the same age, and the cost of healthcare for females is higher.

d) Occupation - The degree of morbidity depends on the hazards inherent in the occupation. Typically, underwriters will have rating of classes of occupation that range from least hazardous to the most hazardous.

e) Work history - A person's work history with a number of gaps in work records may be associated with poor risk for disability.

f) Habits and lifestyle - A person's habits and lifestyle may present higher degree of risks. These may include recent criminal record, and abuse of drug or alcohol.

The usage of risk factors in the underwriting of health insurance is well established in Malaysia. Table 2.1 is a review of samples of proposal forms. Health insurance providers use very similar risk factors to evaluate applications for health insurance. There could be some variation in the factors but insurers generally request similar information from potential clients.

Table 2.1

Summary of Content of Proposal Form for Underwriting of Medical and Health Insurance

	Underwriting Factors	Company 1	Company 2	Company 3
1	Weight & Height – Changes in the past 6 months	✓	✓	
2	Medical Health – history	✓	✓	✓
	a Told or treated on: Cancer, tumour, cyst	✓	✓	✓
	b Told or treated on the following			
	b1 Cardiovascular system	✓	✓	✓
	b2 Respiratory system	✓	✓	✓
	b3 Digestive system	✓	✓	✓
	b4 Mental health or central nervous system	✓	✓	✓
	b5 Eyes, ears, nose, & speech	✓	✓	✓
	b6 Endocrine system	✓	✓	✓
	b7 Muscles & bones	✓	✓	
	b8 Urinary & reproductive system	✓	✓	✓
	b9 Skin or immune system	✓	✓	✓
	c Told or treated on AIDS, HIV or sexually transmitted disease	✓	✓	✓
	d Female only			
	1 Pregnant?	✓	✓	✓
	2 Pregnancy related complications		✓	✓
	3 Disease or disorder of breast, cervix, uteri, uterus, ovaries	✓	✓	✓
	4 Children suffered from spina bifida, etc.			✓
	e Undergone any investigation/screening tests in the past 5 years	✓	✓	✓
	f Medical treatment/advice – admitted or surgery	✓	✓	✓
	g Personal doctor details		✓	
	h Parents/siblings medical history	✓	✓	
3	Lifestyle			
	a Smoke or use any form of tobacco in the past 12 months. How many sticks per day for how many years	✓	✓	✓
	b Consume alcohol. Type of alcohol and average quantity consumed	✓	✓	✓
	c Non-prescribed Drugs		✓	✓
	d Participation in hazardous occupation, sports or past-time activities	✓	✓	✓
	Personal details (among others)			
1	Occupation - exact duty	✓	✓	✓
	Occupation – class (1,2,3,or 4) based on risk			✓
2	Monthly personal income	✓	✓	✓

Note. From proposal forms of insurance and takaful companies.

Empirical evidence of health insurance underwriting is very limited in Malaysia. Previous researchers explored the demographics and demand for health insurance

(Abu-Bakar, Che Razak & Tolos, 2005; Abu-Bakar et al., 2016b; Abu-Bakar, et al., 2012); the influence of health insurance on healthcare utilization (Abu-Bakar et al., 2016a; Kefeli & Jones, 2012; Samsudin, Jamil & Zulhaid, 2012; Wan-Abdullah & Ng, 2009); and the issue of adverse selection and moral hazard in medical and health insurance (Abdul Rahman & Mohd Daud, 2010; Abu-Bakar et al., 2016a; Kefeli & Jones, 2012). Abu-Bakar et al. (2012) found income, age, gender, race and religion, level of education, job sector and risk attitude influenced the decision to purchase health insurance for salaried individuals. The researchers used data from NHMS 2006. Abu-Bakar et al. (2005) found that income and gender were statistically significant in the decision to purchase health insurance. The researchers collected data through the distribution of questionnaires at hospitals and through one insurance company.

The following section will present an investigation of the medical and health insurance risk factors used in this study. Each of the underwriting classifying factors (age, gender, and smoking behaviour) will be investigated separately and its impact on the ownership of medical and health insurance will be presented. Factors under health status and risk preference will be discussed in detail. As the factors that affect ownership decisions are somewhat related to the types of MHI policies, the discussion will focus on the underwriting of hospitalisation and surgical insurance and how these variables relate to the ownership of health insurance.

2.4.1 Socio-Demographic Variables

Economic and socio-demographic factors have been found to have significant influence on underwriting and the ownership of health insurance. Previous studies

have discussed extensively the factors associated with health insurance ownership. For example, in modelling for health insurance ownership in the UK, King and Mossialos (2005) found that females, individuals above 60 years of age, having secondary and post-secondary education, and having professional or managerial position were variables associated with higher likelihood of having personal health insurance. This study identified three of the factors used by underwriters in making underwriting decisions, namely age, gender, and occupation. An investigation of the association between these underwriting factors with ownership of health insurance will be presented. Foubister et al. (2006), in an analysis on private health insurance subscribers in the UK, outlined a number of characteristics found to be common among subscribers. For example, demand for private health insurance was highest among individuals between the ages of 55-64, the likelihood of ownership was higher among individuals with higher income, higher education (post-secondary school), and higher level of employment status or roles.

In a study to determine the decision to own private health insurance and the decline of private health insurance ownership in Australia over two different periods (1989-1995), Barrett and Conlon (2003) found mixed results concerning the effect of age on the decision to own personal health insurance. Younger individuals were less likely to own health insurance. The likelihood of purchase of private health insurance increased when single individuals reached the age of 50; however, for heads of families, the likelihood of purchase started when they were 45, and for spouses the likelihood of purchase differed by both age and period of study. The same study found that female individuals were more likely to own personal health insurance. Similarities with Hopkins and Kidd (1996) were observed. They had earlier

investigated the importance of various characteristics in influencing the demand for health insurance in Australia and found a number of factors influencing the demand for health insurance, including age, health status, and smoking behaviour. Older age was found to influence to the likelihood of ownership of health insurance and the experience of being admitted into a hospital increased the likelihood of ownership, whereas smokers had a lower likelihood of purchasing health insurance.

In profiling health insurance ownership among women of Kenya, Kimani, Ettarh, Warren and Bellows (2014) found the factors that were associated with health ownership of health insurance included being employed in the formal sector and having attained primary and secondary education; and the likelihood of ownership of health insurance tended to increase with age and household wealth index. Kiplagat, Muriithi and Kioko (2013) studied the determinants of health insurance choice in Kenya and found that age, gender, education level and income had significant effect on the choice of health insurance. In their study, increase in age and increase in the level of education were associated with the likelihood of ownership of health insurance. Being employed was only significantly associated with certain types of health insurance. Males were more likely to own private health insurance whereas females were more likely to choose other types of health insurance, while wealth index was positively related to all types of health insurance.

Kirigia, et al. (2005) conducted a study to determine the factors affecting ownership of health insurance among women in South Africa. They found age, white-collar occupations and being gainfully employed predicted the ownership of health insurance.

In Malaysia, the profile of health insurance policyholders and non-policyholders was presented in the study by Abu-Bakar, et al. (2016b) who found that policyholders were generally younger and were male, and there were no differences in their health and smoking status.

2.4.1.1 Age

Age is the first factor used in the classification of risk for the purpose of setting premium rates. The rate of medical need increases as a person advances in age. According to Society of Actuaries (1981), the rate of premium increases as a person grows older and the rate for the oldest male in an insurance plan could be four times higher than that for the youngest male. It is expected that the tendency to seek care and the use of healthcare services will increase during the later stages of life. A descriptive study by Al-Ghanim (2010) indicated that elderly patients made more visits to all formal healthcare facilities in Saudi Arabia. In the study, 77.6 per cent of elderly patients used health services within a year compared to only 48.9 per cent of younger patients. The Association of British Insurers (2012) provided average index premium based on age band as per Figure 2.1. This indexed price explains how the premium increases in comparison to the premium when age is at 35. For example, an individual aged 60 would pay approximately twice the price paid by someone at age 35.

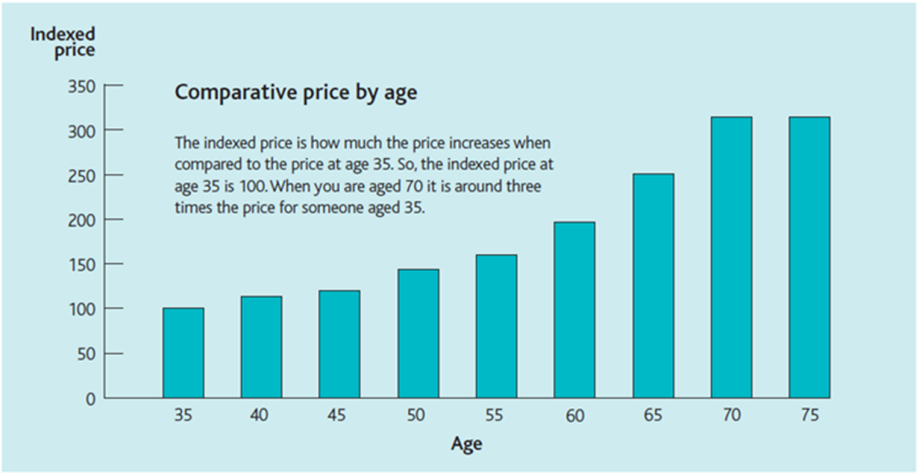

Figure 2.1. Average Index Premium by Age. Adapted from "Are You Buying Private Medical Insurance?". 2012. *Association of British Insurers.*

A number of studies have found that age is significantly associated with ownership of health insurance. For example, Cameron and Trivedi (1991) who studied the determinants of insurance choice between the government Medibank fund and private insurance funds in Australia, found that older individuals who used more health services would be more likely to own private health insurance. A similar situation was observed in the United Kingdom (UK) where Foubister, et al. (2006) noted that the demand for private medical insurance in the UK was highest for older individuals aged 55-64 and lowest for individuals aged 16-24. An earlier study by Wallis (2004) found only 2.7 per cent of individuals in the same age group (16-24) owned private medical insurance in 2001 in the UK. In King and Mossialos (2005), the withdrawal of tax incentive for individuals above 60 did not discourage participants from staying with the health insurance plan suggesting that individuals in that age group placed greater value on the insurance plan than younger individuals.

In the study using comprehensiveness of coverage and actual utilisation as endogenous variables, Resende and Zeidan (2010) found age had positive and significant effect on both comprehensiveness of coverage and hospitalisation. The increased need for medical care increased the likelihood of elderly individuals owning more comprehensive health insurance. A study by Kimani et al. (2014) concluded that as individuals advanced in age, they tended to invest more including for health insurance.

Cardon and Hendel (2001) earlier argued that in a market where health insurance was employer-provided, the demand for health insurance could not be concluded as age sensitive. Similarly, in countries where private healthcare was a substitute and public healthcare was financed by the public sector, as in the case of Malaysia, older age might be a good predictor to ownership of health insurance up to a certain age. Using the Malaysian data, Abu-Bakar et al. (2012) found that age had a significant and nonlinear relationship with ownership of health insurance for salaried individuals. The researchers stated that ownership of health insurance increased with increased age and decreased at a certain age. They suggested that the decrease in ownership might be due to the fact that the premium was higher for older individuals, resulting in a lower take-up rate for this group.

2.4.1.2 Gender

The word “gender” is often used interchangeably with the word “sex”. The average medical cost typically differs between men and women. According to Bickley et al. (2007), the morbidity rate of women is generally higher than that of men of the same age whereas men have a higher mortality rate. Therefore the cost of medical coverage

is generally higher for women than for men. Most health insurers, subject to limitation by the regulators, set different premium rates for men and for women. For example, an insurer may set for younger females a rate 50 per cent higher compared to that for younger males. However, at an older age, the rate for females is 10 per cent lower than that for males. If maternity benefits are included, the rate for females will be 100 per cent higher than that for males (Society of Actuaries, 1981). In a study involving non-pregnant adults, Bertakis, Azari, Helms, Callahan, Robbins (2000) found that women utilised more healthcare services involving higher charges compared to men. On the other hand, Resende and Zeidan (2010) found that women had a stronger likelihood of being hospitalised, in part, due to childbirth procedures. An earlier study in Spain by Redondo-Sendino, Guallar-Castillón, Banegas and Rodríguez-Artalejo (2006) found that for adults 60 years and above, a higher percentage of women visited medical practitioners, took medication and received home medical visits. However, in a study of a takaful (Islamic insurance) provider in Malaysia, Abdul Rahman and Mohd Daud (2010) found that men registered a higher amount of medical claims with a ratio of 2:1. The highest registered medical expenses claims among men were for heart and eye disease.

Cameron and Trivedi (1991) noted that women showed higher propensity for purchasing private health insurance. According to Hopkins and Kidd (1996), the probability of insurance ownership was significantly higher for women. A similar finding was reported by Barrett and Conlon (2003). In contrast, in profiling the health insurance market in the UK, Wallis (2004) found that in 2001 more men were covered by personal health insurance compared to women. Kirigia et al. (2005) found that women with better education, high incomes and living in affluent provinces and

permanent accommodation had a higher likelihood of being insured. In a study to examine the determinants of health insurance coverage among young adults, Gius (2010) found that women were more likely to have health insurance than men. Kiplagat, et al. (2013) studied the determinants of health insurance choice in Kenya found that females of child-bearing age were more likely to own non-private health insurance compared to males who formed the majority without insurance cover. Another study in Kenya by Kimani et al. (2014) found that married women and women living in female-headed households were more likely to own private health insurance. This result is not consistent with an earlier study in Australia by Cameron and Trivedi (1991) who found that the propensity to own health insurance was higher among single women and lower among females living in female-headed households. This may be due to the different family structure in both countries. Women living in female-headed households might have better control over their resources and thus make the decision to enhance/support their own wellness. However, in high-income countries such as Australia, single parent households are usually low-income and thus, the resources may be insufficient for health insurance. In Malaysia, gender is statistically significant in the decision to purchase health insurance (Abu-Bakar et al., 2005; 2012).

As females are less willing to take risks, female individuals are expected to be more likely to own health insurance, as found in a study involving participation of females in sports and a number of other domains (Dohmen, et al., 2005) and according to DeMeza and Webb (2001), highly risk-averse individuals are more cautious and find insurance to be important to prevent potential loss.

2.4.1.3 Occupation

A medical underwriter places more concern on the occupation of an applicant for health insurance than does a life insurance underwriter. This is because occupation brings about a higher morbidity risk than mortality. Health insurance underwriters are concerned with the occupations that bring greater-than-average risk of accident and health hazards.

Depending on the risk level, health insurers will classify occupation into 4 classes with Class 1 for occupations that present few physical dangers and Class 4 for occupations with high injury incident (Bickley et al., 2007). Refer Table 2.2.

Table 2.2
Insurer's Occupational Rating Classes in the United States

Occupational Rating Classes	Definition and Examples
Class 1	• Least hazardous occupation - attorneys, auditors, bookkeepers, pharmacists, admin assistants
Class 2	• Non-hazardous occupation with possible injuries - musicians, laboratory workers, medical technicians, surgeons • Supervisory responsibility in manufacturing plant or construction sites – architects, plant managers, contractors
Class 3	• Blue collar workers • Drivers of passenger of light delivery vehicles
Class 4	• Most hazardous – high incident of injury – boilermakers, structural steelworkers, stevedores
Uninsurable	Exposed to unusual hazards – professional athletes, aerial photographers, divers, underground miners, test pilots

Note. Adapted from *Life and Health Insurance Underwriting* (2nd ed.), by M.C. Bickley, B.F. Brown, J.L. Brown, and H.E. Jones. 2007. Georgia: LOMA

The American Academy of Actuaries (1999) however suggested that occupation was a more important factor in the decision for life insurance and disability income than for medical expenses insurance. The investigation on occupation was based not just on its importance in underwriting but also in the decision to utilise healthcare services.

Occupation is associated with income and those with better occupations are likely to have a higher wealth index and to be able to spend on health insurance. Buchmueller, et al. (2013) noted that ownership of private health insurance was positively related to employment status and income which enable the spending on health insurance to enjoy reduced waiting time for treatment besides the availability of better amenities such as private rooms. However, an earlier study by Mahdavi and Izadi (2012) who categorised management and technical personnel as individuals with higher income compared with individuals in service and production occupations did not find individuals with higher income level purchased more health insurance.

Studies have categorised occupation in many different ways. Browne and Doerpinghaus (1993) used white collar in their study while Kirigia et al. (2005) categorised occupation as blue collar and white collar. Kimani, et al. (2014) categorised occupation as formal or informal sectors. Other authors categorised occupation by sector (Resende & Zeidan, 2010; Kefeli@Zulkefli & Zaidi, 2013; Olivella & Vera-Hernandez, 2013).

While occupation can be analysed by different categorisations, it however is a predictor to ownership of personal health insurance as in Browne and Doerpinghaus

(1993) who found a positive relationship between white collar occupation and amount of insurance purchase. Similarly, Foubister, et al. (2006) identified occupational status as a predictor variable and those in higher-level occupations or roles were more likely to own private health insurance. Kimani et al. (2014) found that a higher percentage of respondents who owned health insurance worked in the formal sector as compared to those working in the informal sector.

2.4.2 Attitude towards Risk Variables

Individuals have different attitudes towards risks. Dohmen et al. (2005) suggested that attitude towards risk differed according to personal characteristics. In their investigation on the relationship between willingness to take risks and a number of personal characteristics, they found that women were less willing to take risks and age was negatively correlated with willingness to take risks. With regard to investment in insurance, Einav and Finkelstein (2011) suggested that individuals' risk tolerance and the willingness to pay for insurance depended on the privately known probability of loss and willingness to pay the premium.

The health insurance underwriter is concerned with the risk behaviours of insurance applicants. Riskier individuals will affect the choice of policy and the premium that they have to pay. Factors commonly associated with high risk-taking behaviours include tobacco use, use of drugs and alcohol, inactivity, thrill-seeking activities including being involved in extreme sports such as skydiving, rock climbing or bungee jumping.

There are not many studies on how risk aversion influences the decision to own health insurance. In a study using data from the Survey of Household Income and Wealth (SHIW) by the Bank of Italy, Guiso and Paiella (2005) found that the more risk-averse individuals were less likely to own health insurance. Their finding was not consistent with findings on health insurance ownership which suggest the positive correlation between health insurance ownership and risk-aversion, such as that of Buchmueller, et al. (2013) who found that health insurance policyholders stated risk aversion as the reason for purchasing coverage. Similarly, Barsky, Juster, Kimball, and Shapiro (1997) found that individuals who were more risk-averse, who do not participate in risky behaviours such as smoking or drinking, were more likely to have health insurance coverage. According to these authors, the most risk-averse individuals would be willing to pay for health insurance as protection from financial risk even if the premium was high.

According to Anderson and Mellor (2008) there was no one standard choice of proxy and measures for risk preference. They reported of different methods of measuring risk preference which had been used in the past including using hypothetical behaviour, actual behaviour, or self-reported behaviour. Guiso and Paiella (2005) determined risk aversion by means of a lottery-type hypothetical behaviour whereby participants were asked the maximum amount they were willing to pay for a risky asset, a method very similar to Anderson and Mellor (2008), the result of which was discussed earlier. Anderson and Mellor (2008), using a pairing method of lottery choice experiment and actual behaviour in their study, found that risk aversion among individuals as defined in the lottery choice experiment was negatively and significantly associated with being overweight/obese, engaged in

smoking, heavy drinking, and non-use of seatbelt. However, they found insignificant result on driving over the speed limit.

Lifestyle risk factors have been used to proxy for risk preference even though few studies use lifestyle risk factors as proxy for health risk (Sturm, 2002; Musich, Hook, Barnett & Edington 2003; Bertakis et al., 2000). Lifestyle risk factors are habits or behaviours that if not modified will affect health status. Such behaviours include those arising from lifestyle include smoking, drinking alcohol, use of the seat belt, exercise, obesity, and being physically inactive.

Barret and Conlon (2003) used a number of variables to control for behaviours that affected the occurrence of health states. These behaviours were consumption of alcohol, smoking status, weight (body mass) and exercise (low, moderate or vigorous). In their study of the factors reflecting attitudes towards risk, it was found that those who were risk-averse (non-smokers, non-drinkers, active in moderate and vigorous exercise) were more likely to purchase health insurance. Their results on smoking behaviour was consistent with Hopkins and Kidd (1996) who found that smokers had a lower likelihood of purchasing private health insurance.

Smoking and drinking habits have been used to measure risk aversion. Bellante and Link (1981) in a study on public sector employment status used an index to measure risk aversion from questions on smoking and drinking habits, among others. Even though the use of this index to proxy risk aversion can easily be criticized, it had been used by Feinberg (1977) in a study that hypothesized a more risk-averse

individual would have a shorter expected duration of unemployment. In both studies, the index of risk aversion used performed as predicted by the theory.

2.4.2.1 Smoking Behaviour and Alcohol

Smoking behaviour and drinking alcohol are often used together in the measure of attitude towards risk. Each of these factors is associated with specific health problems. For example, according to OECD (2011) tobacco consumption still remains the leading cause of early death. Life and health insurance underwriters consider alcohol abuse and alcoholism as factors that will increase mortality and morbidity risks and the extent of consumption of alcohol will risk participants being rated or denied coverage. Evidence that the proposed insured had abused alcohol in the last five years might result in declination of coverage (Bickley et al., 2007). According to the American Academy of Actuaries (1997) drug abuse or alcohol could place individuals under the high-risk category which could cause them to be uninsurable. Due to the magnitude of illness that is contributed through smoking and drinking, insurance companies typically charge additional premium for smoking and alcoholic behaviour.

Smokers and drinkers have different tolerance for risks on different domains. In the measure of employment status, Dohmen et al. (2005) found that smoking had a strong and positive impact on the willingness to take risk in general and greater on health matters. However, there is no association between smoking and financial matters. Bellante and Link (1981) found that risk-averse individuals were expected to seek employment in the public sector due to its stability. Barsky, et al. (1997) found

that in general, current smokers were more risk-tolerant than those who did not smoke and individuals who drank were more risk-tolerant than those who did not drink.

An individual's risk tolerance is associated with ownership of health insurance. Kirigia et al. (2005) found that alcohol, smoking, and use of contraceptives had significant influence on ownership of health insurance. The use of contraceptives and alcohol both had negative coefficient with demand for health insurance, implying that people who drink alcohol were less likely to own health insurance. The authors suggested that the use of contraceptives might not be linked to risk aversion. Smoking however was positively related to demand for health insurance. Their result on smoking was consistent with Wallis (2004) who suggested that smokers had lower probability of purchasing private health insurance. Kiplagat et al. (2013) found that those who were less risk-averse such as those who smoked were less likely to own health insurance. The result supports an earlier study by Hopkins and Kidd (1996) who found that smokers had lower probability of purchasing private insurance and Buchmueller, et al. (2013) who found negative correlation between smoking and health insurance and other insurances including life, home content and motor. However, a study in Malaysia using NHMS 1996 survey data by Kefeli and Jones (2012) found smoking to be positively related to ownership of health insurance. Perhaps, despite having to pay higher premium for health insurance, smokers may find the value of peace of mind in the assurance of healthcare in a timely manner greater than the value of premium paid.

Studies on the prevalence of alcohol usage in Malaysia are limited. Few studies have attempted to document drinking behaviour among Malaysians from different

perspectives. Tan, Yen, and Nayga (2009) studied alcohol purchase decisions and expenditures while Cheah (2014) studied the socio-demographic factors affecting the decision to consume alcohol. In the same year, Abdul Mutalip, Kamarudin, Manickam, Abd Hamid and Saari (2014) profiled the current drinker and risky alcohol-drinking pattern among Malaysians. None of these studies however related drinking with health insurance ownership.

Even though there are many studies that have used both smoking and alcohol as factors associated with health risk, the use of the variable alcohol in a study in the Malaysian context may be subject to argument. Abdul Mutalip, et al. (2014) noted that the overall prevalence of alcohol use among the population could be diluted because alcohol use among ethnic Malays who form the majority of the population was uncommon due to religious prohibition. For the same reason, it was not unexpected when Tan, et al. (2009) excluded Malays in their study on alcohol consumption in Malaysia. Based on these factors, alcohol is not deliberated as a proxy to attitude towards risk.

2.4.2.2 Inactivity

The lack of physical activity has been documented to be associated with cardiovascular disease and other health conditions. Pietiläinen, et al. (2008) found that lack of physical activity strongly predicted obesity and abdominal obesity. Many studies including that by Hong, Coker-Bolt, Anderson, Lee and Velozo (2016) have confirmed that physical activities lowered the risk of being overweight. Other than being overweight, WHO stated that the risks of lack of physical activity include 6 per cent of global mortality, 21–25 per cent of breast and colon cancers, 27 per cent of

diabetes and approximately 30 per cent of ischaemic heart disease. In a study on obesity in Europe, Ekelund, et al. (2015) found that inactivity was responsible for twice the number of deaths compared to obesity. From the financial perspective, a study conducted in Australia in 2007 found that 9 million Australians did not do enough physical activity on a daily basis and that had cost Australia 1.5 billion a year in healthcare services and caused higher risks among Australians of coronary heart disease, stroke, Type 2 diabetes, breast cancer, colon cancer, depression symptoms, and falls (Medibank, 2007). In Malaysia, a study on physical activity pattern reported that only 14 per cent of the population had adequate exercise. The population spent 74 per cent of the time in a day on sedentary activities, 15 per cent on light intensity activities and 10 per cent on rigorous activities (Poh, et al., 2010). A more recent study by Häußler (2014) confirmed earlier studies that BMI and inactivity influenced visits to medical practitioners and hospitalisation.

Physical activity has been used to proxy for risk aversion. Barret and Conlon (2003) used exercise as a proxy behaviour for attitude to risk besides consumption of alcohol, smoking status, and body mass. The findings of Anderson and Mellor (2008) that risk-averse individuals were less likely to be overweight suggested that individuals who exercised were more likely to be risk-averse. This finding however did not support an earlier study by Dohmen, et al. (2005) who used general and lottery-like questions to determine individual willingness to take risk and applied the risk attitude on a number of context specific behaviours including sporting activities. In the study by Dohmen, et al. (2005) it was found that female individuals who were generally risk-averse were less likely to participate in sports activities compared to men.

Therefore, as suggested by Barret and Conlon (2003), physical activity fulfilled the criteria for measuring attitude to risk as the presence or non-presence would have impacted on the probability of future health state and the demand for access to health-care services.

2.4.3 Health Risk Level

The health history of a proposed insured is a factor that the health insurance underwriter pays close attention to before issuing a policy. The focus will be on the impairments that may result in future healthcare expenses. The family health history may provide additional information on the proposed's insured health status because many health conditions are genetically-related. The health status of an insured will determine the amount of premium.

Individual healthcare expenses are derived by analysing medical claims data. However, in the absence of claims information, self-reported healthcare utilisation may be used as proxy for financial outcomes (Short, et al., 2009). Therefore, it can be reasoned that individual risk level is associated with the frequency of utilisation of healthcare services.

The influence of health status on the decision to purchase private health insurance has been discussed previously. Studies have shown mixed results regarding the influence of health risk that affect utilization and the likelihood of having private insurance coverage. Browne (1992) found that low-risk individuals purchased less private health insurance. Sanhueza and Ruiz-Tagle (2002) found that people who

were enrolled in private health insurance plans were more likely to demand health services. Barrett and Conlon (2003) found that health status was a significant determinant in the purchase of private health insurance. They found that individuals who rated their health status as poor and fair were less likely to own personal health insurance compared to individuals who rated themselves as having good health status. Their result was supported by Wallis (2004) who found that more people with excellent health purchased private health insurance compared to individuals with poor health. Gius (2010) found that individuals who did not spend much on healthcare (good health status) were more likely to own health insurance. Similarly, Buchmueller et al. (2013) found adults with health insurance had lower utilisation of healthcare compared to individuals without private health insurance. Kirigia et al. (2005) however found that the ownership of health insurance was more likely to be low for individuals who were of excellent, very good or good health. In Malaysia, using 1996 survey data, Kefeli and Jones (2012) found that the decision to buy private health insurance was not influenced by health condition.

Health risk level has been measured differently by previous different authors. Musich, et al. (2003) used five biological risks and three lifestyle risks to measure three levels of risks – low, medium, and high levels of health risk. Cutler, et al. (2008) used admission to a hospital in the last two years to measure occurrence of risk. Grunow and Nuscheler (2014) cited self-assessed health status, objective health, and healthcare utilisation as qualified measures of health.

a) Self-assessed health status (SAHS)

SAHS is a common measure of the overall health risk level of an individual. Typically, individuals are required to rate themselves on their perceived health condition. The rating can be from very poor health status to excellent. The self-reported health state (excellent, good, fair, poor) has been used by Cardon and Hendel (2001). Kirigia et al. (2005) used 5-level SAHS: excellent, very good, good, fair or poor as the measure for health risk. Barrett and Conlon (2003) used specific health conditions other than self-reported health of good, fair, and poor. Similarly, Gius (2010) used self-reported health where health status was measured by very good health and otherwise. Buchmueller et al. (2013) used self-reported health (fair or poor) and a number of long-term health conditions in the measure of health risk level. Self-reported health status was found to be a good predictor of the number of physician contacts (Miilunpalo, Vuori, Oja, Pasanen & Urponen, 1997).

b) Objective health

Objective health is the individual health status based on tests and observation by others such as doctors. Objective health is measured by the existence of diseases. A number of chronic conditions were used in the study by Cameron, Trivedi, Milne and Piggott (1988). Musich et al. (2003) used eight individual risks selected from Health Risk Appraisal in Australia which combined both lifestyle risks and biological risks to determine the health risk level. The risks considered were lifestyle risks (smoking, physical activity, alcohol use) and health/biological risks (blood pressure, cholesterol, weight, medical problems, absent due to illness). According to Musich et al. (2003), high-risk is when an individual was suffering from one of the chronic diseases.

c) Utilisation of healthcare

An individual's healthcare utilisation is an indicator of the presence of illness. The utilisation of healthcare can be measured in several ways. Donham, Sensenig, and Heffler (1995) used the number of inpatient days and the average of an adult's length of hospital stay while Buchmueller et al. (2013) used inpatient stay (last 12 months), inpatient nights (last 12 months) and GP visits (last 2 weeks) as the measure for healthcare utilisation.

2.4.4 Controlled Variables

The influence of income and education on the ownership of health insurance has been discussed in a number of earlier studies. Many studies found that income had significant and positive effect on the ownership of health insurance coverage: Resende and Zeidan (2010) in Brazil, Nguyen and Leung (2010) in Vietnam, and Kimani et al. (2014) in Kenya. Nguyen and Leung (2010) found that increased wealth motivated individuals to purchase private health insurance instead of reliance on compulsory insurance. An earlier study in Australia by Cameron and Trivedi (1991) found that education had strong influence on health insurance ownership and coverage even when controlling for income, suggesting that besides greater awareness, higher potential income from education increased the likelihood of ownership. In South Africa, Kirigia et al. (2005) found that education was a significant predictor of health insurance among women. Making the decision on personal health insurance requires higher cognitive ability. Buchmueller et al. (2013) used three proxies for cognitive ability, namely language proficiency, mental health (level of distress), and education. The study found that individuals were less likely to own health insurance if they spoke languages other than English at home, had higher

level of distress, and lower level of education. In Malaysia, researchers also found the association of income and education level with ownership of health insurance (Abdul Rahman & Mohd Daud, 2010; Abu-Bakar et al., 2005; 2012; Kefeli and Jones, 2012). These variables, income and education level, will be used as control in the analysis of ownership of health insurance.

2.5 Chapter Conclusion

In this chapter, the relevant theories in health insurance selection and the problems associated with selection of insureds were discussed. Generally, the asymmetric information theory proposes that imbalance in information can cause inefficient outcome. In the health insurance market, the inefficiency occurs during the pricing of health of insurance products to match with the risk of the insured. While the presence of asymmetric information theory suggests the problems of adverse selection, the theory of propitious selection provides a contrasting view which can offset the problem of adverse selection. Both theories are compared in the section that follows.

The chapter provides the discussion on ownership of health insurance and the selection factors used in the study and the empirical evidence guiding the selection of the independent variables that are relevant for use in the study. Table 2.3 provides a summary of the main explanatory variables and the corresponding literatures supporting the use of the independent variables.

Table 2.3
Main Independent Variables and Supporting Literatures

S/N	Variable	Author/Year	Results	Statement
1	Age	Cameron and Trivedi (1991)	+ve	Older individuals who use more health services are more likely to own private health insurance.
		Hopkins and Kidd (1996)	+ve	Both age and frequency of hospitalization and doctor visits increase the likelihood of having health insurance.
		Barrett and Conlon (2003)	+ve	Ownership of health insurance is positively related with age and the likelihood increases at age 45 for head of family and 50 for single individuals.
		Kirigia et al. (2005)	+ve	Increase in age is associated with likelihood of being insured.
		King and Mossialos (2005)	+ve	Demand for private health insurance increases as individuals get older and become more concerned about being able to access healthcare.
		Foubister, et al. (2006)	+ve	Demand for PMI is concentrated among individuals aged 55-64.
		Resende and Zeidan (2010)	+ve	As the need for medical care increases among elderly individuals, the likelihood to own more comprehensive health insurance increases.
		Abu Bakar, et al. (2012)	+ve	Age has significant and nonlinear relationship with ownership of health insurance for salaried individuals.
		Kimani, et al. (2014)	+ve	The probability of having health insurance tends to increase with age as the tendency of older individuals to invest more including in health insurance increases.

Table 2.3 (Continued)

S/N	Variable	Author/Year	Results	Statement
2	Gender	Cameron and Trivedi (1991)	Women	Women show a higher propensity to purchase private health insurance.
		Hopkins and Kidd (1996)	Women	The probability of insurance ownership is significantly higher for women.
		Barrett and Conlon (2003)	Women	Women have a higher propensity to purchase health insurance.
		Wallis (2004)	Men	There is a relationship between men and the purchase of private health insurance.
		Kirigia et al. (2005)	Women	Women with better education, high incomes and living in affluent provinces and permanent accommodations have a higher likelihood of being insured.
		Gius (2010)	Women	Men are less likely to have health insurance than women.
		Abu Bakar et al. (2012)	Women	Women are found to be more likely to own health insurance.
		Kiplagat and Muriithi (2013)	Women	Women especially at the child-bearing age demand more medical services and are hence more likely to purchase insurance cover.
		Kimani et al. (2014)	Women	Women living in female-headed households are significantly more likely to be insured.
3	Occupation	Browne and Doerpinghaus (1993)	White collar +ve	A positive relationship exists between a white collar job and amount of insurance purchase.
		Foubister et al. (2006)	Occupa-tional Status	Individuals with high level occupation or roles are more likely to have private health insurance.

Table 2.3 (Continued)

S/N	Variable	Author/Year	Results	Statement
		Buchmueller et al. (2013)	Employ-ment status	Employment status is positively related to ownership of private health insurance.
		Kimani et al. (2014)	Formal	Being employed in the formal sector is associated with having health insurance.
4	Attitude towards risk	Hopkins and Kidd (1996)	Smoking (-ve)	Smokers have a lower likelihood of purchasing private health insurance.
		Barrett and Conlon (2003)	Smoking (-ve)	Smokers are less likely to own private health insurance.
			Drinking (-ve)	Those with drinking behaviour are less likely to purchase health insurance.
			Exercise (+ve)	Active individuals are more likely to purchase health insurance. However, the result is mixed according to types of exercise for individuals and families.
		Wallis (2004)	Smoking (-ve)	Smokers have a lower probability of purchasing private health insurance.
		Kirigia et al. (2005)	Smoking (+ve)	Smokers are more likely to own health insurance.
			Alcohol (-ve)	Individuals who drink alcohol are less likely to own health insurance.
		Kefeli and Jones (2012)	Smoking (+ve)	Smokers are more likely to own health insurance.
		Buchmueller et al. (2013)	Smoking (-ve)	Smokers are less likely to own health insurance.
		Kiplagat and Muriithi (2013)	Smoking (-ve)	Individuals who smoke are less likely to own health insurance.

Table 2.3 (Continued)

S/N	Variable	Author/Year	Results	Statement
5	Health Risk Level	Browne (1992)	+ve	Low-risk consumers purchase less insurance.
		Barrett and Conlon (2003)	-ve	Negative relationship exists between health risk status and likelihood of holding insurance.
		Wallis (2004)	-ve	More people with excellent health purchase private health insurance compared to individuals with poor health.
		Kirigia et al. (2005)	+ve	Individuals who are in excellent, very good, or good health are less likely to own health insurance.
		Kefeli and Jones (2012)		The decision to buy health insurance is not influenced by health condition.
		Buchmueller et al. (2013)	-ve	The majority of health insurance policyholders are in good health status.

The findings of the empirical studies presented on the central issue of the relationship between health risk factors, attitudes towards risk and ownership of health insurance are mixed, prompting further investigation. While most of the evidence is centred in the U.S., the experiences of other countries including the OECD, African and Asian countries including Malaysia are discussed. There are common factors that are used to select insureds in all countries but there are countries that provide some flexibility for insurers to decide on the factors.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents the theoretical framework and the methodology employed in this study. The first section outlines the research model and defines the independent variables with their respective reference sources, followed by a detailed development of the hypotheses. The next section details the measurement of variables and the statistical analysis applied in this research.

3.2 Research Framework

The theories and literatures discussed in Chapter Two motivate the development of the health insurance underwriting risk model used for this study. The theoretical framework that constitutes the risk factors in the selection of insureds is presented in Figure 3.1.

3.2.1 Theoretical Model

The theoretical framework of the study aims to explain how insurance ownership, risk level, and risk preference are interrelated in the market of health insurance. Figure 3.1 illustrates the relationship between the dependent and independent variables.

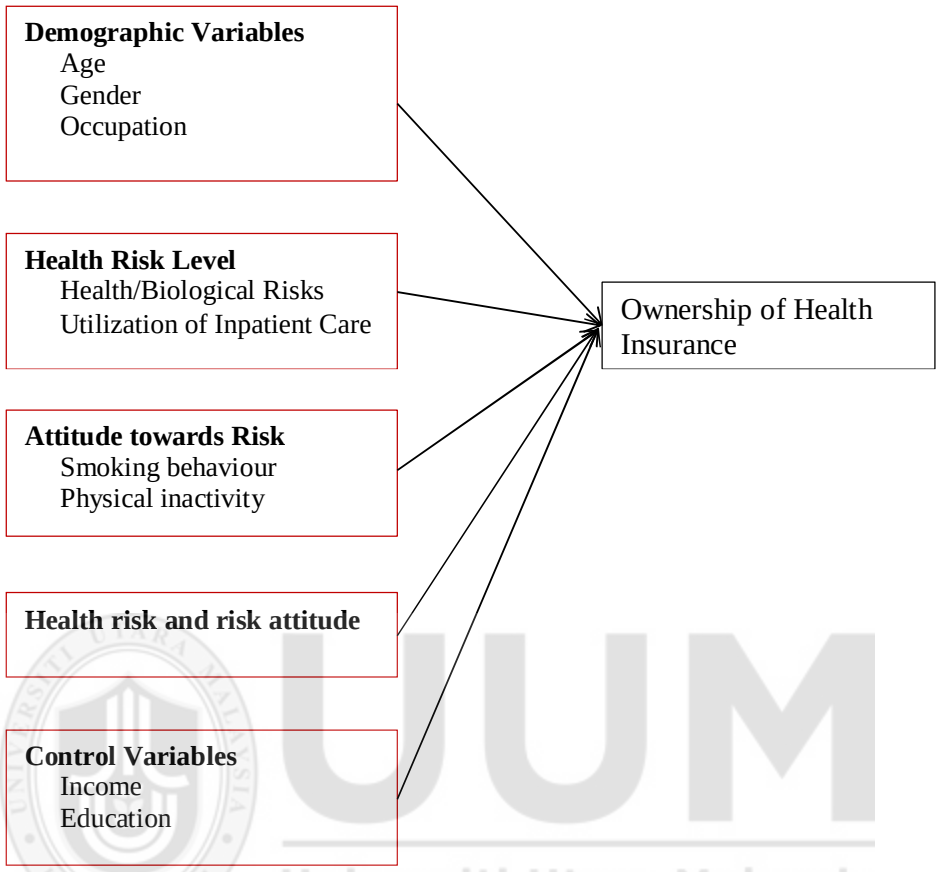

Figure 3.1. Conceptual Model of Risk Factors Influencing Ownership of Private Health Insurance.

The dependent variable in the study is ownership of health insurance. It is a binary discrete variable that specifies whether an individual in the study owns health insurance (1) or does not own health insurance (0) which provides cover for medical expenses.

The independent or explanatory variables were classified into five groups. The first group comprised demographic and socio-economic variables of age, gender, and

occupation. The second group in the explanatory variables provided information on the health condition. The third group listed the risk behaviour of the respondents. The fourth combined the health condition and risk behaviour, and the final group was the control variables.

3.2.2 Empirical Estimation

The current study is to analyse the dichotomous outcome of whether the respondents own health insurance Y=1 or do not own health insurance Y=0 was able to be explained by the explanatory variables consisting of categorical (example: gender, occupation, education, race), ordinal (example: health risk level, attitude towards risk), or continuous variables (example: age).

This model was analysed using logistic regression technique. In this type of study where the dependent variable is binary, descriptive statistics and the use of logit model is appropriate. For the bivariate analysis, Pearson's Chi-square test was used to test the association between explanatory variables and health insurance ownership.

The relationship between variables was estimated using logistic regression techniques and the relationship was as follows:

Log [odds(y=1)] = Logit (Π) =

$$y_i = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \beta_3 X_{i3} + \beta_4 X_{i4} + \beta_5 X_{i5} + \ldots + \ldots e \quad (1)$$

where,

y = 1 = own health insurance

y = 0 = do not own health insurance

Π = the probability of owning health insurance

β = coefficients / scalars

X = regressors / predictors

3.2.3 Hypotheses

The following hypotheses were formulated to answer the research questions. The hypothesised relationship is as shown in Table 3.1. The directions of the relationship are based on the findings from previous literatures as summarized in Table 2.3.

Table 3.1

Hypothesised Relationships between Dependent Variable (Health Insurance Ownership) and Independent Variables

Independent Variable	Effect on Probability of Ownership Health Insurance
Gender	Female +
Age	Older +
Occupation	+
Attitude towards risk	Risk-Averse +
Health risk level	+
Low-health risk and high risk aversion	+

Hypothesis 1: Older individuals are more likely to own health insurance

Previous studies have found age to be a significant determinant in health insurance ownership and that older individuals are more likely to own health insurance (Cameron & Trivedi, 1991; Hopkins & Kidd, 1996; Barret & Conlon, 2003; King & Mossialos, 2005; Foubister, et al., 2006; Resende & Zeidan, 2010; Abu-Bakar et al., 2012; and Kimani et al., 2014).

Grossman (1972) proposed that health is a capital stock that produces output of healthy time and this stock of health will depreciate with age. In order to improve health stock, older individuals are to invest more in their health to reduce the rate of health status depreciation. Based on the need for healthcare, it is not surprising that the demand for private medical insurance in the UK was highest for individuals aged 55-64 (Foubister, et al., 2006) and lowest among the individuals aged 16-24 (Foubister, et al., 2006; Wallis, 2004). Similarly, in Australia, personal health insurance is more likely to be subscribed by older individuals (Barret & Conlon, 2003). Based the literatures, it is hypothesized that older individuals are more likely to own health insurance.

Hypothesis 2: Female individuals are more likely to own health insurance compared to male individuals

Women have been associated with higher health risk and demand more medical services especially at child-bearing age (Bertakis et al., 2000). Current underwriting practices have resulted in higher health insurance premium rates for women due to their higher morbidity as compared to men (Bickley et al., 2007). Despite this fact, most previous studies have found that women or women as heads of families are more likely to own health insurance compared to men (Cameron & Trivedi, 1991; Hopkins & Kidd, 1996; Barrett & Conlon, 2003; Kirigia et al., 2005; Gius, 2010; Abu-Bakar et al., 2012; Kiplagat et al., 2013; and Kimani et al., 2014). They are more likely to own health insurance due to their risk aversion (Dohmen et al., 2005). Therefore, it is hypothesized that female individuals are more likely to own health insurance.

Hypothesis 3: Occupation is associated with the likelihood of owning health insurance

Certain occupations are categorized as at a higher than average risk exposure level. Individuals in higher-risk occupations are more likely to own health insurance as protection against possible medical expenditure due to illness or injury from their occupation. The health insurance industry has grouped occupation into rating classes based on the degree of risks of the occupation (Bickley et al., 2007).

The NHMS 2011 however does not categorise occupation based on exposure to risks. Occupation is categorised as the sector employed, namely as government employee, semi-government employee, private sector employee, self-employee, unpaid worker, homemaker, and retiree.

The study by Browne and Doerpinghaus (1993) found positive relationship between white collar occupations and the amount of insurance purchase. Foubister et al. (2006) in an analysis of private health insurance subscribers noted the relationship between employment status and roles and ownership of private health insurance. Similarly, Buchmueller, et al. (2013) found that employment status is positively related to ownership of private health insurance. In another study, Kimani et al. (2014) found that being employed in the formal sector is positively related to ownership of private health insurance.

Based on the previous studies and the fact that individuals in higher-risk occupations may have higher needs for health insurance to financially protect them from possible medical expenditure due to illness or injury from the occupation, this

study hypothesizes that an individual's occupation is associated with the likelihood of owning health insurance.

Hypothesis 4: Individuals who are risk-averse are more likely to own health insurance

Individuals who are risk-averse are expected to engage in behaviours that promote a healthy and safe lifestyle. Such behaviours may include not smoking, not consuming alcohol, regularly doing physical exercise or practising safe behaviour during driving or during riding of motorbikes.

Previous authors have studied the relationship between attitudes towards risk and ownership of health insurance using behavioural factors. Kirigia et al. (2005) for example, analysed the behaviours of using contraceptives and alcohol consumption and found that people who use contraceptives and drink alcohol are less likely to own health insurance. Similarly, Barrett and Conlon (2003) found other risk behaviours such as physical exercise and alcohol to be positively associated with health insurance ownership while Anderson and Mellor (2008) reported that using the seat belt is positively associated with health insurance ownership.

Other studies use smoking behaviours as a proxy for risk attitude in which non-smokers are considered risk-averse individuals. Most studies found that smokers are less likely to own health insurance (Hopkins and Kidd, 1996; Barret & Conlon, 2003; Wallis, 2004; Kirigia et al., 2005; Buchmueller, et al., 2013; and Kiplagat & Muriithi, 2013).

On the contrary, in their study using NHMS 1996 data, Kefeli and Jones (2012) found a positive correlation between smoking and health insurance ownership. With the exception of Kefeli and Jones (2012), other studies found positive relationship between risk attitude and health insurance ownership. Thus this study hypothesizes that individuals' risk aversion is positively related to the ownership of health insurance as more studies have recorded positive relationship.

Hypothesis 5: There is a relationship between individuals' health risk level and the likelihood of owning health insurance

Individuals' health status is an important determinant for achieving a better life. Individuals with higher health risk level are assumed to have bad health status and incur higher medical cost (Musich et al., 2003) and most likely to be in need of health insurance to cover potential medical expenditures. Studies by Browne (1992) and Kirigia et al. (2005) found that the demand for health insurance is low for individuals who have excellent, very good, or good health. However, Barrett and Conlon (2003) and Wallis (2004) found that individuals having low health risk are more likely to own health insurance. Similarly, Buchmueller et al. (2013) found that the majority of health insurance policyholders in their study are in good health status.

As previous studies offered mixed results on the effect of health risk level on ownership of health insurance, this study hypothesizes that individuals' health risk level is associated with the likelihood of owning health insurance. The findings shall support the theory of propitious selection if low health risk individuals are found to be more likely to own health insurance.

Hypothesis 6: Individuals with low health risk and are highly risk-averse are more likely to own health insurance

The propitious selection theory suggests that health riskiness and risk aversion are negatively correlated. Hemenway (1990) postulated that propitious selection is when individuals reduce risk through risk-avoiding behaviours and at the same time buy insurance. Fang, et al. (2008) suggested that advantageous selection is present when there is private information that is positively correlated with insurance coverage (i.e. a risk-averse individual is more likely to own health insurance) and negatively correlated with health risk (i.e. a risk-averse individual is more likely to be in good health). In this study, private information in reference is the risk aversion of individuals which is negatively correlated with health risk level and positively correlated with ownership of personal health insurance.

It was empirically proven in Einav and Finkelstein (2011), Olivella and Vera-Hernandez (2013), and Buchmueller et al. (2013) that highly risk-averse individuals with low level of health risk would remain in the insurance market. Thus, this study hypothesizes that individuals with low health risk and are highly risk-averse are more likely to own health insurance.

3.3 Methods

3.3.1 Data Collection

The data for empirical analysis was extracted from the National Health and Morbidity Survey (NHMS) 2011. NHMS is a nationally representative survey of the population in Malaysia conducted by the Institute for Public Health (IPH). IPH, one of the institutes under the National Institutes of Health, focuses on public health research. The first NHMS was conducted in 1996 and subsequently it was conducted every 10 years. Since 2011, the survey cycle was shortened to every 4 years to ensure availability of timely information for planning purposes.

The NHMS 2011 states three specific objectives:

a. To determine the healthcare demand of the community in Malaysia
b. To determine the risk factors for cardiovascular disease among the adult population
c. To determine the prevalence of other health-related problems

The scope of the study by IPH covers loads of illness, health-seeking behaviour, pattern of utilisation and healthcare cost. The scope for cardiovascular disease risk factors includes the study on nutritional status, physical activity, tobacco use, alcohol consumption, hypertension, hypercholesterolemia, and diabetes. Included in the survey are other health-related problems such as home injury and mental health.

The data of the NHMS 2011 was collected through self-administered questionnaires and interviews. NHMS 2011 covered both urban and rural areas in all states of Malaysia. The sample was selected based on a two-stage stratified sampling design. The first stage was the selection of Enumeration Blocks (EB). In each EB there were 80-120 living quarters (LQ) with an average population of 500-600 people. For the NHMS 2011, a total of 794 EBs (484 urban and 310 rural) were randomly selected from the total EBs in the country. For each EB, 12 LQs were randomly selected making the total 9,528 LQs. The survey team of IPH visited 7,522 LQs and 28,650 individuals were interviewed with response rate of 88.2 per cent and 93 per cent respectively (Institute for Public Health, 2011a). Based on the data collection method and after comparing the estimated population with Census 2010, the sample was representative of the population of Malaysia (Institute for Public Health, 2011b).

A request was made to the Director General of the Ministry of Health of Malaysia to access the raw data from the study. The approval was received in August 2016. The data set was given by the IPH in SPSS format. To ensure originality and avoid duplication, the IPH only released the data to the first researcher who studied a particular area.

3.3.2 Unit of Analysis

The unit of analysis was individuals who were above 18 years of age. This is the minimum age to own private individual health insurance in Malaysia. The total number of respondents aged 18 years and above was 18,231. There was no information whether the health insurance ownership included ownership of takaful. Further discussion on this limitation is presented in Chapter 5.

3.3.3 Measurement

Data management and analysis was performed using SPSS. The summary of the definition of variables used is as shown in Table 3.2.

Table 3.2
Definitions of Variables

Dependent Variables	
Ownership of health insurance	A categorical variable that equals 1 when an individual owns health insurance and 0 when an individual does not own health insurance policy.
Independent Variables	
Age	1 if 18 to 24, 2 if 25 to 34, 3 if 35 to 44, 4 if 45 to 54, 5 if 55 to 64, 6 if 65 and above
Gender	1 if the respondent is Male, and 0 if the respondent is Female
Occupation	1 if Government employee, 2 if Private employee, 3 if Self-employed, 4 if Homemaker/unpaid worker, 5 if Retiree
Education	1 if No formal education, 2 if Primary education, 3 if Secondary education, 4 if Tertiary education
Income	1 if RM1000 and below, 2 if RM1001to RM3000, 3 if RM3001 to RM5000, 4 if above RM5000
Attitude towards Risk	1 if Risk-averse, 2 if Moderate risk-taker, 3 if Risk-taker
Health Risk Level	1 if Low risk, 2 if High risk

3.3.3.1 Health Insurance Ownership

Health insurance ownership was a categorical variable that equalled to 1 when an individual owned personal health insurance and 0 when an individual did not own any personal health insurance policy. The variable ownership of health insurance was

derived from question A2302 of the NHMS 2011 survey where respondents had to answer the following question with a “yes” or “no” answer:

> *“Are you covered by any private personal health insurance plans which you or a family member had purchased?”*

An individual may be covered by other means of payment for receiving health-care such as:

- Government guarantee letter
- Employer-sponsored insurance, panel facilities, or other forms of employment coverage

This study excluded individuals who were under a government guarantee and employer-sponsored health insurance plan. Employer-sponsored health insurance is a policy that is offered to employees as part of employment benefits. Individuals under an employer-sponsored plan do not make the decision to purchase health insurance and the choice of coverage is influenced or decided by the employer.

3.3.3.2 Health Risk Level

Health risk level has been measured differently by previous different authors. For example, Cutler et al. (2008) used admission in a hospital to measure occurrence of risk. In this study health risk level was measured by either good or bad based on two variables, utilisation of inpatient care (admission to a ward) and the self-assessed health status (SAHS).

The first variable was the admission to any ward, the question for which was asked through a dichotomous question which required a “Yes” or “No” answer.

Inpatient visits (any admission to a ward) in the past 12 months measured for health-care service utilisation. Respondents were recorded as 1 = bad (for respondents who utilised inpatient care), and 2 = good (for respondents who did not utilise inpatient care).

The second variable was self-assessed health status (SAHS). Answering SAHS required respondents to state and record SAHS as 1 = very good, 2 = good, 3 = moderate, 4 = not good, and 5 = very bad. SAHS was later collapsed and re-coded into a dichotomous variable: 1 = good comprising very good and good status; and 0 = bad comprising moderate, not good, or bad status. Refer to Table 3.3. This re-coding is consistent with the study by Kirigia et al. (2005), Grunow and Nuscheler (2014), and Semasaka, et al., (2016).

Table 3.3

Old and New Categories of Self-Assessed Health Status (SAHS)

Old categories	New categories
1 = very good 2 = good	1 = good
3 = moderate 4 = not good 5 = very bad	0 = bad

Both (admission to any ward and SAHS) variables were computed to become a single variable which carried “High” or “Low” measurement of health risk level. High health risk level was defined as having at least one “bad” category and low health risk level was when an individual had both variables as “good”. In summary, the categories of health risk are:

- Low Risk : Not having any of the above bad risks (never admitted to a ward and having good SAHS)
- High Risk: Having at least one bad risk, either being admitted to a ward or having bad SAHS

3.3.3.3 Attitude towards Risk

This study adopted the lifestyle risk variables in Musich et al. (2003) as proxy for attitude towards risk. The variables are smoking and physical inactivity. Musich et al. (2003) defined high risk for the two variables as follows:

a. Smoking is defined as current smoker ($\geq$ 1 cigarettes per day)
b. Physical inactivity is being active for less than 60 minutes a week.

The measurement for smoking was based on the question *"Do you currently smoke?"* asked to respondents. Respondents were required to answer "Yes" or "No".

Physical activity was measured by the number of minutes of participation in activities in a week which included walking, moderate-intensity and vigorous-intensity activities as in Ying, et al. (2014). The respondents' weekly duration of physical activity was summed and determined whether it met the recommended duration. To qualify as physically active, an individual has to do either 75 minutes a week of vigorous activity or 150 minutes a week of moderate activity including walking or combination of vigorous and moderate activities.

The World Health Organization (2011) Guideline states that:

"Adults aged 18–64 should do at least 150 minutes of moderate-intensity aerobic physical activity throughout the week or do at least 75 minutes of vigorous-intensity aerobic physical activity throughout the week or an equivalent combination of moderate - and vigorous-intensity activity".

The NHMS 2011 asked two questions for each category of physical activity to determine the number of minutes of activity:

- Vigorous activity
  1. *"In the past 7 days, how many days have you done vigorous physical activity (eg: carry heavy weights, till the earth, aerobic exercises or fast cycling and others) for at least 10 minutes per session?"*
  2. *"On the day you carry out vigorous physical activity, how long do you do this activity?"*
- Moderate activity
  1. *"In the past 7 days, how many days have you done moderate physical activity (eg: carry light weights, mop the floor, or normal rate of cycling and others) for at least 10 minutes per session? This does not include walking."*
  2. *"On the day you carry out moderate physical activity, how long do you do this activity?"*
- Walking
  1. *"In the past 7 days, how many days have you walked for at least 10 minutes per session?"*
  2. *"On one of these days that you walked, how long did you spend walking?"*

Two sets of data (vigorous-intensity and moderate-intensity activities) were available for analysis. Both data sets were combined and computed. Based on the above guidelines, individuals were classified as active or inactive.

In order to have a comprehensive analysis of the effect of the variable attitude towards risk on ownership of personal health insurance, the variables were categorised into three levels as follows:

- Risk-taker (smoking and physically inactive)
- Moderate risk-taker (doing one of the behaviours of smoking and physically inactive)
- Risk-averse (do not smoke and physically active)

3.3.3.4 Demographic Variables

Gender

Male and Female

Age

Age is a continuous variable. For more efficient use and analysis, age was categorised into age groups as follows:

- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65 and above

Occupation

Insurance underwriters classify occupation into classes based on the risk exposure level of the occupations, as follows:

- Class 1: Least hazardous occupation
- Class 2 Non-hazardous occupation & Supervisory responsibility
- Class 3 Blue collar workers & Drivers
- Class 4 Most hazardous
- Uninsurable Exposed to unusual hazards

However, the NHMS 2011 is not categorised by risk exposure but by the employment types, making it impossible to use the category. The NHMS 2011 uses occupational types which include government employee, semi-government employee, private sector employee, self-employed, unpaid worker, homemaker, and retiree. In evaluating policyholders and non-policyholders by occupation, it was found that unpaid workers had a low count of 3. In ensuring that it would not negatively affect the result of subsequent analysis, the occupational categories of homemaker and unpaid worker were combined. Refer to Table 3.4.

Table 3.4
Old and New Categories of Types of Occupations

Old categories	New categories
• Government Employee • Semi Government Employee	• Government Employee
• Private Sector Employee	• Private Sector Employee
• Self-Employed	• Self-Employed
• Unpaid Worker • Homemaker	• Homemaker/ Unpaid Worker
• Retiree	• Retiree

A further regrouping was carried out for government employees and semi-government employees due to the similarity of the sector. With this combination and regrouping, variable occupation was finally categorised into five categories, namely government employee, private sector employee, self-employed, homemaker/ unpaid worker, and retiree. .

Income

Income is a continuous variable and is monthly. For more efficient use, income was categorised into 4 bands, as follows:

- RM 1000 and below
- RM 1001 to RM3000
- RM3001 to RM5000
- Above RM5000

Education

The NHMS 2011 study classifies individual education based on five categories, namely "No Formal Education", "Primary", "Secondary", "Tertiary", and "Unclassified". "Unclassified" is rather ambiguous in definition and for this study and it was grouped together with "No Formal Education". These new categories were more reflective of Malaysian education classification.

3.4 Chapter Conclusion

This chapter starts with a discussion of the theoretical framework that set the grounds of the study and the details of the methods employed. It is followed by the development of the hypotheses to be tested which are based on the theories and empirical findings from literatures. The hypothesized relationships of the variables are presented.

The method section explains the data to be used and the how the variables were to be measured. The measurement of variables was guided by the previous studies with some variation adjusted based on the availability of the data in the NHMS 2011.

The following chapters will focus on the examination of the data; profiling of respondents related to the ownership of personal health insurance; analysing the effect of underwriting factors, health risk and risk behaviours on the ownership of personal health insurance; predicting the factors affecting the likelihood of ownership of personal health insurance policy; and examining the existence of advantageous selection in the health insurance market.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the results of the analyses and a discussion of the findings. The first section provides the descriptive statistics of the respondents who were 18 years old and above. The profile of the respondents is further analysed based on who owned and who did not own personal health insurance according to socio-demographic and underwriting factors of age, gender, occupation, income, education, health risk level, and risk preference behaviour. Results that are presented descriptively in numbers and in percentages to describe the respondents and variables of interest will answer the first research question (Objective 1).

The subsequent sections will present the results of probability of the independence of the distribution of the data and logistic regression. These analyses will address the relationship between underwriting factors, health risk level, and risk preference behaviour of the respondents in relation to ownership of personal health insurance (Objective 2) and whether the presence of advantageous selection is observed (Objective 3). The final section summarizes the results.

4.2 Descriptive Statistics

The total number of respondents in the NHMS survey is 28,498 with 48.3 per cent or 13,757 males and 51.7 per cent or 14,741 females. As the information on health

insurance ownership was only answered by adult respondents aged 18 and above, cases answered by those below 18 were deleted, leaving only 18,231 cases.

Based on the 18,231 cases stated in the previous chapter, a further cleaning of the data was carried out through deleting erroneous and missing data to improve the usefulness for the intended analysis. Finally, only 13,073 cases were included for the analysis after filtering the cases that were covered by employer-sponsored health insurance policies, as has been clarified earlier in the previous chapter. The cases were subsequently computed or dichotomised into new variables as explained in the Methodology chapter. The continuous variables of age and income are presented after being computed into categorical variables.

The sample was made up of almost 94 per cent Malaysians and all states in Malaysia were represented with Selangor having the largest number of respondents, followed by Sabah/Labuan, and Johor. By gender, 55 per cent were female and the majority of the sample (57.1%) were Malays, followed by Chinese, Other Bumiputeras, Indians and Others. The respondents were between the ages of 18 and 107 with mean age of 44 years. More than half of the respondents (62%) were between the ages of 25 to 54 while another 27 per cent were those 55 years old and above. Only 11 per cent were aged 18 to 24.

Almost half of the respondents (45%) had at least secondary education and another 18 per cent had completed tertiary education. The largest groups of respondents worked in the private sector (26.1%) and were self-employed (25.7%), while only 13 per cent worked in the government and semi-government sector

combined. In terms of monthly income from employment, the range was between RM0 and RM50,000 with mean monthly income of RM1,104. The majority of the respondents (66 %) earned below RM1000 while another 27 per cent earned between RM1,000 to RM3,000. A more detailed distribution of the socio-demographics of the respondents is provided in the summary statistics of samples in Table 4.1.

4.2.1 Summary Statistics of Samples

The socio-demographics of the respondents are displayed in Table 4.1 below.

Table 4.1
Distribution of Socio-Demographics of Sample

Variables	Full Sample N=13,073	
	Frequency	**Per cent**
Gender		
Male	5896	45.1
Female	7177	54.9
Race		
Malay	7467	57.1
Chinese	2578	19.7
Indian	954	7.3
Other Bumiputera	1266	9.7
Others	808	6.2
Age Group		
18-24	1431	10.9
25-34	2721	20.8
35-44	2641	20.2
45-54	2741	21.0
55-64	2082	15.9
65 and above	1457	11.1
Minimum age:	18	
Maximum age	107	
Mean Age:	44.27	

Table 4.1 (Continued)

Variables	Full Sample N=13,073	
	Frequency	Per cent
Citizenship		
Malaysian	12251	93.7
Non-Malaysian	822	6.3
Marital Status		
Single	2203	16.9
Married	9644	73.8
Widow/Widower/Divorcee	1226	9.4
Education level		
No formal education	1305	1.0
Primary education	3543	27.1
Secondary education	5908	45.2
Tertiary education	2317	17.7
Occupation		
Government employee	1754	13.4
Private sector employee	3418	26.1
Self-employed	3354	25.7
Homemaker/Unpaid worker	2903	22.2
Retiree	1644	12.6
Income Group		
RM1000 and below	8583	65.7
RM1001 - RM3000	3586	27.4
RM3001 - RM5000	704	5.4
Above RM5000	200	15.2
Minimum income:	0	
Maximum income:	50000	
Mean income:	1104.55	
Admitted to any ward		
Yes	990	7.6
No	12083	92.4

Table 4.1 (Continued)

Variables	Full Sample N=13,073	
	Frequency	Per cent
Self –Assessed Health Status		
Bad	2729	20.9
Good	10344	79.1
Smoking		
Yes	2976	22.8
No	10097	77.2
Physical Activity		
Inactive	3968	30.4
Active	9105	69.6
State		
Johor	1075	8.2
Kedah	788	6.0
Kelantan	954	7.3
Melaka	797	6.1
Negeri Sembilan	722	5.5
Pahang	737	5.6
Penang	782	6.0
Perak	812	6.2
Perlis	803	6.1
Selangor	1629	12.5
Terengganu	876	6.7
Sabah/Labuan	1432	11.0
Sarawak	872	6.7
WP Kuala Lumpur	378	2.9
WP Putrajaya	416	3.2

To compare if the sample used was representative of the population, Chi-square test was conducted to determine if there were significant differences between the respondents and the general population. The population data was adopted from Census 2010 as used in NHMS 2011 analysis (Institute for Public Health, 2011b). The

Chi-square test suggested that there was no statistically significant association between the selected sample and the corresponding population.

Correlations between independent variables were tested using Spearman Correlation. None of the variables were highly correlated. Variables with highest correlation were Age and Marital Status with Pearson $r = 0.557$, $p < .01$.

4.2.2 Variables under Investigation

In addressing the research objectives of profiling individuals with and without personal health insurance and the association with socio-demographic variables and underwriting factors, this section segments the profile of the respondents by ownership of personal health insurance according to socio-demographic factors, focussing on selected underwriting factors, health risk level, and risk preference/attitude. The analysis begins with a summary of the statistics on ownership of personal health insurance. Subsequently, the ownership of personal health insurance was matched with personal and underwriting factors, health status, and risk behaviour to determine significant association between the variables.

4.2.2.1 Ownership of Personal Health Insurance

Table 4.2 summarizes the number of respondents having personal health insurance. A total of 2,461 respondents or 18.8 per cent of the total sample owned personal health insurance. The figure is slightly higher compared to the 18 per cent in 2008 as stated by Institute for Public Health (2008). The other 10,612 or 81.2 per cent did not own personal health insurance.

Table 4.2
Distribution of Personal Health Insurance Ownership

Variables	Full Sample N=13073	
	Frequency	(Per cent)
Own personal health insurance	2461	18.8
Do not own personal health insurance	10612	81.2

4.2.2.2 Profile of Respondents who Own and do not Own Personal Health Insurance

Studies have found that the socio-demographic factors of age, gender, occupation, income, education, and race have significant influence on ownership of personal health insurance.

Each of these factors is associated with different levels of health risks. For example, age has been associated with a higher tendency to seek healthcare and in setting insurance premium, elderly persons would be charged a higher rate. Studies have also found that the morbidity rate of women is generally higher than that of men of the same age. Similarly, certain occupations are often associated with risk of accident and health hazards. Due to the different health risk levels that age and gender have been associated with, both are used in risk-based underwriting of health insurance. In this study, the profile of insureds is as shown in Figure 4.1.

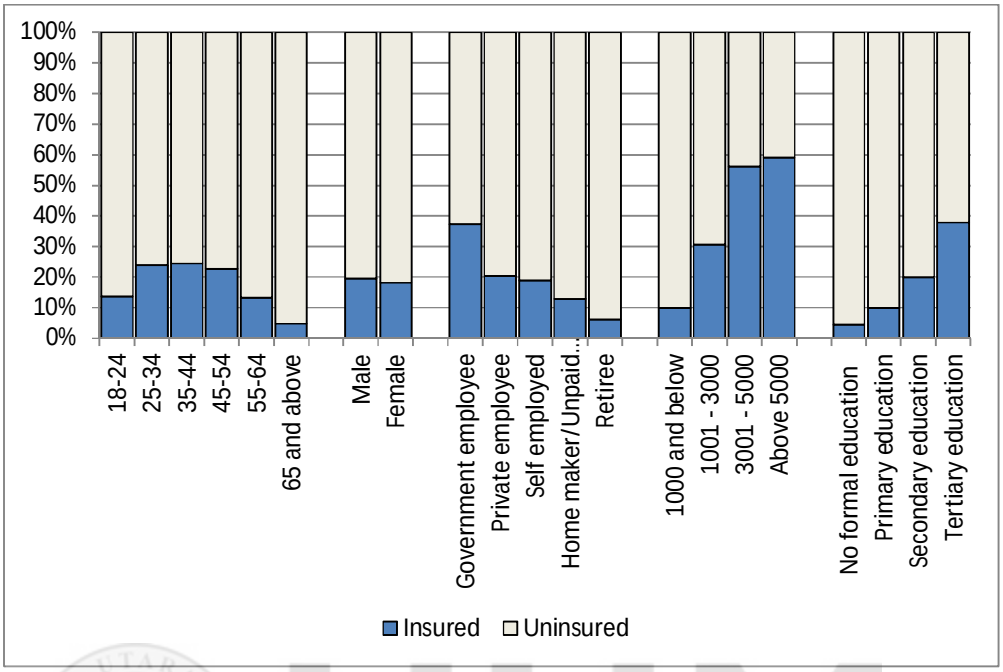

Figure 4.1. Profile of Insureds and Uninsureds.

Age

The subscription to personal health insurance varied between the age groups of the respondents as shown in Table 4.3. In the case of individuals aged 18-24, 13.5 per cent subscribed to personal health insurance compared to 86.5 per cent who did not while for individuals aged 25-34, 23.9 per cent subscribed to personal health insurance compared to 86.1 per cent who did not subscribe. The age group with the largest number of those that subscribed to personal health insurance was the 35 to 44 age group with 24.5 per cent owning personal health insurance while 75.5 per cent did not own personal health insurance. More than twenty per cent (22.6%) of individuals in the 45 to 54 age group subscribed to personal health insurance and 77.4 per cent did not. Lower subscription was seen among individuals aged 55-64 with 13.3 per cent of them having personal health insurance in contrast to 86.7 per

cent being non-subscribers. Respondents aged 65 and above comprised the group with the smallest number of subscribers of personal health insurance; only 4.8 per cent of them owned personal health insurance while 95.2 per cent did not.

Table 4.3
Cross Tabulation and Chi-Square of Personal Health Insurance Policyholders and Non-Policyholders by Age Group

Cross Tabulation Matrix

Age group		Own personal health insurance		Total
		No	Yes	
18-24	Count	1237	194	1431
	Expected Count	1161.6	269.4	1431.0
25-34	Count	2070	**651**	2721
	Expected Count	2208.8	512.2	2721.0
35-44	Count	1993	**648**	2641
	Expected Count	2143.8	497.2	2641.0
45-54	Count	2121	**620**	2741
	Expected Count	2225.0	516.0	2741.0
55-64	Count	1805	277	2082
	Expected Count	1690.1	391.9	2082.0
65 and above	Count	1386	71	1457
	Expected Count	1182.7	274.3	1457.0
Total	Count	10612	2461	13073
	Expected Count	10612.0	2461.0	13073.0

Pearson Chi-Square

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	381.620	5	.000

A Chi-square test was conducted to determine if there was a relationship between the age of the respondents and ownership of personal health insurance. The

test results generated Chi-square value = 381.620, p = .000 which showed that there was statistically significant association between age and ownership of personal health insurance.

Examining the actual and expected count, it was noted that individuals in the 25-34, 35-44, and 45-54 age groups had higher count of 651, 648, and 620 respectively compared to the expected count of 512.2, 497.2, and 516 respectively, suggesting that individuals in these age groups (25-34, 35-44, and 45-54) were more likely to own personal health insurance.

Economic theory predicts that as individuals advance in age, the health stock depreciates and they are more likely to increase investment in health including having personal health insurance to reduce the negative effect of depreciation. This is seen in the result which showed that those between 25 to 54 years of age were the most likely to own personal health insurance. As understood, health insurance ownership provides better access to private healthcare services. Therefore, insurers would need to understand the risk profile of individuals in all age categories and their healthcare requirements for better selection of risk.

Gender

Table 4.4 provides the results of cross tabulations between ownership of personal health insurance policy and gender. Males had higher subscription of personal health insurance compared to females. Almost twenty per cent (19.5 %) of males subscribed to personal health insurance compared to 81.5 per cent of males who did not. A higher percentage of females were without cover, with only 18.3 per cent having personal health insurance compared to 81.7 per cent of females who did not have

personal health insurance. The Chi-square test however did not generate significant value with Chi-square value = 3.411, p =.065 which showed that there was no statistically significant association between gender and ownership of personal health insurance. This means that insureds and uninsureds were equally represented by males and females.

Table 4.4
Cross Tabulation and Chi-Square of Personal Health Insurance Policyholders and Non-Policyholders by Gender

Cross Tabulation Matrix

Gender		Own personal health insurance		Total
		No	Yes	
Male	Count	4745	**1151**	5896
	Expected Count	4786.1	1109.9	5896.0
Female	Count	5867	1310	7177
	Expected Count	5825.9	1351.1	7177.0
Total	Count	10612	2461	13073
	Expected Count	10612.0	2461.0	13073.0

Pearson Chi-Square

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.411	1	.065

Occupation

The cross-tabulation of occupation with ownership of personal health insurance is shown in Table 4.5. The tabulation saw that more than one-third (37.2%) of government employees subscribed to personal health insurance plans while 62.8 per cent did not. More than twenty per cent (20.3 %) of private sector employees subscribed to personal health insurance and 79.7 per cent of private sector employees did not subscribe to personal health insurance. The percentage of self-employeds

who were enrolled in private health insurance was 19 per cent while 81 per cent were not. Only 12.9 per cent of homemakers/unpaid workers and 6.2 per cent of retirees owned personal health insurance.

Table 4.5
Cross Tabulation and Chi-Square of Policyholders and Non-Policyholders by Occupation

Cross Tabulation Matrix

Occupation		Own personal health insurance		Total
		No	Yes	
Government employee	Count	1101	**653**	1754
	Expected Count	1423.8	330.2	1754.0
Private sector employee	Count	2724	**694**	3418
	Expected Count	2774.6	643.4	3418.0
Self-employed	Count	2716	**638**	3354
	Expected Count	2722.6	631.4	3354.0
Homemaker/Unpaid worker	Count	2529	374	2903
	Expected Count	2356.5	546.5	2903.0
Retiree	Count	1542	102	1644
	Expected Count	1334.5	309.5	1644.0
Total	Count	10612	2461	13073
	Expected Count	10612.0	2461.0	13073.0

Pearson Chi-Square

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	632.188	4	.000

A Chi-square test was done to determine the relationship between ownership of personal health insurance and type of occupation. The test result generated Chi-square value = 632.188, p = .000 which showed that there was statistically significant association between occupation and ownership of personal health insurance.

Looking at the actual count and expected count, it was noted that higher actual count was observed for individuals who were government employees (653), private sector employees (694), and self-employeds (638) compared to the expected counts of 330.2, 643.4, and 631.4 respectively, suggesting that individuals who were government employees, private employees, and self-employed were more likely to own personal health insurance.

The likelihood of government employees, private employees, and self-employeds to own personal health insurance suggests their preference for private healthcare services is probably due to wanting peace of mind or in anticipation of needing medical care as reported earlier by Buchmueller, et al. (2013). Employees in the government sector are typically not provided with the benefits of private health insurance while self-employeds would have to finance their own healthcare services. Similarly, not all private employees are provided health insurance benefits by their employers. For any sector of employment, having personal health insurance makes it possible to access private healthcare services and enjoy the benefits of shorter waits.

Income

Income has been significantly associated with ownership of personal health insurance. Table 4.6 shows that subscription to personal health insurance increased with income. More than 30 per cent of those who earned RM1001-RM3000 owned personal health insurance while 69.5 per cent did not. About 56 per cent of individuals in the RM3001- RM5000 income bracket owned personal health insurance and 43.9 per cent did not, and almost 60 per cent of individuals with income of above RM5000 owned personal health insurance while 41 per cent did not

own personal health insurance. Only about 10 per cent of individuals with monthly income of below RM1000 owned personal health insurance.

Table 4.6
Cross Tabulation and Chi-Square of Personal Health Insurance Policyholders and Non-Policyholders by Income

Cross Tabulation

Monthly Income (RM)		Own personal health insurance		Total
		No	**Yes**	
1000 and below	Count	7730	853	8583
	Expected Count	6967.2	1615.8	8583.0
1001 - 3000	Count	2491	**1095**	3586
	Expected Count	2910.9	675.1	3586.0
3001 - 5000	Count	309	**395**	704
	Expected Count	571.5	132.5	704.0
Above 5000	Count	82	**118**	200
	Expected Count	162.3	37.7	200.0
Total	Count	10612	2461	13073
	Expected Count	10612.0	2461.0	13073.0

Pearson Chi-Square

	Value	**Df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	1617.002	3	.000

The Chi-square test suggested that there was a statistically significant association between income and ownership of personal health insurance with the result of Chi-square value = 1617.002, p = .000. Based on a comparison of the actual count and the expected count, individuals with monthly income of above RM1000 were more likely to own personal health insurance, with each income group having a higher actual count compared to the expected count.

Personal health insurance is seen as an option to enable access to private healthcare providers. The willingness to spend on personal health insurance depends on the availability of disposable income to pay for personal health insurance and the value that individuals put on private healthcare despite the availability of public health services. Those with higher income may have larger capacity to afford paying personal health insurance premium.

Education

Table 4.7 presents the ownership of personal health insurance by education level.

Table 4.7
Cross Tabulation and Chi-Square of Personal Health Insurance Policyholders and Non-Policyholders by Education

Cross Tabulation

Education		Own personal health insurance		Total
		No	Yes	
No formal education	Count	1247	58	1305
	Expected Count	1059.3	245.7	1305.0
Primary education	Count	3195	348	3543
	Expected Count	2876.0	667.0	3543.0
Secondary education	Count	4731	**1177**	5908
	Expected Count	4795.8	1112.2	5908.0
Tertiary education	Count	1439	**878**	2317
	Expected Count	1880.8	436.2	2317.0
Total	Count	10612	2461	13073
	Expected Count	10612.0	2461.0	13073.0

Pearson Chi-Square

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	920.513	3	.000

The largest group of subscribers of personal health insurance comprised individuals with tertiary education, with 37.9 per cent owning personal health insurance and 62.1 per cent who did not. Almost twenty per cent (19.9 %) of individuals with secondary education owned personal health insurance while 80.1 per cent did not, and 9.8 per cent of individuals with primary education owned personal health insurance while 91.2 per cent did not. Only 4.4 per cent of individuals without formal education owned personal health insurance.

The Chi-square test suggested that there was statistically significant association between education and ownership of personal health insurance with the result of Chi-square value = 920.513, p = .000. Based on the actual count and the expected count, individuals with secondary and tertiary education were more likely to own personal health insurance with both having higher actual counts compared to the expected counts.

The result is as expected as individuals with higher level of education are more likely to understand the need for personal health insurance in addition to having the ability to make financial decisions involving the purchase of personal health insurance.

4.2.2.3 Profile of Respondents who Own and do not Own Personal Health Insurance by Attitude towards Risk

This study measured attitude towards risk using two variables, namely smoking and physical activity. Smokers and those who are physically inactive are considered risk-takers.

Smoking

Table 4.8 provides the results of crosstabs between the smoking status of respondents and ownership of personal health insurance. The results of the cross tabulation show that 15.2 per cent of smokers owned personal health insurance and 84.8 per cent of smokers did not own personal health insurance. Non-smokers who had personal health insurance comprised 19.9 per cent while 81.1 per cent did not have personal health insurance.

Table 4.8
Cross Tabulation and Chi-Square of Personal Health Insurance Policyholders and Non-Policyholders by Smoking Status

Cross Tabulation

Smoking Status		Own personal health insurance		Total
		No	Yes	
Yes	Count	2525	451	2976
	Expected Count	2415.8	560.2	2976.0
No	Count	8087	**2010**	10097
	Expected Count	8196.2	1900.8	10097.0
Total	Count	10612	2461	13073
	Expected Count	10612.0	2461.0	13073.0

Pearson Chi-Square

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	33.971	1	.000

The Chi-square test suggested that there was statistically significant association between smoking behaviour and ownership of personal health insurance with the result of Chi-square value = 33.971, p = .000. The actual count of individuals who did not smoke was 2010 and it was higher than the expected count of 1900.8, suggesting that individuals who did not smoke were more likely to own personal health insurance. The result was consistent with Hopkins and Kidd (1996) and

Buchmueller, et al. (2013) in terms of the negative correlation between smoking and ownership of health insurance. The fact that the insureds did not smoke suggests that they were more risk-averse and did not expose themselves to various health risks and health insurance would further protect them from the possible financial burden of healthcare.

Physical activity

Table 4.9 presents the results of crosstabs between physical activity and ownership of personal health insurance.

Table 4.9
Cross Tabulation and Chi-Square of Personal Health Insurance Policyholders and Non-Policyholders by Physical Activity Status

Cross Tabulation

Physical Activity		Own personal health insurance		Total
		No	Yes	
Inactive	Count	3278	690	3968
	Expected Count	3221.0	747.0	3968.0
Active	Count	7334	**1771**	9105
	Expected Count	7391.0	1714.0	9105.0
Total	Count	10612	2461	13073
	Expected Count	10612.0	2461.0	13073.0

Pearson Chi-Square

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.687	1	.006

The results saw that the more active individuals owned personal health insurance compared to those who were non-active. About 20 per cent (19.5 %) of individuals who were physically active owned personal health insurance and 80.5 per

cent who were active and uninsured while 17.4 per cent of those who were physically inactive owned health insurance and 82.6 per cent who were inactive were uninsured.

The Chi-square test suggested that there was statistically significant association between physical activity and ownership of personal health insurance with the result of Chi-square value = 7.687, p = .006. The higher number of physically active insured was further confirmed with the higher actual count of 1771 physically active individuals compared to the expected count of 1714. This suggests that individuals who are physically active are more likely to own personal health insurance. The result is consistent with Barret and Conlon (2003) who found that individuals who did moderate and vigorous exercise were more likely to purchase health insurance.

Attitude towards Risk

Attitude towards risk was categorised using three-level categorisation of risk-taker, moderate risk-taker, and risk-averse as was defined in the Methodology chapter.

Table 4.10 shows that the proportion of individuals in the risk-averse category who owned personal health insurance was the largest at 20.9 per cent and 79.1 per cent in the same category did not. For the moderate risk-takers, 16.5 per cent owned personal health insurance while 83.5 per cent did not. As for the risk-takers, only 16 per cent owned personal health insurance and 84 per cent were uninsured. The Chi-square value = 43.486, p = .000 suggested that there was a significant association between attitude towards risk and ownership of personal health insurance. Furthermore, risk-averse individuals were more likely to own personal health

insurance based on the higher count of 1430 compared to the expected count of 1282.9.

Table 4.10
Cross Tabulation and Chi-Square of Personal Health Insurance Policyholders and Non-Policyholders by Attitude towards Risk

Cross Tabulation

Attitude towards risk		Own personal health insurance		Total
		No	Yes	
Risk-Taker	Count	576	110	686
	Expected Count	556.9	129.1	686.0
Moderate Risk-Taker	Count	4651	921	5572
	Expected Count	4523.1	1048.9	5572.0
Risk-Averse	Count	5385	**1430**	6815
	Expected Count	5532.1	1282.9	6815.0
Total	Count	10612	2461	13073
	Expected Count	10612.0	2461.0	13073.0

Pearson Chi-Square

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	43.486	2	.000

This finding suggests that attitude towards risk as represented by smoking behaviour and physical activity is significant although they are not the only determinants of the decision to own personal health insurance. Risk-averse individuals (represented by non-smokers and the physically active) want to lower their health risk and related financial risk and are willing to make larger investment on lower return for a known risk. For risk-averse individuals, having personal health insurance provides some form of security and peace of mind in terms of assurance of timely treatment with private healthcare services and being protected from the known risk of having to incur high expenses for healthcare treatment.

4.2.2.4 Profile of Respondents who Own and do not Own Personal Health Insurance by Health Risk Level

In this study, health risk level was measured using two variables as explained in the Methodology chapter. Each of the variables was analysed separately to determine the association with personal health insurance ownership.

Admission to Any Ward

Table 4.11 presents the results of crosstabs between admission to any ward and ownership of personal health insurance. To test the relationship between ownership of personal health insurance and experience of being admitted in a ward, a Chi-square test was administered. The Chi-square value = 3.663, p = .056 suggested that there was no statistically significant association between admission to a ward and ownership of personal health insurance. In other words, insureds and uninsureds were similarly represented by individuals who had been admitted and those who had never been admitted to a ward.

Table 4.11
Cross Tabulation and Chi-Square of Personal Health Insurance Policyholders and Non-Policyholders by Admission to Any Ward

Cross Tabulation Matrix

Admission to any ward		Own personal health insurance		Total
		No	Yes	
Yes	Count	781	209	990
	Expected Count	803.6	186.4	990.0
No	Count	9831	2252	12083
	Expected Count	9808.4	2274.6	12083.0
Total	Count	10612	2461	13073
	Expected Count	10612.0	2461.0	13073.0

Pearson Chi-Square

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.663	1	.056

Self-Assessed Health Status (SAHS)

Self-Assessed Health Status (SAHS) was used to determine the health risk status of respondents. The use of SAHS is consistent with Cardon and Hendel (2001), Kirigia et al. (2005), Gius (2010), and Buchmueller et al. (2013). The cross tabulation between SAHS and ownership of personal health insurance was done and the results are presented in Table 4.12.

Table 4.12
Cross Tabulation and Chi-Square of Personal Health Insurance Policyholders and Non-Policyholders by Good/Bad Self-Assessed Health Status

Cross Tabulation

SAHS		Own personal health insurance		Total
		No	Yes	
Bad	Count	2334	395	2729
	Expected Count	2215.3	513.7	2729.0
Good	Count	8278	**2066**	10344
	Expected Count	8396.7	1947.3	10344.0
Total	Count	10612	2461	13073
	Expected Count	10612.0	2461.0	13073.0

Pearson Chi-Square

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	42.726	1	.000

The cross tabulation results showed that 14.5 per cent of respondents who claimed their health status as bad owned personal health insurance while 85.5 per cent of this group were uninsured. For individuals in the good health status category, 20 per cent owned personal health insurance and 80 per cent of respondents with the same health status did not own personal health insurance.

A Chi-square test based on the good SAHS and bad SAHS categorisation was performed to find its association with ownership of personal health insurance. The Chi-square value = 47.726, p = .000 suggested that there was statistically significant association between SAHS and ownership of personal health insurance. The actual count of individuals with good SAHS was 2066. It was higher than the expected count of 1947, suggesting that individuals with good SAHS were more likely to own personal health insurance.

High and Low Health Risk Level

The computation of admission to any ward and SAHS into a single variable which carries "High" or "Low" health risk level has been explained in the Methodology chapter. An individual was considered as having a low health risk level or good health status when both the rating for admission to a ward and SAHS were good. Individuals having at least one bad rating for either of the factors (admission to a ward or SAHS) were considered to be in the high health risk level or bad health risk status. However, due to the non-statistically significant result of the Chi-square of the variable admission to any ward, the variable admission to any ward was not further analysed in the subsequent analysis. Therefore, health risk level was measured only by the variable SAHS. In this relation, good SAHS was redefined as low health risk level and bad SAHS was subsequently redefined as high health risk level as shown in Table 4.12.

Based on this redefinition of the health risk level, it is suggested that individuals in the low health risk level (who assessed their health status as very good or good) were more likely to own personal health insurance, while individuals in the

high health risk level (who assessed their health status as moderate, not good, and bad status) were more likely not to own personal health insurance.

The results also concluded that the personal health insurance market is characterised by preferred selection and not by adverse selection. Adverse selection can be observed when health risk status and ownership of personal health insurance are negatively correlated. The findings are more consistent with the earlier study in Malaysia by Kefeli and Jones (2012) who did not find evidence of adverse selection in the Malaysian health insurance market. However, the result is an exception to Cutler et al. (2008) who noted that adverse selection was more evident in most health insurance markets.

Health status affects the ability to earn income and enjoy life. A decline in health status especially at working ages can affect life negatively. While the result suggests that insurers have successfully attracted individuals with lower than average health status, it might also suggest that individuals who feel that the ability to generate earning and enjoy life could be threatened by health status would be prepared to maintain good health including by investing in personal health insurance for assurance of access to and treatment at private healthcare providers.

4.3 Factors Predicting Ownership of Personal Health Insurance

This section investigates the factors that affect the decision to own personal health insurance. Logistic regressions were performed on the data to predict a discrete outcome of ownership of health insurance from a set of variables. The variables in the analysis were age, gender, occupation, income, education, health risk level, and attitude towards risk. Tests on whether the models fit the data were administered using Hosmer and Lemeshow test. Two logistic regression models (Model 1, Model 2) that fit the data are presented to answer specific research questions.

Table 4.13 provides the regression coefficient (B), the Wald statistic and the Odds Ratio (Exp (B)) for each variable category of Model 1.

The regression model had good fit to the data (Chi-Square = 6.384, df=8, p=0.604) with Cox & Snell R Square and the Nagelkerke R Square were 13.4 per cent and 21.6 per cent respectively. All variables were included to answer the specific questions on the effects of underwriting and non-underwriting factors and on the ownership of personal health insurance and the presence of advantageous selection. The results of the analysis exhibited that other than occupation, there was highly significant overall effect for all variables in equation.

Table 4.13

Logistic Regression Result- Model 1

	B	S.E.	Wald	Df	Sig.	Exp(B)
Age			42.574	5	.000	
25-34	.369	.095	15.090	1	.000	1.446
35-44	.477	.097	24.097	1	.000	1.611
45-54	.501	.100	25.116	1	.000	1.650
55-64	.274	.118	5.367	1	.021	1.315
65 and above	-.108	.175	.378	1	.538	.898
Gender						
Female	.300	.058	26.302	1	.000	1.349
Occupation			12.655	4	.013	
Private sector employee	.124	.076	2.649	1	.104	1.132
Self-employed	.133	.080	2.779	1	.095	1.142
Homemaker/ Unpaid Worker	.156	.100	2.425	1	.119	1.168
Retiree	-.265	.147	3.253	1	.071	.767
Attitude Towards Risk			28.982	2	.000	
Moderate Risk-Taker	.104	.121	.740	1	.390	1.110
Risk -Averse	.367	.122	9.103	1	.003	1.443
Health Risk Level	.269	.065	17.217	1	.000	1.308
Income			537.201	3	.000	
1001-3000	1.206	.066	332.569	1	.000	3.340
3001-5000	2.069	.103	406.366	1	.000	7.914
Above 5000	2.211	.162	187.328	1	.000	9.129
Education			135.631	3	.000	
Primary Education	.525	.150	12.218	1	.000	1.691
Secondary Education	1.026	.147	48.870	1	.000	2.790
Tertiary Education	1.400	.156	80.969	1	.000	4.055

Hosmer and Lemeshow Test	**Chi-square**	**df**	**Sig.**
	6.384	8	.604

Model Summary	**Cox & Snell R Square**	**Nagelkerke R Square**
	.134	.216

Base Category: *Age 18-24, Male, Government employee, High Health Risk Level, Risk-Taker, No Formal Education, Salary 1000 and below*

4.3.1 The Effect of Age on Ownership of Personal Health Insurance

Age had significant effect on the ownership of personal health insurance. For ages 25-64, the B coefficients for all age categories were significant and positive, indicating that age was associated with the odds of having personal health insurance. The results show that the odds of having personal health insurance increased steadily from ages 25 to 54 but reduced after the age of 54 until age 64. Subsequently the odds ratio became not significant after age 64. This suggested that compared to individuals aged 18-24, the likelihood of individuals aged 25 to 64 owning personal health insurance was higher.

The Odds Ratio (OR) exhibited that individuals aged 25-34 were 1.446 times more likely than those aged 18-24 (the reference category) to own personal health insurance. In other words, individuals aged 25-34 were 44 per cent more likely to own health insurance compared to individuals aged 18-24. Similarly, individuals aged 35-44 were 1.611 times more likely to own personal health insurance or it was 61 per cent more likely for them to own personal health insurance compared to individuals aged 18-24. The odds ratio increased further for individuals aged 45-54 who were 1.650 times more likely to own personal health insurance. However, for individuals aged 55-64 years, the likelihood of ownership reduced slightly. The odds ratio of ownership of personal health insurance for this age group was 1.315 or 31 per cent more likely compared to individuals in the 18 to 24 age group. The odds ratio became not significant for individuals aged 65 and above. The difference in coefficients confirmed the nonlinear relationship of age on ownership of personal health insurance.

Although the profile indicated that the mean age of individuals who owned personal health insurance was lower than the mean age of uninsureds, controlling for other variables, the likelihood of having personal health insurance increased as age increased. As argued by Grossman (1972), older individuals tended to invest more in their health to ensure a healthy lifetime. The results therefore supported the hypothesis that older individuals are more likely to own personal health insurance. This is consistent with earlier studies by Cameron and Trivedi (1991), Hopkins and Kidd (1996), Barrett and Conlon (2003), King and Mossialos (2005), Abu-Bakar et al. (2012), and Kimani et al. (2014).

Another possible explanation for older individuals having personal health insurance is the possibility that insured may have owned personal health insurance for a number of years. As reported by (Barret & Conlon, 2003), the entry into a health insurance plan differs by age and individual status, for example, the head of a family owns health insurance at age 45. While the data did not provide duration of ownership, having had insurance for a long time was one of the stated reasons for ownership of private health insurance (Buchmueller et al., 2013), and perhaps for the reason that buying health insurance at a younger age entitles individuals to comprehensive deals of cheaper premium and less concern with pre-existing conditions. However, the findings did not show that younger individuals especially those aged 18-24 were more likely to subscribe to personal health insurance. The lower participation rate by younger individuals was similarly experienced in the UK as reported by Foubister, et al. (2006) and by Wallis (2004).

After the age of 65, the likelihood of owning personal health insurance became not significant. This may suggest that individuals 65 years and above may have been denied coverage due to health reasons or the price for coverage becomes prohibitive especially for new entrants. However, for individuals who entered a health insurance contract at an early age and enjoyed lower premium, health insurance premium could be adjusted higher on renewal for the reason that an insured being moved to new age band or adjustment was done to reflect the previous year's higher than expected expenditure across the insured pool. Coverage could also be withdrawn if the insured had exceeded the benefits limit. The need for healthcare for individuals aged 65 years and more would then be fulfilled by the highly accessible public health institutions or alternatively by paying through out-of-pocket expenses for attendance at private healthcare providers. Therefore, only those who placed greater value for their insurance plan would stay with the plan irrespective of age (King & Mossialos, 2005).

The findings may also be viewed as the result of effective underwriting practice where insurers are able to enrol a balanced share of individuals of different age groups to ensure avoidance of the problem of adverse selection associated with risks from different ages.

4.3.2 The Effect of Gender on Ownership of Personal Health Insurance

The results of the regression saw that gender was a significant predictor of ownership of personal health insurance (Wald = 31.154, p=0.000). The results of the regression analysis showed that females were found to be 1.349 times more likely to own personal health insurance compared to males. The finding is consistent with the

hypothesis developed in this study that female individuals are more likely to own personal health insurance compared to male individuals. The result is also consistent with the findings of previous studies by Cameron and Trivedi (1991); Barrett and Conlon (2003); Abu-Bakar et al. (2005); Gius (2010); Abu-Bakar et al. (2012); Kiplagat et al. (2013); and Kimani et al. (2014) who found that women had higher propensity to purchase personal health insurance. As women are less willing to take risks compared to men (Dohmen, et al., 2005), a greater assurance of access and timely payment for healthcare services could be the motivation for females to own personal health insurance.

Another possible explanation for the higher tendency for females to purchase health insurance could be to rely less on the head of the family especially when women have a higher life expectancy. In some cultures including Asian cultures, the male head of the family makes the final decisions for the family, therefore limiting the role of females in making important decisions. A similar situation is found in female-headed households where more females are likely to own private health insurance (Kimani et al., 2014). While the role of the head of family in making decision on the ownership of health insurance is important, more females are now equally responsible for making decisions for the family and the situation where females rely entirely on the male head of the family may have changed. Over-reliance on the male head of the family can prove to put the family in a vulnerable situation especially when the head of family is faced with extreme economic changes such as termination of employment or severe reduction in income. The other possible reason for females losing health insurance protection could be divorce. Kulkarni (2012) stated that females could go up to more than two years without

health insurance during the process of splitting of assets. Realising the possibility of losing health insurance coverage due to unfortunate reasons such as those stated above, perhaps more females have begun to make the decision to have their own personal health insurance. The ability and willingness to make decisions is consistent with Buchmueller et al. (2013) who suggested that the ability to make financial purchase decisions was important in health insurance purchases.

With increased awareness of the cost of health treatment, women are more prepared to protect their financial independence. Despite the higher premium rates that women have to pay for personal health insurance in Malaysia, more women are expected to subscribe to personal health insurance. Women may value the expected premium as being lower than the expected loss, implying that the current underwriting practice with regard to gender is satisfactory.

4.3.3 The Effect of Occupation on Ownership of Personal Health Insurance

The results of the logistic regression saw that occupation was not a significant variable in the ownership of personal health insurance. All categories of occupation were not significant to predict the ownership of personal health insurance. The results did not support the findings of earlier studies including by Browne and Doerpinghaus (1993), Foubister et al. (2006), and Buchmueller, et al. (2013) who found certain occupational sectors were strong predictors to ownership of health insurance.

Health insurance underwriters categorise certain occupations as riskier than others. The higher exposure level to risk of an occupation increases the exposure to

illness and injury, thus leading to higher needs for health insurance. However, certain occupations, especially those involving hazardous jobs are excluded from cover. The higher needs for coverage for certain occupations is offset by the unavailability of insurance coverage, thus occupation becomes not significant.

Another possible explanation is the fact that categorization used in this study i.e. the government, semi-government, and private sector may not reflect the actual risk involved in performing the tasks. Current underwriting practices in which applicants are asked to state the work nature or the exact duty performed may be more accurate. Such details are important in personal insurance as they provide assurance to insurers of minimum risk posed from the occupation of the individual insured. Table 2.2 in the previous section provides more detailed information required by insurers. Such data however was not available in this study.

4.3.4 The Effect of Controlled Variables on Ownership of Personal Health Insurance

Income

The logistic regression results confirmed the influence of income on ownership of personal health insurance. Using individuals with a monthly income of RM1000 and below as the comparative category, individuals with income higher than RM1000 were more likely to own personal health insurance. For example, individuals with monthly salary of between RM1001-RM3000 were three times more likely to own personal health insurance (OR=3.340) compared to individuals with monthly income of RM1000 and below. Similarly, for individuals earning between RM3001-

RM5000, the OR = 7.914, and for individuals who earned more than RM5000 monthly, the OR=9.129, suggesting that the higher the monthly income, the more likely the individual to own personal health insurance.

The results proved that the personal health insurance market is income sensitive. The finding is consistent with Kefeli and Jones (2012) and Abu-Bakar et al. (2012). The result is as expected as individuals in the study did not own any employer-sponsored health insurance which typically is not the case for individuals in the higher income bracket. Wallis (2004) suggested that individuals with higher incomes were more likely to have both personal and corporate health insurance. This finding will have implication on overall healthcare services if the majority of the population are in the lower income bracket as this will create the possibility of an underinsured society.

Education

The influence of education has been discussed in earlier studies which showed that individuals with higher level of cognitive ability were more likely to own personal health insurance. Included in cognitive ability are language proficiency, mental health (level of distress), and education (Buchmueller et al., 2013). The higher cognitive ability of the more educated individuals allow them to make better decisions in choosing among the various health insurance products and able to make the decision not only to purchase products with better coverage but also those that will lower healthcare expenditure (Fang et al., 2008).

The results of the regression showed that individuals having higher education were more likely to own personal health insurance compared to individuals with no formal education. Individuals with primary level education were almost 70 per cent more likely to own personal health insurance. The likelihood increased to almost three times (2.790) and four times (4.055) for individuals with secondary and tertiary education respectively.

The findings suggest that awareness and knowledge of health insurance and the ability to make decision such as on the necessity to possibly make small regular payments to avoid the risk of catastrophic medical expenditure motivated the ownership of personal health insurance. This is matched by insurers' ability to introduce different regular premium products to attract individuals having different levels of education. Based on these findings, insurers have been able to select insureds of different levels of education by introducing simple-to-understand to complicated personal health insurance products.

4.3.5 The Effect of Attitude towards Risk on Ownership of Personal Health Insurance

The logistic regression results exhibited that risk-averse was the only category in the variable attitude towards risk that was found to be significant in predicting ownership of personal health insurance with OR of 1.443 times. This suggested that risk-averse individuals were 44 per cent more likely to own personal health insurance compared to risk-takers.

This finding supported the hypothesis and was consistent with Barsky, et al., (1997), Barret and Conlon (2003), and Buchmueller, et al., (2013) who found risk-averse individuals were more likely to purchase health insurance.

The results can be attributed to the risk aversion of individuals where risk-averse individuals exhibit cautiousness and are more likely to own insurance. As suggested by Einav and Finkelstein (2011), the willingness to spend on insurance depends on the individual's privately known probability of loss. By nature, risk-averse individuals dislike risks or venturing into risky experience. Given the opportunity, they will secure certainty including in healthcare treatment. Personal health insurance serves as a transfer of losses mechanism that will undertake to protect individuals from financial risk due to illness. It will compensate for losses from illness and the cost of recovery. A risk-averse individual will be willing to bear and forgo losses in the form of premium to guarantee the avoidance of larger losses arising from risks.

4.3.6 The Effect of Health Risk Level on Ownership of Personal Health Insurance

The logistic regression using a two-level measurement of high (bad) and low (good) health risk level saw that health risk level had overall significant effect on the ownership of personal health insurance (Wald = 17.217, p=.000). The results saw that low health risk level (good health status) had significant and positive effect on ownership of personal health insurance with OR of 1.308 times, suggesting that individuals with good health were 30 per cent more likely to own personal health insurance compared to individuals with bad health risk level.

A decline in health status will affect negatively the ability to earn income and enjoy life. To ensure their health status will not be threatened, individuals will be willing to spend on protecting the health stock from depreciating. This risk aversion behaviour has been the reason why personal health insurance has the greatest appeal to healthy individuals.

Many people recognise that less healthy individuals may be denied coverage or have to pay higher premium. Insurers will decline poor health status or exclude all pre-existing conditions from cover as they will expose insurers to greater risk of high potential claim. This awareness motivates individuals to enrol in a health insurance plan while they are healthy. The capability of insurers to cater for the needs of different segments of individual markets including the healthy, and the price-sensitive could have encouraged higher enrolment. This includes the ability to offer products that differ in scope of cover and pricing from a narrow range of benefits with lower premium to the more expensive with a comprehensive range of benefits that satisfy the different profiles of healthy individuals.

In issuing a health insurance policy, underwriters need to decide on who is qualified based on standard selection guidelines. In their practice, underwriters will need information to make up a picture of the client's current health risk level. Current medical condition and personal medical history are among the factors that determine eligibility for personal health insurance.

The findings may also be viewed as the result of effective underwriting practice where the current manner of selection of insureds is able to identify low

health risk and avoid higher than average health risk factors. It may also be viewed as asymmetric information that could shield insurers from accurate identification of risk factors of insureds is not present. Requiring potential insureds to declare their medical history including getting confirmation from medical doctors will reduce the chances of inaccurate information provided to insurers. However, such practice may be argued as strict underwriting approach to fail less healthy individuals from enrolling into a health insurance plan.

The results support the hypothesis that individuals who have good health status are more likely to have personal health insurance. They were consistent with Gius (2010), and Barret and Conlon (2003) who found risk-averse individuals were more likely to purchase health insurance and supported the finding of Buchmueller, et al., (2013) who found the majority of respondents in their study that owned health insurance had better health status. The findings did not support Browne (1992), Kirigia, et al. (2005), and Musich et al. (2003) who reported that those having bad health status were more likely in need of health insurance to cover for medical expenses. Similarly, they did not support Sanhueza and Ruiz-Tagle (2002) who suggested the presence of moral hazard in their study.

4.4 Advantageous Selection in the Personal Health Insurance Market

The regression analysis of Model 1 presented two key findings. First, the result from the regression saw that individuals with low health risk level were more likely to own personal health insurance. Insurance underwriters will categorise these

exceptionally good risk individuals under the preferred risk category. Such preferred category of insureds is desirous to insurers as it would reduce the likelihood of excessive claims. Second, the regression analysis correspondingly confirmed that risk-averse individuals were more likely to own personal health insurance.

To test on the presence of advantageous selection, further analysis on the association between health risk level and attitude towards risk was required. Then, logistic regression for individuals with low health risk level was conducted. Understanding the association between attitude towards risk and health risk level on ownership of personal health insurance is essential in coming to the conclusion of whether the profile of the respondents suggested the presence of advantageous selection.

4.4.1 Association between Health Risk Level and Attitude towards Risks

The relationship between health risk levels and attitude towards risks was explored to understand how both variables were associated. A cross tabulation of health risk levels and risk aversion involving all cases was administered.

The results as shown in Table 4.14 indicated that there was statistically significant association between risk levels (riskiness) and risk aversion with the result of Chi-square value = 18,766, p = .000. The results showed that highly risk-averse individuals were found to be more likely to be of low health risk as indicated by the actual count of 5492 as compared to the expected count of 5392.4. This result was consistent with Fang, et al. (2008), who found negative correlation between health risk and risk aversion, suggesting the presence of advantageous selection.

Table 4.14
Cross Tabulation and Chi-Square of Health Risk Level and Attitude towards Risk of Respondents

Cross Tabulation

Attitude Towards Risk		Health Risk Level		Total
		High (Bad Health)	Low (Good Health)	
Risk-Taker	Count	160	526	686
	Expected Count	143.2	542.8	686.0
Moderate Risk-Taker	Count	1246	4326	5572
	Expected Count	1163.2	4408.8	5572.0
Risk-Averse	Count	1323	**5492**	6815
	Expected Count	1422.6	5392.4	6815.0
Total	Count	3432	9641	13073
	Expected Count	3432.0	9641.0	13073.0

Pearson Chi-Square

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	18.766	2	.000

4.4.2 Association between Attitude towards Risks and Health Insurance Ownership among Low-Risk Individuals

Further analysis was conducted focusing on low-risk individuals only. In the test, data on health risk status was split into low health risk level and high health risk level. A cross tabulation of attitude towards risk and ownership of personal health insurance involving 10,344 data of individuals with low health risk level (good health) was analysed and Chi-square test was administered. The results are shown in Table 4.15.

Table 4.15
Cross Tabulation and Chi-Square of Personal Health Insurance Policyholders and Non-Policyholders by Attitude towards Risk of Respondents with Low Health Risk (Good Health Status)

Cross Tabulation

Attitude Towards Risk		Own Personal Health Insurance N=10344 (Low Health Risk)		Total
		No	Yes	
Risk-Taker	Count	435	91	526
	Expected Count	420.9	105.1	526.0
Moderate Risk-Taker	Count	3564	762	4326
	Expected Count	3462.0	864.0	4326.0
Risk-Averse	Count	4279	**1213**	5492
	Expected Count	4395.1	1096.9	5492.0
Total	Count	8278	2066	10344
	Expected Count	8278.0	2066.0	10344.0

Pearson Chi-Square

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	32.757	2	.000

The results saw that for those who were risk-averse, 22 per cent owned personal health insurance compared to 78 per cent who did not. The result of Chi-square value = 32.757, p = .000 suggested that there was statistically significant association between risk aversion and ownership of personal health insurance for individuals having low health risk level. The actual count of risk-averse of 1213 was higher than the expected count of 1096.9, suggesting that risk-averse individuals with low health risk level were more likely to own personal health insurance. Therefore, the study supports the hypothesis that individuals with low health risk level and are highly risk-averse are more likely to own personal health insurance.

4.4.3 Logistic Regression – Model 2

Table 4.16 presents the logistic regression model for low-risk individuals only.

Table 4.16

Logistic Regression Result- Model 2 for Low Health Risk Level

	B	S.E.	Wald	Df	Sig.	Exp(B)
Gender						
Female	.319	.064	24.669	1	.000	1.376
Age			33.212	5	.000	
25-34	.330	.103	10.224	1	.001	1.391
35-44	.474	.105	20.211	1	.000	1.606
45-54	.494	.109	20.606	1	.000	1.639
55-64	.294	.128	5.234	1	.022	1.342
65 and above	-.055	.191	.082	1	.774	.947
Occupation			11.177	4	.025	
Private sector employee	.076	.084	.825	1	.364	1.079
Self -employed	.097	.087	1.227	1	.268	1.102
Homemaker/ Unpaid Worker	.206	.110	3.531	1	.060	1.229
Retiree	-.276	.162	2.916	1	.088	.759
Attitude Towards Risk			23.311	2	.000	
Moderate Risk-Taker	.074	.133	.310	1	.577	1.077
Risk-Averse	.337	.134	6.360	1	.012	1.401
Income			455.519	3	.000	
1001-3000	1.250	.073	294.019	1	.000	3.490
3001-5000	2.050	.112	333.681	1	.000	7.767
Above 5000	2.285	.180	161.369	1	.000	9.828
Education			105.421	3	.000	
Primary Education	.532	.164	10.603	1	.001	1.703
Secondary Education	.998	.160	39.117	1	.000	2.713
Tertiary Education	1.363	.169	64.886	1	.000	3.907

Hosmer and Lemeshow Test	**Chi-square**	**df**	**Sig.**
	9.186	8	.327

Model Summary	**Cox & Snell R Square**	**Nagelkerke R Square**
	.131	.208

Base Category: *Age 18-24, Male, Government Employee, Risk-Taker, No Formal Education, Salary 1000 and below*

The regression model had good fit to the data (Chi-Square = 9.186, df=8, p=0.327). Cox & Snell R Square and the Nagelkerke R Square were 13.1 per cent and 20.8 per cent respectively. The results show that attitude towards risk had overall significant relationship with ownership of personal health insurance. The Odds Ratio for risk-averse was 1.401, which suggested that risk-averse individuals who were in low health risk level were 1.401 times or 40 per cent more likely to own personal health insurance compared to risk-takers who were low in health risk.

The regression results of Model 2 re-confirmed the findings from Model 1 that individuals who were risk-averse were more likely to own personal health insurance. Taken together, the results of Model 1 and Model 2, and the relationship between health risk level and risk attitude confirmed empirically the presence of advantageous selection. Hemenway (1992) suggested the presence of propitious selection occurred when responses to questions on smoking, alcohol, medical check-up, and food questions were associated with insurance purchase in the direction that suggested that risk-avoiders would tend to buy insurance.

This empirical evidence supports the theory of propitious selection and the findings confirm that the study found the evidence of propitious or advantageous selection in the Malaysian personal health insurance market. The findings also suggest that asymmetric information may not be present. Asymmetric information has been associated with the issue of inefficient selection of insureds, which would affect adversely the sustainability of health insurers. The non-evidence of the presence of adverse selection suggests that the personal health insurance market in

Malaysia has been able to avert the problem of adverse selection perhaps through initiatives undertaken by insurers.

A possible explanation for the result is effective risk management on the part of insurers in designing and pricing health insurance products to ensure health insurance continues to be affordable and accessible. Insurers have strong motivation to enrol healthy individuals because of the financial commitment to pay for the health services covered under the health insurance policy. The ability to enrol healthy and risk-averse individuals suggests that the risk management strategy used by insurers to control the levels of risk have been effective. Insurers could avoid high-risk individuals from enrolling into a plan through various measures including by increasing premium, excluding pre-existing medical conditions in the cover or by introducing greater cost sharing. These risk management initiatives could avoid insurers from making errors due to difficulty in pricing high-risk factors (Foubister, et al., 2006).

Another possible explanation for the result is that the pricing structure has appealed to individuals with different health risk and risk aversion levels. Typically, people will be willing to pay for health insurance cover if the price is viewed as fair, i.e. lower than the losses from catastrophic illness. However, if the price goes beyond the fair level, only the most risk-averse will enrol into the plan (Barsky, et al., 1997).

Even though the initiatives taken by insurers may have severely limited the number of insureds and limited the choices of services available, insurers have

nevertheless been able to attract consumers who require the services provided by private healthcare providers. The initiatives taken have been able to counter the effect of adverse selection that has been faced by insurers in different markets as stated in the literature.

The results suggests that insurers have not only been able to effectively select insureds that are advantageous but also to reduce the pressure of preserving financially viable operations through highly effective selection mechanism.

4.5 Chapter Conclusion

Thorough analyses were conducted on 13,073 cases of individuals who owned and did not own personal health insurance to address all the research objectives that were proposed in Chapter 1. The first section of this chapter profiled the policyholders and non-policyholders to fulfil the first objective of the study. The descriptions were compared and the results of the profiling exhibited that the two groups were significantly different in terms of socio-demographic and underwriting factors of age, gender, occupation, income, education and race. The results also showed that policyholders and non-policyholders were significantly different in terms of health status and their attitude towards risk. Specifically, compared with individuals who did not own personal health insurance, individuals who owned personal health insurance were older, employed (government and private sector), self-employed, had low health risk level, and were risk-averse. By race, income and education,

individuals who owned personal health insurance were mainly Chinese and Indians, with monthly income above RM1000, and with formal education respectively.

Chi-square tests on the variables were conducted and the results showed that there was statistically significant association between each of the variables (age, occupation, health risk level, attitude towards risk) and ownership of personal health insurance. Similarly, there was statistically significant association between each of the controlled variables (race, income, and education) and ownership of personal health insurance. However, gender was found not to be significantly associated with ownership of personal health insurance. Significant associations were confirmed between risk aversion and health risk level, and between risk aversion and ownership of personal health insurance for low health risk individuals.

Subsequently, a regression model was generated on the variables in the equation, namely gender, age, occupation, health risk level, attitudes towards risk, income, and education. The regression was able to predict the factors that determined significantly the ownership of personal health insurance. The results showed that all variables were significant predictors of ownership of personal health insurance with the exception of variable occupation. Two key variables that were critical for subsequent analysis, health risk level and attitude towards risk, had significant and positive coefficient with ownership of personal health insurance. This meant that the second research objectives of determining the association between a) underwriting factors of age, gender, occupation with ownership of personal health insurance b) health risk level with personal health insurance ownership, and c) attitude towards risk with personal health insurance ownership had been effectively accomplished.

Advantageous selection, the key theme in this study, was proven to be present in the Malaysian personal health insurance market. This was demonstrated through the significant result of the regression which was interpreted as low health risk level being more likely to own personal health insurance and risk-averse individuals being more likely to own personal health insurance. Additional regressions analyses to determine if there was significant association between high-risk aversion and low health risk level were administered for individuals in the low level of health risk. The results saw that risk-averse individuals who were in low health risk level were more likely to own personal health insurance.

The results of the regressions were consistent with the theory of advantageous selection that proposes the negative correlation between attitude towards risk and the health risk exposure and that cautious individuals would put efforts to avoid loss including by buying insurance. Therefore, the overall results could be interpreted as empirical evidence that low health risk level and high risk aversion both predict the ownership health insurance. This result fulfilled the third objective of the study in investigating the existence of advantageous selection in the personal health insurance market and the empirical investigation proved the presence of advantageous selection.

The findings in this chapter enhance the current knowledge and understanding of risk selection in the personal health insurance market in Malaysia. Additional discussion on the policy implications and recommendations to stakeholders and researchers are presented in the next chapter.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter summarizes and concludes the principal findings of the study. Recommendations for stakeholders and future researches are also presented. The study contributes significantly to the academic field in the form of new knowledge of risk selection and ownership of personal health insurance. In addition, it provides further understanding of current health insurance market practices, particularly regarding underwriting factors and the presence of advantageous selection. The study adds to the current evidence of advantageous selection (that is present in other healthcare markets) in the Malaysian healthcare market which features voluntary private health insurance and easily accessible public healthcare.

5.2 Conclusions

This study investigated the factors that affect the decision to purchase personal health insurance with a particular focus on health insurance underwriting factors. In a market where information failures exist, accurate risk assessment of potential insureds is technically difficult and costly to be administered. Insurance companies use underwriting criteria to select and classify the insured. Criteria such as health risk level, gender and age have been widely used in health insurance risk selection as

these factors have been found to influence healthcare utilizations. In this regard, this study analysed the selected socio-demographics factors of adult individuals to present the current profiles of health insurance policyholders and non-policyholders. In addition, these factors, in particular underwriting factors, were further investigated to determine their influence on health insurance ownership. The health insurance market is traditionally theorized to attract higher-risk individuals, a situation reflecting adverse selection. Higher-risk individuals are assumed to be more likely to purchase health insurance in anticipation of higher likelihood of needing medical care. However, a limited number of researchers have found that evidence of adverse selection is minimal or non-existent, leading to the proposition of advantageous selection. The uniqueness of the Malaysian health insurance market and the limited availability of market information on personal health insurance may provide new evidence of the presence of advantageous selection. Thus, this study discussed in depth the issue of risk selection in the health insurance market and investigated the presence of advantageous selection.

The theoretical framework of this study was fundamentally based on the Theory of Asymmetric Information and the Theory of Propitious Selection. Both theories underline the importance of information balance between insurers and insureds and the resulting outcomes of risk selection of either advantage or otherwise to the market. The study examined if the pattern of ownership behaviour of personal health insurance in Malaysia can be explained by the proposition of these theories. Similarly, the hypotheses were developed in respect of the theories and supported by findings from previous literatures.

In the data analysis, this study used both bivariate and multivariate analysis. Bivariate analysis using Chi-square tests was conducted to profile the adult individuals according to selected socio-demographic variables in relation to health insurance ownership. Based on the descriptive analysis, a measure of health risk level and risk preference was introduced. One novelty was the use of physical activities in the measurement of risk preference. Individuals are considered risk-averse if they have taken sufficient care to avoid potential losses. In this study, individuals who were physically active and were non-smokers were considered risk-averse individuals.

The logistic regression was employed to find the influence of the underwriting factors on the ownership of personal health insurance. As the main goal of this study is to investigate the presence of advantageous selection, further exploration on the interaction of health risk level, risk preference and health insurance ownership was conducted by analysing adult individuals with low risk level only.

5.2.1 Profile of Insureds and Uninsureds

This study has identified that health insurance owners are more likely to be younger, work in either the government or the private sector or be self-employed, are in good health, are non-smokers and physically active. Insureds are more likely to have at least secondary education and earn above RM1000 a month. In terms of risk preference, insureds tend to be risk-averse individuals.

It is interesting to note that there is no significant difference between insureds and uninsureds in terms of gender and admission to hospital. Table 5.1 summarises the profile of insureds and the uninsureds.

Table 5.1

Profiles of insureds and uninsureds

Variables	Insureds	Uninsureds
Gender	No difference	
Age	Younger, 25-54	18-24, Older, above 54
Income	Above RM1000	Below RM1000
Education	Secondary, Tertiary	No formal education, primary
Occupation	Employees of government and private sectors, self-employed	Homemakers/ Unpaid workers, retirees
Warded	No difference	
SAHS	Good	Bad
Health Risk Level	Low	High
Smoking	No	Yes
Physical Activity	Active	Inactive
Attitude towards risk	Risk -averse	Risk-takers, Moderate risk-takers

5.2.2 Factors that Influence Ownership of Health Insurance

The logistic regression analysis reveals that the underwriting factors that influence health insurance ownership are age, gender and health risk level. Occupation is found to be not statistically significant in influencing health insurance ownership. In terms of risk preference, insureds are more likely to be risk-averse. Table 5.2 summarizes the findings in comparison with the hypotheses.

Table 5.2

Summary of findings in comparison with the hypotheses

Independent Variables	Hypotheses	Findings
Gender	Female +	Female +
Age	Older +	Older +
Occupation	+	Not significant
Attitude towards risk	Risk-Averse +	Risk-Averse +
Health risk level	Low +	Low +

This study hypothesized that older individuals are more likely to own personal health insurance. This study finds that individuals aged 25 to 54 are more likely to own personal health insurance compared to those aged 18-24. After the age of 65, the likelihood of owning health insurance becomes not significant. An implication of the result is that insurers will not be able to rely on the age cohort of 18-24 as preferred customers. This youngest age group is most attractive to insurers as young people are generally healthier and use less medical care. Their enrolment in a health insurance plan will help to moderate the higher medical cost brought about by the older and higher health risk individuals. Leaving this age group out of the insurance pool will potentially cause inefficiency and reduce risk-sharing ability from the mix of insureds. Ultimately it might result in health insurance death spiral (Cutler & Zeckhauser, 1998) as discussed in the earlier chapters.

In terms of gender, this study hypothesised that females are more likely to own health insurance. In the logistic regression, female individuals are found to be more likely to own personal health insurance compared to male individuals. For reasons

mentioned in the previous chapter, the willingness and ability of female individuals to make decisions to own personal health insurance have changed the market structure of the protection industry. This change in structure is seen when comparing the results of this study with an earlier study by Abu-Bakar et.al (2016) using NHMS III survey data collected in 2006 that found that female individuals were less likely to own health insurance. It can thus be concluded that there has been a gender shift in the predictors of personal health insurance ownership within a span of five years.

This study hypothesized that occupation influences health insurance ownership as occupation is used as an underwriting criteria. However, the logistic regression found that occupation is not a significant predictor of ownership of personal health insurance. As discussed in the previous chapter, the categorization of occupation used in this study may not reflect the risk involved. Besides, certain occupations, especially those that involved in hazardous activities are excluded from cover. The higher needs for coverage for certain occupations is offset by the unavailability of insurance coverage, thus occupation does not seem to affect health insurance ownership.

It was hypothesized that individuals who are risk-averse are more likely to own health insurance. The regression results showed that risk aversion is significantly and positively able to predict ownership of personal health insurance. These findings are consistent with and support the theory that risk-averse individuals are more likely to own health insurance. The result recognises the role of risk aversion in individuals that results in individuals exhibiting cautiousness including buying insurance. Cautious individuals view having personal health insurance as a technique of

transferring the health risk of paying medical expenses to an insurance company, thus ensuring access to healthcare when needed. According to DeMeza and Webb (2001) individuals who are highly risk-averse are more cautious and it is important for them to buy insurance to prevent potential loss.

Despite the common expectation that high health risk individuals are more likely to own health insurance in anticipation of higher healthcare utilization, this study hypothesized that low-health risk individuals are more likely to own health insurance, following Buchmueller (2013). The results showed that individuals in the low level of health risk are more likely to be insured. This finding suggests that adverse selection is not observed. The non-presence of adverse selection offers overwhelming conclusion that underwriting practices in the industry have been effective in ensuring that individuals with higher risk do not subscribe to private health insurance. Perhaps the results also suggest that the less healthy individuals fail to enrol into a plan due to the rigorous underwriting practice adopted. Such a conclusion may send a signal to policymakers that the industry may be neglecting the less healthy individuals.

The risk behaviour of individuals is the outcome of differing underlying risk attitudes. In health insurance, certain behaviours are considered risky, resulting in the imposition of higher premium or even rejection of health insurance application. Risky behaviours such as smoking, alcohol consumption, being inactive, failure to use seatbelt, or participation in hazardous occupation, sports or past-time activities, which increased the likelihood of utilisation of healthcare services are not easily measured. To measure such behaviours, researchers used factors that contribute to

uncertainty and the potential for loss. An individual is considered risk-averse if he or she has taken sufficient care to avoid potential loss. Two factors used in this study to determine individual attitudes towards risk were smoking behaviour and being physically active.

Unfortunately, insurers have no way of differentiating individuals' attitudes towards risk except for common risk behaviour such as smoking. Positive risk behaviours such as being physically active or involvement in diet plans or other private information that is negatively correlated with risk (Fang, et al., 2008) were not taken into consideration.

5.2.3 Advantageous Selection in Malaysian Health Insurance Market

The major contribution expected of this study is the evidence of advantageous selection in the Malaysian personal health insurance market. Hemenway (1990, 1992) proposed that risk aversion was positively correlated with the purchase of insurance and taking efforts in reducing risk of loss. The more recent view by Fang et al. (2008) proposed that advantageous selection was when risk aversion was positively correlated with insurance coverage and at the same time negatively correlated with health risk. Similarly, Einav and Finkelstein (2011), Olivella and Vera-Hernandez (2013), Buchmueller et al. (2013) referred to advantageous selection as negative correlation between riskiness and risk aversion for individuals who purchase insurance.

It is interesting to note that in this study, health risk level is found to be negatively correlated with risk preference. In other words, individuals who are of low

health risk are more likely to own health insurance. Another important finding was that among low-risk individuals, risk preference is found to be positively correlated with health insurance ownership.

In a nutshell, the results of the analysis confirm that the personal health insurance market in Malaysia features propitious or advantageous selection. The findings also suggest that asymmetric information in the market may not be present. Asymmetric information has been associated with inefficient selection due to unequal information that insurers and insureds have that causes adverse selection that potentially affects the sustainability of health insurers.

These results are in accord with the recent studies in other markets by Buchmueller et al. (2013) and Olivella & Vera-Hernandez (2013) and earlier studies by Finkelstein and McGarry (2006) and Fang et al. (2008), indicating that advantageous selection is present.

This study was undertaken to offer an answer to the very little-known knowledge of the relationship between individual risk preference and riskiness and health insurance ownership. Based on the available literature, the direction of relationship may pose a problem that affects the sustainability of insurers. While insurers have the responsibility of attaining public policy objectives of promoting affordable coverage, they need to remain financially sustainable in the domain of a competitive environment and cost escalation. Adverse selection can potentially pose a significant barrier to sustainability. Therefore, prudent risk selection is the only means to provide a balance in absorbing risk and pricing of risk protection. The

understanding of individual characteristics and behaviours and how each of them relates to the need for health insurance may improve the current manner of risk selection. It is expected that the findings of this study can be used as benchmark for insurers to evaluate their performance in attracting healthy insureds and repel sick insureds (Cutler and Zeckhauser, 1998). Therefore, insurers will find it advantageous if they are able to select individuals who have both low health risk level (good health status) and are high in risk aversion.

Meanwhile, the challenge of the industry is to maintain this advantageous pool of insureds. The availability of public and private sector integration in the delivery aspect of the healthcare system allows for the option of not having personal health insurance. To be able to attract the general public, private sector healthcare in Malaysia may have surpassed the aspects of the public system that are of special importance in the success of private health insurance. Foubister, et al. (2006) identified these aspects as “gaps in coverage” - gaps in terms of services, costs, people and expectations - as areas to develop for a strong voluntary health insurance market in the UK. The continuous improvement being planned, especially in the service delivery aspects of the public healthcare system will have impact on the preservation of the personal health insurance pool. With improved services, individuals with low health risk level and high in aversion may opt for public healthcare services rather than the private providers. All things considered, ultimately, fair pricing will prevail as the defining factor for the choice of personal health insurance.

5.3 Recommendations

The findings from this study benefit policymakers and insurance industry players, as well as provide valuable insight for future research.

5.3.1 Benefits to Policymakers and Insurance Industry Players

The findings of the study which present a number of factors that are significant determinants of personal health insurance ownership have important policy and industry implications.

With regard to the profile of the insureds, it can be seen that insurers have made effective selection with the participation of younger and healthier individuals in the ownership of personal health insurance. It dismisses the idea that the Malaysian health insurance market is characterised by adverse selection. This is further supported when predicting for potential insureds where individuals with low health risk status and who are risk-avoiders are more likely to own health insurance.

A number of conclusions benefitting policymakers and industry players can be drawn from the study. Most importantly, the findings suggest that insurers achieve the preferred or favourable selection position when low health risk individuals make up a larger share of insureds in the personal health insurance market. This favourable selection to insurers can be only achieved either by chance of by design. Achievement by design includes deterring enrolment of people requiring healthcare by imposing cost-sharing structures or the inclusion of pre-existing condition clause. However, other initiatives such as offering benefits that appeal to healthy people are

not purposively driven. The findings prove that initiatives of insurers in the selection of insureds have been effective

The findings conclude that risk-avoiders or those who do not engage in risky behaviour are more likely to enrol in a personal health insurance plan. For insurers, having such candidates as insureds will be desirous and advantageous as they would not be likely to incur high medical expenses. The ability to attract risk-averse individuals will ultimately improve the financial position of insurers. Unfortunately, insurers have no way of knowing whether potential insureds have engaged in healthy and active lifestyles and consequently risk aversion is not translated into any enrolment benefits, which potentially will risk insurers losing potentially preferred candidates for insurance. It might be useful for insurers to include positive lifestyle activities that are of preference to insurers in the proposal form.

The continuous challenge facing the industry is to retain low-risk individuals considered favourable to the industry. Low-risk individuals look for health insurance plans that are seen to be actuarially fair where the premiums paid are equal to the value of the compensation expected to be received in relation to their risk level. Foubister et al. (2006) defines actuarial fairness as “a principle of justice according to which the price charged should correspond to the level of risk the insured person brings to the insurance pool”. Regulators and authorities responsible for designing policies to increase the proportion of the population having health insurance must look for better strategies in attracting low-risk individuals including young individuals aged 18-24. “Bare-bones policies” that offer limited benefits and minimal coverage in exchange for less expensive premium could be introduced. This would

require insurers to have a special classification for lower than average risk individuals to be offered such insurance. The initiatives should be tied together with regulation to ensure private healthcare providers are willing to provide the services with minimum insurance. This would encourage not only low-risk individuals to enrol in a personal health insurance plan, but will also to motivate existing insureds to become more risk-avoiding by leaving risky behaviour.

Policymakers may view the insurance market that features advantageous selection as a signal that people who need insurance the most are not insured. In the more advanced countries such as in the United States, uninsureds pose serious social problems especially when they require medical care. ObamaCare or the Patient Protection Affordable Care Act that started in 2010 had the goal of improving the quality, access, and affordability of healthcare and health insurance. The law requires people who can afford it to buy insurance or pay a per-month fee while those who cannot afford be given subsidy. At the same time, larger employers are required to insure their employees. In Malaysia, the public health system serves as safety net for people without access to or cannot afford treatment at private health- care facilities. Nevertheless, some form of systematic social healthcare financing is needed to enable access to private healthcare. National Health Insurance (NHI) is envisaged to undertake this role. The need is for the government to hasten the move towards implementing NHI not only to complement the existing healthcare systems, but also to address the affordability issue faced by individuals, especially those aged 18-24 and those aged above 54 years.

Furthermore, in comparing the profile of insureds by occupational categories, government employees comprise largest proportion of subscribers to personal health insurance. With greater interest among government employees for medical services provided by the private sector, NHI could be part of the public sector employment benefits to attract better talents into the public sector. NHI when introduced can be extended to homemakers/ unpaid workers, and retirees who are proportionally among the lowest who subscribe to personal health insurance plans provided by the private sector.

In a market characterised by advantageous selection, lower risk individuals will benefit from the lower premium. When the pool is disproportionately monopolised by lower premium paying insureds, a high claim from a member may disrupt the pool which may result in inevitably higher premium for the pool members. The ability to effectively manage the risk pool and make adjustment or match reimbursement with a beneficiary's expected cost is critical especially when insurers have a number of competing products. Continuous adjustment of premium to match the loss ratio from claims will be a concern to policymakers.

Instead of continuously adjusting premium, post-selection benefits may be achieved if insurers are able to adopt initiatives that will improve insureds' health risk level to the advantage of insurers. In the US where healthcare costs associated with risky behaviour of inactivity continue to increase, insurers adopt wellness programmes in response to the problem. An insurance provider, Blue Care Network (BCN) of Michigan, launched such a programme for its subscribers targeting smokers and those with BMI greater than 30. Insureds are required to participate in

the insurer's weight-management programme until the BMI falls to below 30 and smokers have to attend a tobacco cessation programme until it is proven through monitoring through urine or blood tests that they no longer use tobacco. Those insureds who reach this enhanced level of wellness benefit through reduced deductibles and co-payments (Blue Care Network of Michigan, 2017).

In Malaysia, AIA started providing incentives to those who participate in a healthy lifestyle. In their Vitality programme, the incentives are based on the points collected from participation in physical activities such as running and workouts or participation in organised sports events, attending nutrition assessment and consultations, as well as participating in health checks. Points are tracked and updated though a fitness device linked to a mobile application or entered manually into the application. The rewards from the points range from discounts for services and products to an additional insurance protection of up to 45 per cent (AIA, 2016).

The initiatives by BCN in the United States and AIA in Malaysia should be encouraged and expanded for greater participation by all players in Malaysia with incentives to include reduced premium payments. The insurance associations, together with the Ministry of Health and Bank Negara Malaysia can take the leading role to improve the overall health status of Malaysian insureds through such programmes which can eventually reduce healthcare expenditure, health insurance premiums and improve the financial health of insurers.

5.3.2 Thesis Limitation

The study used NHMS 2011 data that was already collected and archived. The advantage of using secondary data is the savings in the collection time and costs. The large volume of data allows for generating hypotheses and better statistical analysis. However, since the survey was not designed specifically for this study objectives, there was a limit to the usage of the data. For example, the data on health insurance ownership did not specify the ownership of either takaful or conventional insurance even though takaful is increasingly becoming more popular in the Malaysian market. In addition, the available data on employment is categorized by sector of employment such as private, government and self-employed. This is while the ownership of personal health insurance is often associated with occupational status or hierarchy of employment as suggested by King & Mossialos (2005) and Foubister et al. (2006). Without such employment data, the association between ownership of personal health insurance and occupational status may not be able to be established. Another possible limitation of the study involves cases having more than one health insurance policy. Individuals may be covered by both personal and employer-sponsored health insurance plans. Such cases were excluded from the study for fear of possible wrong inference in the responses. This resulted in the information regarding the decision to own personal health insurance among cases with dual cover not being taken into consideration for analysis. Even though it may not impact the overall findings due to the availability of large data, the results may be otherwise for small dataset. These are limitations of the current study and areas for further investigation.

5.3.3 Future Research

Theoretically, advantageous selection occurs when individuals who buy health insurance have their health risk status negatively correlated with risk aversion. The extreme ends of both risk factors may not necessarily be observed as the level of riskiness can fall within a spectrum from low to high. The study explored the use of three levels of risk aversion (high, moderate, low) which complicated the making of decision on absolute direction of the equation. While it is conclusive that advantageous selection exists in the Malaysian health insurance sector, it nevertheless could raise the question of whether insurers may find it advantageous to select: 1) individuals who have low health risk and are moderate risk-takers, 2) individuals who are high health risk but high in risk aversion, and 3) individuals with low health risk and high risk taking (low risk aversion). Exploring the effects of selection based on the different health risk and risk aversion levels is a topic for future research.

This study used SAHS as the measure for health risk status. Using one variable is not the only manner to measure health risk status. Fang, et al. (2008) suggested that any private information could function as a source of advantageous selection if it could provide evidence of the opposing direction of health risk and risk aversion. Future research may consider using other measures of health risk status including the use of the combination of 36 illnesses that make the standard health insurance cover. However, data on the 36 illnesses was not available for the study.

In this study, occupation has not been found to be a significant predictor of ownership of personal health insurance. This is in contrast to many other studies.

Perhaps the usage of sectorial occupation may not result in better prediction of ownership of health insurance. Future studies should consider occupational status or hierarchy as in King & Mossialos (2005) and Foubister et al. (2006) to replace sectorial category.

The survival of health insurers depends on enrolling younger individuals into their health plans. The revenue from young and healthier individuals who seldom visit a doctor is supposed to offset the cost of medical expenses incurred by the older and sicker ones. While the introduction of NHI may partially improve the enrolment, the challenge in attracting young and healthy individuals into a personal health insurance plan requires further investigation that takes into consideration the health risk, healthcare needs, risk behaviour, and the willingness to pay the premium. This is clearly an important topic for further research.

The study concludes that females are more likely to own personal health insurance. The factors that motivate females towards ownership of personal health insurance are not entirely known even though the supposition is that females now play a bigger role in the family including in making the decision to purchase insurance. Understanding the factors that motivate females towards the ownership of personal health insurance will make good subject for further research.

Finally, it is recommended that further research be undertaken to investigate the factors affecting the ownership of health takaful. The study could consider choices of health takaful that cover both medical expenses and critical illness, which is not covered in the current study.

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