Centre for International Health

Health Insurance in Developing Countries: Willingness to Pay for Health Insurance in Thailand using Discrete Choice Experiment Methods

Anoo Nanna

This thesis is presented for the Degree of
Doctor of Philosophy
of
Curtin University

April 2011

Declaration

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledge has been made

Signature:

……

Date: 31.10.2011

Abstract

In Thailand, a universal health insurance coverage policy was implemented in 2001 alongside the reform of public health insurance. Since the reform, Thailand has had three major public health insurance schemes of the Social Security Scheme (SSS), Civil Servant Medical Benefit Scheme (CSMBS) and the Gold Card scheme. These three schemes covered more than 90 percent of the Thai population in 2003, moving the country closer to universal coverage.

The Gold Card scheme was a new public health insurance scheme, introduced in 2001 and covering the majority of Thai population. The scheme is designed to provide coverage for those on low and middle incomes and, thus, plays a vital role in the drive towards universal coverage. There are problems that need to be rectified in this scheme, including financing feasibility, the need for additional sources of finance and the problems of contracted hospitals in the Gold Card scheme.

This thesis seeks to elicit the willingness to pay (WTP) for public health insurance (the Gold Card scheme) in Thailand by using a Discrete Choice Experiment (DCE) approach. DCE provides an interesting application to decision- making in health care financing and this study is the first to use the DCE approach to elicit the WTP for public health insurance in Thailand.

WTP may help policy makers understand the communities' preferences because it is elicited through community consultation. Although insured people in the Gold Card scheme currently pay nothing for accessing health care, the DCE approach finds that insured people may be willing to contribute to the cost of running the scheme through the payment of a premium.

The DCE was conducted in the northern part of Thailand from 1st August to 31 October 2009. The sample size comprising 1,200 heads of households from five districts who are covered by the Gold Card scheme were surveyed and interviewed. Both qualitative and quantitative methods were used. Qualitative methods were used to collect socio- economic status, health expenditures, hospitalisation and financing experience. Quantitative methods were used to analyse DCE data.

The study finds that the Gold Card scheme is very important for respondents and if the Gold Card scheme is able to extend the choices of health care providers and the waiting time in Out-Patient-Department (OPD) can be reduced, insured people would be willing to pay a premium for the Gold Card scheme.

Thus, it is possible that premium payment can be used to raise additional funds for the Gold Card scheme. This study recommends that as long as other additional public funds such as tax reform cannot be sourced, the Gold Card scheme may require the insured to pay the premium in order to ensure its long-term viability.

ACKNOWLEDGEMENTS

It gives me pleasure to be finalising this research. I would like to share credit with and express my sincere thanks to a number of individuals: Firstly, I wish to thank Prof. Sandra Hopkins for her rigorous support, guidance, encouragement and, supervision during my studies. In addition, I am grateful to Prof. Jeffrey Petchey for his encouragement and supervision. I am also grateful to Prof. Ian Kerr, as well as Prof. Peter Zweifel of the University of Zurich for kind assistance and support.

I acknowledge the assistance and generous support of A/Prof. Jaya Earnest, postgraduate research coordinator, Centre for International Health and Jo Boycott, Curtin Business School Higher Degree by Research Student coordinator. I offer my appreciation to the Librarians at Curtin University. In addition, I owe a great deal to the staff of Curtin University Student Support Centre.

I would like to mention the friendly support of my fellow PhD student, Arnold Kihaule. I am also very thankful to my research assistants for aiding me in conducting the survey for this study. I also acknowledge the generous support of members of the Health Insurance System Research Office (HISRO) of Thailand, particularly Patchanee Thumvanna. I am thankful to Australia government for supporting for my doctoral program course fees. I also acknowledge the financial support from Curtin University for my studies.

I would sincerely like to thank my mother Vilaiwan and the Nanna family for financial support and encouragement during my study period, and it is to them that I dedicate this work, with gratitude.

Table of Contents

List of Tables

List of Figures

Abbreviation and Acronyms

SSS	Social Security Scheme
CSMBS	Civil Servant Medical Benefit Scheme
WTP	Willingness to Pay
DCE	Discrete Choice Experiment
MWS	Medical Welfare Scheme
HCS	Health Card Scheme
NHSO	National Health Security Office
HISRO	Health Insurance System Research Office
CV	Compensating variation
EV	Equivalent Variation
OPD	Out-Patient-Department
MRS	Marginal Rate of Substitution
$A	Australia Dollar

Chapter 1: Introduction

1.1 Background

Health insurance is central to improvements in population health status, as it subsidises access to health services during periods of ill health. Health insurance enables the transfer of money between a state, when a person is healthy, to reimburse the losses when a person is sick.

Health insurance is a method of pooling risk, so that members do not suffer from financial catastrophe in the face of illness. Health insurance needs to be effective as possible in ensuring that the basic health and medical needs are covered. Thus, sustainable funding of the insurance pool is crucial. Many developing countries such as Thailand face issues of financial sustainability of their insurance pools due to reliance on variable tax revenues and donor funds.

Thailand is seeking to achieve universal health insurance coverage. Since the reform of the health insurance system in 2001, Thailand has had three major public health insurance schemes which are the Social Security Scheme (SSS), Civil Servant Medical Benefit Scheme (CSMBS) and the Gold Card scheme. These three schemes covered more than 90 percent of the Thai population in 2003, moving the country close to universal coverage.

The Gold Card scheme for those on low and middle incomes plays a vital role in the drive towards universal coverage because it includes more than 70 per cent of the Thai population. Unfortunately, there are many problems that need to be rectified in this scheme, including financing feasibility, the need for additional sources of finance and the problems of contracted hospitals in the Gold Card scheme. Thus, the Thai government is focusing on solving these problems.

1.2 Motivation for the Research

This study seeks to elicit the willingness to pay (WTP) for public health insurance (the Gold Card scheme) in Thailand by using a Discrete Choice Experiment (DCE) approach. Studies using DCE to elicit WTP for health insurance have been carried out in developed countries such as Switzerland and the U.K (Ryan and Gerard 2003, Zweifel et al. 2005 and Zweifel et al. 2006). There are also some WTP studies available in developing countries such as Africa, however, these studies did not use the DCE method (Dong et al., 2006). There are three motivations in this study.

Firstly, Thailand is actively seeking to achieve universal health insurance coverage via a public health insurance scheme known as 'The Gold Card scheme'. Unfortunately, as mentioned earlier, there are many problems in this scheme. Thus, eliciting WTP may help the policy maker to understand the communities' preferences because WTP is elicited through community consultation.

Secondly, this study estimates the WTP for public health insurance in Thailand. Although insured people in the Gold Card scheme currently pay nothing for accessing health care, insured people may be willing to contribute to the cost of running the scheme through the payment of a premium.

Innovations in the insurance product such as extended choice of contracted healthcare providers and a reduction in waiting time in the Out-Patient- Department (OPD) may make the insurance sufficiently attractive to induce Thai people to pay the premium for the running of the Gold Card scheme. Thus, in this way, the Gold Card scheme may obtain more funds.

Thirdly, the Gold Card scheme cannot operate smoothly due to lack of funds each year. If Thailand wishes to achieve universal health insurance coverage, it is desirable that those who are covered under the Gold Card scheme need to learn and understand that there is both a direct and opportunity cost in accessing health services.

In other words, one of the ways to ensure that all Thais have basic health insurance coverage may be to charge them a small premium rather than place them in a situation where they are uninsured and may face catastrophic health expenditures in the future.

1.3 Research Objectives

The primary research objective is to elicit the WTP for health insurance, the Gold Card scheme, in Thailand. The WTP is elicited by using a Discrete Choice Experiment (DCE). WTP for the Gold Card scheme can indicate a possible additional source of finance for the Gold Card scheme. The specific research objectives are as follows.

Objective 1: This study elicits the WTP for the Gold Card scheme in Thailand by using DCE.

There is no official WTP research on health insurance in Thailand, whereas many developing and developed countries such as Switzerland, Taiwan and South Africa have used WTP in order to re-design their health insurance system (Dong et al., 2005, Zweifel et al. 2006 and Land and Lai, 2008). WTP is embedded in the practice of cost–benefit analysis which entails the use of money as a proxy for utility and is important because it enables the community to have a voice and represent their demand for services in the absence of a price mechanism.

The DCE technique can help this study to elicit WTP more accurately and reliably. DCE can overcome problems such as respondents' biases and the warm glow effect which can occur in more traditional techniques such as the Contingent Valuation approach. These problems can be avoided because respondents are faced with more reality about decision making.

DCE allows different alternatives to be described by a wide range of attributes. Respondents are able to deal with more numerous attributes in DCE (Riedesel, 2001).

Objective 2: This study aims to recommend an alternative source of funds for the Gold Card scheme

The problems of the Gold Card scheme are long term financing feasibility, and thus a need to access additional sources of finance. This research focuses on the issue of financing feasibility and additional sources of finance because, if Thailand wants to achieve universal coverage, the financing sustainability of the Gold Card scheme is vital.

Currently, tax revenues are used to finance the Gold Card scheme. Although the government tries to allocate more funds to the Gold Card scheme every year, available evidence clearly shows that the Gold Card scheme requires more funds from other sources (Chanduaywit et al. 2006). Many contracted health care providers have withdrawn themself from the scheme and many teaching hospitals are complaining that the current reimbursement rates are too low.

There are three reasons that the government cannot allocate sufficient funds to the scheme. First, a policy of universal coverage is costly and may not be achievable in a middle income country with modest tax base. Second, Thai politicians have marketed the Gold Card scheme to the electorate as a free program resulting in many Thais not appreciating the real cost of providing the health services. This makes it extremely difficult to get more funds from the demand side.

Third, in spite of efforts to do so, the government has been unsuccessful in combining health funds into one with a single payer. A single payer cannot be achieved easily in Thailand because the CSMBS and the SSS are not willing to transfer their funds to the Gold Card scheme.

A single payer would have the advantage of transferring from a relatively low-risk pool (The Social Security scheme) to a high risk-pool (the Gold Card scheme). (NHSO 2004)

Other sources of finance for the Gold Card scheme such as tax reform are politically unpopular and problematic, and consequently have not happened. Whereas, a premium which can be set more easily from people's WTP may be considered as another source of finance for the Gold Card scheme. The results of WTP for the Gold Card scheme may aid the re-design of Thailand's health insurance system by potentially revealing more funds for sustainability. The financial health of the Gold Card scheme will assist in propelling Thailand towards universal health insurance coverage.

Objective 3: This study collects and analyses socioeconomic data, health status and health expenditures in order to understand the characteristics of insured people

A questionnaire is used to collect socio-economic, health status and health expenditures data from respondents. The overall objective of collecting and analysing socioeconomic, health status and health expenditures data is to understand the phenomenon being studied (Cavana et al. 2000). Thus, analysis of socioeconomic, health status and health expenditures data will aid in understanding respondents' behaviours and preferences with respect to the Gold Card scheme. These results will be used to link to the DCE results in order to explain more dimensions of the WTP.

1.4 Research Methods

This research uses a Discrete Choice Experiment (DCE) to elicit WTP for health insurance in Thailand which means that both quantitative and qualitative methods are used.

Ryan et al. (2001, pp. i55) state that "Discrete choice experiments are based on the premise that, firstly, any good or service can be described by its characteristics (or attributes) and, secondly, the extent to which an individual values a good or service depends upon the nature and levels of these characteristics. The technique involves presenting individuals with choices of scenarios described in terms of characteristics and associated levels."

Ryan et al. (2001, pp. i55) further explain that "For each choice they are asked to choose their preferred scenario. Response data are modelled within a benefit (or satisfaction) function which provides information on whether or not the given characteristics are important; the relative importance of characteristics; the rate at which individuals are willing to trade between characteristics; and overall benefit scores for alternative scenarios." DCE overcomes problems which normally occur when using the traditional method known as Contingent Valuation.

1.5 Data Sources and Limitations

The DCE was administered from 1st August to 31 October 2009. The sample size for this study was 1,200 heads of households from five districts in the northern part of Thailand who are covered by the Gold Card scheme. Both qualitative and quantitative methods were used. Qualitative methods were used to collect socio- economic status, health expenditures, hospitalisation and financing experience. Quantitative methods were used to analyse the DCE data.

Limitations of this study, which are discussed in detail in chapter 8, need to be considered in interpretation of the results and taken into account in future research. There are three limitations, which may cause estimation errors in this study. These limitations are attributable to the weakness of the DCE technique itself, the limitations of the design of this study and the errors which could occur in a household survey.

1.6 Organisation of the Research

This research is organised into nine chapters. Chapter Two provides an overview of the theory of insurance with application to health care. Chapter Three reviews the Thailand health insurance system before and after the reform in 2001. This chapter discusses problems with the health insurance system in Thailand.

Chapter Four presents the theory of the Willingness-to-Pay (WTP) approach in micro economics. Chapter Five presents the model of eliciting WTP which focus on DCE methods. Chapter Six shows how DCE in this research was designed and constructed step-by-step and then Chapter Seven discusses the method used to collect data such as socio-economic, health status and health expenditures data.

Chapter Eight provides DCE estimation results of the WTP for the Gold Card scheme in Thailand. Chapter Nine concludes with the discussions of results, recommendations on additional source of funds for the Gold Card scheme, limitations of the study and the suggestions of areas for future research.

Chapter 2: Literature Review

2.1Introduction

The chapter provides an overview of the theory and design of health insurance with special application to developing countries. Imperfections in health insurance markets render the achievement of a competitive equilibrium improbable. Thus insurance design has to accommodate market failures such as moral hazard and adverse selection problems. Efficiency and equity issues are also discussed in this chapter.

Finally, the chapter reviews the development of health insurance systems with a focus on risk pooling and the willingness to pay (WTP) and the community' preferences for health insurance schemes. The method of eliciting WTP and community' preferences are also discussed. The context in this chapter can be applied to construct a foundation for discussion in the reform of health insurance systems in many developing countries including Thailand.

2.2 Health Insurance

2.2.1 Why Health Insurance?

Health insurance is important because health status is associated with uncertainty and risk. Having a heart attack or breaking a leg, for example, can happen anytime in our life. When an accident or serious illness occurs, health insurance can cover some of the financial losses. Health insurance enables the transfer of money between the usual state (when a person is healthy) to reimburse the losses when a person is sick.

Getzen (2004, p.67) states that "from an individual perspective, insurance generates net benefits by allowing trade between two possible states of the world: a little money in the usual state (when a person is healthy) is given up to get a lot of money in an unusual and difficult state (when a person is sick). From society's point of view, insurance is a method of risk pooling so that one person's loss is shared across many people rather than borne by that person alone."

Getzen (2004) further notes that health insurance is a method of pooling risk so that sick people and healthy people join the same health insurance pool rather than paying for treatment by themselves. In the other words, if all people join a health insurance fund, the pool of collected funds should be sufficient to compensate the sick people.

Smith and Witter (2004) also contend that risk pooling has two objectives: the reduction of individual uncertainty associated with health care needs (an efficiency issue) and a transfer of health care resources between individuals or households (an equity issue). Local considerations are very important to the design of a health insurance system such as preference for equity of payment, nature of existing information bases, nature of major health priorities and size and geography of the country.

According to the above discussion, health insurance is very important for many reasons. Governments in many countries offer health insurance to their citizens. However, there are many kinds of health insurance systems. Types of health insurance systems in the world are discussed in the following section.

Health insurance systems may need to be reformed in many developing countries because health expenditures may be a cause of poverty. Gottret and Schieber (2006) show the poorer the country the larger the amount that is out-of-pocket. They estimate the average amount as 93 percent in low income countries and 85 percent in middle income countries. Out of pocket expenditures is the most inequitable source of health financing.

2.2.2 Types of Health Insurance

There are four types of health insurance systems. These are national health insurance, social health insurance, private health insurance, and medical saving accounts.

2.2.2.1 National Health Insurance

National health insurance can be found in many countries, including Australia, Canada, New Zealand, Japan and the United Kingdom. National health insurance means that the government provides health insurance for its citizens. Public national health insurance schemes offered by the government are normally the main health insurance in such schemes. However, private health insurance can play a complementary or supplementary role in the national health insurance system.

The majority of national health insurance systems are funded primarily by tax revenue. Single funder or single-payer is used in many of these countries. However, some nations, such as Taiwan, employ a multi-funder or multi-payer system in which health care is funded by private and public contributions.

The main characteristic of a national health insurance is that the national health insurance is normally financed through many forms of tax such as general tax revenue, a levy on taxable income and consumption taxes. People may pay tax at different rates, however, health benefit packages are the same for all people. In the other words, the national health insurance provides the same health benefits to all people regardless of their ability to pay when people need to access health care services.

National health insurance can help to deal with a free rider problem. A free rider problem arises when a person can access the benefit from a "public good" without contributing to the cost of producing those benefits.

The free rider problem is solved under national health insurance because generally all citizens are covered by public health insurance and contribute to the tax revenue of the country.

Countries such as Australia and United Kingdom are good examples of national health insurance systems because these countries have had national health insurance for a long time.

In Australia, the Commonwealth government offers universal access to health care, regardless of ability to pay, via the government health insurance system called Medicare. Medicare is financed through general taxation and a compulsory tax levy on income, while private health insurance is an additional voluntary health insurance for Australians. (Healy, 2002)

Likewise, the UK National Health Service (NHS) covers all legal residents of the United Kingdom. The constituent countries of the United Kingdom of England, Wales, Scotland and Northern Ireland have the responsibility for delivery of health care and delivery is frequency devolved to local bodies such as Primary Care Trusts in England and Health Boards in Scotland (Dixon and Robinson, 2002). NHS is financed via national taxation.

2.2.2.2 Social Health Insurance

Social Health insurance is funded by employees and employers possibly with subsidises from the government. Funds for the social health insurance are collected in advance mainly in the form of premiums. Social health insurance may be compulsory which means that all people must join the fund, but it may also cover only part of population. For example, people in the formal sector can be covered by the social health insurance and people in informal sector are left to purchase health insurance voluntarily. (Eldis, 2006)

The first social health insurance fund was established in Germany in 1883. The important characteristic of the social health insurance is quite similar to the national health insurance as the contributions are not linked to the risk of individuals and individual' s ability to pay. For example, in the case of social health insurance contributions are proportionate to income, then, the elderly member may actually pay less than young people. On the other hand, in the case of unregulated private health insurance, the elderly have to pay higher premiums than young people because the elderly are likely to have higher needs for health care. (Eldis, 2006)

Social health insurance plays an important role in health care systems in some developed countries. For example, in Germany, the health care system is mainly financed via payroll contributions. Social health insurance covers up to 88 percent of the population. Nine percent of the population are covered by private health insurance and two percent of the population are covered by free government health care while less than 0.2 percent is uninsured. (Busse, 2002)

Gertler and Strum (1997) claim that social health insurance often shifts the burden of delivering and financing health care to the private sector. They used cross-sectional household survey data from Jamaica to find out whether some burdens of health care were shifted to private sector or not. They found that people with social health insurance demand 30 percent more outpatient care from the private sector and the demand was lower for the public sector. However, Dow and Gertler (1997) use very similar methods to Gertler and Strum (1997). They found that although people with social health insurance demand more outpatient care in the private sector, there was no effect on public demand in Indonesia.

For developing countries, a report on "Social Health Insurance" was prepared by WHO in 2003. WHO (2003) concludes that universal health insurance coverage can be achieved through expanding social health insurance coverage for the poor in many developing countries. In general, only formal sector employees are covered by social health insurance. WHO (2003) notes that the rapid expansion of health insurance coverage without sufficient safeguards could result in loss of efficiency, effectiveness and protection for the poor.

Many Asian countries such as China, Malaysia, Korea, Indonesia, Mongolia, The Philippines, Thailand and Vietnam are considering, introducing, expanding or modifying social health insurance. Gertler (1998) mentions that the most important factor for moving social health schemes towards universality are relatively high levels of income, largely urbanized populations and had large formal sectors relative to informal sectors.

Gertler (1998) suggests that low-middle income developing countries should start introducing social health insurance in the formal sector where income levels are high, where economic growth is the fastest and where they are able to register these workers through the existing income tax collection systems. Then, they can slowly expand social health insurance sector by sector with an aim of achieving universality.

2.2.2.3 Private Health Insurance

Private health insurance is often voluntary and provided by for-profit organizations. Public health insurance schemes are normally financed through taxation, whereas, with private health insurance the money is paid directly by an individual to the health insurance pool (Sekhri and Savedoff, 2005). Alternatively, an employer may make contributions to the payment of premiums on behalf employees.

Private health insurance is normally supplementary to national health insurance and social health insurance. People can buy private health insurance in order to have extra health care benefits which are not offered from national health insurance and social health insurance. However, the cost of private health insurance plan may depend on the insured's risk and ability to pay in some countries. For example, premiums will be higher for people who are not healthy and older on the basis that they may require more health services than younger people.

Many developed countries such as Australia, and the United Kingdom use private health insurance as a supplement to public health insurance. However, private health insurance covers the majority of the population in a few countries. For example, in the United States, the private sector plays an important role in financing, purchasing and delivering health care services to the community.

In the United States nearly two-thirds of the non-elderly population is covered by private health insurance. Employers are the primary purchasers of health insurance benefits for their employees. The remaining one-third is covered either under the public health insurance (Medicare and Medicaid) or is uninsured. (Ernst and Young, 2003)

For developing countries, Sekhri and Savedoff (2005) suggest that out-of-pocket expenditures account for the highest share of total health spending. Hence, private health insurance could play a part in moving towards greater prepayment and risk pooling in these countries.

The role of private health insurance is supported by Zweifel and Pauly (2004) who contend that a model of voluntary private health insurance with targeted subsidies is feasible. For example, in the U.S.A., Medicare beneficiaries were offered an option that insured people are able to receive their Medicare benefit from private health insurance plans, instead of through the Original Medicare Plans. These programs are known as the "US Medicare + Choice".

2.2.2.4 Medical Savings Accounts

A Medical Saving Accounts is a tax-free bank account in which people are able to deposit money to reduce future health expenditures. The Medical Savings Accounts policies include specific criteria for saving and withdrawals mechanisms. However, the Medical Saving Account policies are not necessarily the same for all countries. There are three main objectives of Medical Savings Accounts. The first objective is to encourage saving for the expected high cost of health care in the future. The second objective is to control the health care expenditures. The third objective is to build extra funds for health care systems. (WHO, 2002)

According to WHO (2002), Medical Savings Accounts can be either voluntary or compulsory. In some countries such as China and the United States, Medical Savings Accounts are voluntary. For instance, China's pilot Medical Savings Accounts was limited to two cities and Medical Savings Accounts were compulsory only for all public enterprises and government employees.

WHO (2002) points out that Medical Savings Accounts should be compulsory for all citizens, otherwise, voluntary enrolment may result in only low risk people want to join the Medical Saving Accounts.

In this case, the premium in traditional health insurance programs would be expected to increase due to having only high risk people in the health insurance pool. This is an adverse selection problem which will be discussed in the next section.

In Singapore, the Medical Savings Accounts or Medisave is one of the three major sources of financing in the Singapore's health care system and Medical Savings Accounts are compulsory in Singapore. There are two types of Medisave.

First, the Ordinary Account where saving can be used for housing, education, health insurance and other approved investments. Second, the Special Account is for old people and provides a contingency for retirement-related products. In Singapore, 6 to 8.6 percent of the employee's wage is allocated to an individual's Medisave account. (WHO, 2002)

In summary, there are four types of health insurance systems. These four types are national health insurance, social insurance, private health insurance, and medical savings accounts. In the next section, the characteristics of health insurance markets are explained.

2.3 How Can Health Insurance be Funded

Taxation revenue is used to finance health insurance in many developed and developing countries. There are two types of taxes. The first are direct taxes where the government receives tax payment directly from their citizens (Wilson-Rogers and Pinto, 2010) and include personal and company income taxes, payroll taxes and property taxes. Phelps (2002) mentions two points about direct taxes. First, he explains that income tax financing can be progressive redistribution or at least proportional to their citizens' income. Otherwise, regressive tax financing means that low and middle income people are asked to pay tax proportionally higher than high income people.

Thus, the tax burden may fall heavily on these low and middle income people. Second, many direct taxes such as payroll taxes tend to be regressive in many developed and developing countries as the contribution are proportionally higher on lower incomes.

A second type of taxes is indirect taxes in which taxes are shifted from the original payer to a consumer of commodities and services such as consumption taxes. Various types of indirect taxes such as VAT in Canada are used to finance health insurance. (Wilson-Rogers and Pinto, 2010).

However, tax systems in many developing countries do not provide sufficient funds for their health insurance system due to the narrow tax base and ineffective tax collection in many low and middle income countries (WHO, 2002). Other sources of finance include out-of-pocket payment, donor funds and charities. Middle East countries with substantial oil and other natural resources may choose to use the revenues to fund their health care.

Next, voluntary health insurance can be established. Individuals, then, are required to pay a premium directly for voluntary health insurance with or without tax subsidies, thus, health insurance can be funded. Tax subsidies in this case aim to encourage certain types of behaviour.

For instance, Australia encourages high income people to buy private supplementary health insurance for extra hospital cares through the tax system. Donor and charities can contribute to the financing of health insurance. This option can be very important especially for low income countries.

2.4 Funding Health Insurance and the Characteristics of Developing Countries

Developing countries are characterised by low levels of GDP per capita, underdeveloped infrastructure and large informal sectors. Combined these characteristics limit the availability of funds for tax financing of health insurance and limit the membership of social insurance schemes to those working in the public sector and for large private corporations. Thus, developing countries tend rely more heavily on donor funds and out-of-pocket payments to funds health care. The use of out-of-pocket payments is impoverishing for the poor and creates a barrier to access to even the most basic health care.

Smith and Witter (2004) find that households in developing countries are increasingly paying directly for health services: a payment mechanism among the least equitable from a risk-pooling point of view. He further states that many developing countries' health insurance systems fail to transfer from low risk to high risk or from the rich to the poor.

Efforts to move towards universal coverage mean that public policy needs to focus on the harnessing of as many sources of fundidng for pre-payments as possible.

Creese and Bennett (1997) note that developing countries relatively large informal sectors, generating sufficient funds is problematic. Ajay et al. (2002) suggest that India, which has a large informal sector, can learn from the experiences of other developing countries' health insurance systems.

He found that, in India, only the upper and middle–income people are most likely to benefit by the current health insurance system. Thus, the government should focus efforts to expand health insurance coverage on the poor.

Development of a health insurance system in a developing country needs to consider the feasibility of funding due to the characteristics which render funding problematic. Based on the characteristics of developing countries, community health insurance could be a good option for developing health insurance system for these countries. Community health insurance is a locally based, builds on available funds in the households and generally cross-subsidises from healthy to sick household. The objective of community health is to enlarge the pool to make it more sustainable by either expanding it from rural to urban areas such as in Senegal or from urban to rural such as in many Africa countries. (Criel et al., 2009)

Criel et al. (2009) mention that community health insurance has five characteristics which are solidarity where risk sharing is included and premiums are independent of peoples' health risks, community-based dynamics where the schemes can be organized according to social characteristics such as geographic, participatory decision making and management, non-profit character and voluntary participation. These characteristic of community health insurance may aid developing countries to move towards universality and at the same time improve access to health care for its members.

Waelkens et al. (2005) assert that community health insurance may even reduce poverty and it may boost sustainable development and democratization at community level. To achieve these outcomes, increased social control and management transparency of community health insurance are required.

Jutting (2004) uses household survey data and a binary probit model to ascertain whether members of community-based health insurance in rural Senegal are better off than non-members. He found that insured members have a higher chance of using health care services and these members pay less significantly when they need health care than non-members. Gnawali et al. (2009) used propensity score matching to minimise the observed baseline differences in the characteristics of insured and uninsured groups and the observed difference in health care utilisation between these groups. They found that community-based health insurance in Burkina Faso impacts positively and significantly on health care utilisation, however, the benefit from the scheme is not enjoyed equally by all socioeconomic groups.

Sustainability of community health insurance can be achieved through combinations of civic voice, political stability, government stewardship and administrative competence. Unfortunately, the difficult part of running community health insurance in developing countries is that most of these countries do not have these particular contexts (Criel et al., 1999). For example, Carrin et al. (1999) and Liu et al. (2002) comment that although community health insurance in China known as Rural Cooperative Medical System (RCMS) which aimed to cover all rural populations has never disappear from the political agenda, both the communal administrative structure that employed the health workers and the collective welfare funds disappeared due to market-oriented reforms in 1984 resulting in 90% of China's rural people being uninsured in 1990s. Thus, China created a new RCMS again in 2003 in order to cover the whole of rural China in 2008.

Moreover, low enrolment in community health insurance is a major problem in many developing countries such as in Philippines due to voluntary membership (Yap, 2003). Thus, Criel et al. (2009) state that community health insurance cannot be developed easily, but it may be a good step for developing countries aiming to achieve sustainable universal coverage. Next, market failure in health insurance market is another issue that need to be concerned.

2.5 Market Failure in Health Insurance Market

The theory of a perfectly competitive market and its underlying assumptions holds that a free market can produce the best possible outcome for society (Witter et al. 2000). The assumptions are free entry and exit, perfect knowledge, many buyers and sellers, costless transactions, and mobility of factors of production. Unfortunately, many of these assumptions fail to hold in the health insurance market.

The health insurance market is likely to be an oligopolistic industry for three reasons. First, due to economies of scale in the industry, there are likely to be only a few sellers. Second, it is costly to get access to the information in the health insurance market.

Third, transactions costs are high so many potentially beneficial agreements cannot be negotiated. Thus, most of the assumptions of a "perfectly competitive market" do not hold and government intervention is often required. (Getzen, 2004)

Generally, health insurance design attempts to accommodate three market failures which are information asymmetry, adverse selection and moral hazard. Market failures imply allocative efficiency or social goals cannot be achieved due to the market imperfections. (Christie, 2004)

Information asymmetry is a significant issue in the health insurance market. Information asymmetry refers to the disparity in information between a consumer and producer in a transaction. For example, insured people may not fully reveal their health profile to insurers. Thus, insurers may not be able to set the appropriate benefit packages. Information asymmetry represents a market failure in health insurance market.

In a health insurance market, market failure arises due to adverse selection and moral hazard which derive from information failures (Arrow, 1963). Adverse selection and moral hazard are particularly acute in markets for health insurance requiring the development of health insurance policies to deal with these problems.

2.5.1 Adverse Selection in Health Insurance Market

Adverse selection occurs when community rating is used in combination with voluntary insurance (Getzen, 2004). Over time, the insurance pool become adverse for the insurer as premium increases lead low risk people to cancel existing contracts or not take up new ones

Adverse selection results in inefficiencies and market failure. It is inefficient because when adverse selection occurs in the health insurance market, low-risk people face a premium unfavourable given their risk profile. As a result, they will tend to purchase less health insurance.

Sustained welfare loss affects low-risk people who are unable to buy insurance at rates appropriate to their risk. In contrast, high-risk people will face a favourable rate and they will tend to buy more health insurance. (Folland, Goodman and Stano, 2001)

In theory, there are two methods which can deal with adverse selection. First, risk rating can deal with the problem of adverse selection. Risk rating means people with higher risk have to pay more than the average premium price. In the other words, a health insurance contract for healthy and unhealthy people should be offered with different premiums.

Healthy people should be offered a contract with a low premium but high co-payment. On the other hand, high risk or unhealthy people should be offered a contract with a high premium but no or small co-payment (Folland, Goodman and Stano, 2001; & Smith and Witter, 2004). Thus, the adverse selection problem that causes low-risk people to drop out of the insurance market can be minimised.

In practise, it is costly for a health insurance company to obtain information on who is healthy and who is unhealthy, therefore, insurance companies normally discriminate between groups of people based on past medical history, age and gender.

Second, compulsory health insurance coverage can be used to deal with adverse selection. Compulsory health insurance means that all people are forced by law to purchase health insurance. Thus, low risk people are not able to refuse to purchase health insurance and free ride on the health system.

With voluntary health insurance and community rating, low risk and high income people will not want to join the health insurance scheme as they have to subsidise unhealthy and low income people due to the adverse selection problem. For example, Wang et al (2006) use a unique longitudinal data set for 1,020 households and they found that although the subsidised voluntary health insurance scheme in rural China achieved a high enrolment rate, adverse selection still exists. They found that individuals with worse health status are more likely to enrol in the scheme than healthy individuals. Thus, compulsory health insurance coverage can reduce the adverse selection problem. (WHO, 2004)

2.5.2 Moral Hazard in Health Insurance Market

There are two types of moral hazard. Pauly (1968) contends that hidden information moral hazard is reflected in excessive consumption of medical services by insured individuals. Hidden information moral hazard means that the insurers may not have full knowledge of the risk profile of insured individuals. Informed insured individuals are likely to misrepresent their health by understating their risk of ill health.

Another type is hidden action moral hazard (Gordis, 1998). Hidden action moral hazard occurs where the precautionary actions of individuals are not observable. For example, an insurer may not know whether an insured person wears a seatbelt while driving.

Many studies have attempted to ascertain whether moral hazard exists in the presence of health insurance. Bulter and Worall (1990); & Bulter, Hartwing and Gardner (1996); & Conn and Walford (1998) believe that moral hazard could lead to inefficient cost escalation in the health insurance system and an inefficient increase in health care utilisation.

Studies such as, Butler and Worrall (1990) and Butler, Hartwing, Gardner, (1996) found that moral hazard does exist in the United States. These researchers believe that the increase in the costs of health care and utilisation are due to the moral hazard problem in the United States. Co-payment[1], deductible[2], co-insurance[3] and health savings accounts have been imposed on insured people to deal with moral hazard in many countries.

---

1 Co-payment means a fixed dollar amount that an insured person must pay to health care providers rendering the services or supply.

2 Some health insurance plans have a deductible, which require the patient to pay out-of- pocket the first, for example, $A 100 or $A 400 per year or per illness.

3 Co-insurance means patients may have to pay, for example, 5 percent or 15 percent of the bill.

First, co-payment, deductible and co-insurance could force patients to take measures to reduce the utilisation of health care services. For example, in the United States, results by Roemer (1975) indicate that the number of physician visits declined by 4 percent for individuals with co-payments compared to those people without co-payment.

The RAND experiments examined the effects of cost-sharing on use of medical services from 1974 to 1977 in the United States. They found that variation in the cost-sharing rate induced a clear change in health care utilisation (Newhouse, P., 1996, pp.79).

Newhouse (1995) mentions that if the price elasticity of demand for medical care is higher, cost-sharing such as a co payment has to be big enough in order to control the moral hazard problems. This can be a problem in many developing countries as the poor cannot afford the co-payments. Newhouse (1996) further found that cost-sharing clearly decreases the use of all types of services such as in-patient and out-patient services and dental services among adults and children. The poor and non-poor also decreased their expenditure for health services even though cost-sharing in the experiment was reduced for the poor. Breyer (1991) argues that it is possible that co-payments could make every insured person better off. He uses the Pareto-efficient allocative improvement principle to explain that a uniform and proportional co-payment rates and co-payment rates which are differentiated according to income and the degree of sickness can be used and every insured person is still better off than without co-payments.

Roemer (1975), however, found that the number of hospitalisations increased for people with co-payments. This can be supported by Helms, Newhouse and Phelps (1978) who found that although co-payment and deductible on insured people were introduced in California in 1972, there was a 17 percent increase in hospitalisations.

Rice and Matsuoka (2004) also found that the results of the effect of the co-payments on health utilisation are mixed. Of the seven studies, four studies concluded that an insured person with co-payments had not reduced their health care utilisation. (Balkrishnan et. al, 2001; Johnson et al., 1997; & Stuart and Zacker, 1999; & Tamblyn, 2001), while another three found that an insured person with a co-payment has a lower health care utilisation than an uninsured person in the United States. (Magid et. al, 1997; Blais et. al, 2001; Pilote et. al, 2002)

Second, Health Savings Accounts may be a good option to deal with the moral hazard problem. For example, in 2004, the Bush administration introduced Health Saving Accounts to deal with the problem. As President Bush explained "Health Saving Accounts all aim at empowering people to make decisions for themselves, owning their own health-care plan, and at the same time bringing some demand control into the cost of health care." (Galdwell, 2005, pp.4)

In other words, Health Saving Accounts move insured people a little bit closer to the uninsured because consumers are forced to be more responsible for health care access and costs by paying from their Health Saving Accounts. Thus, consumers may be more careful with the use of health care services. Hence, the cost of health care may be reduced.

Some health economists such as Mooney (1994) and Pauly (2003), on the other hand, believe that policy makers should not worry too much about moral hazard. Mooney (1994, pp.139) argues that moral hazard may not exist because economists still do not know exactly the shape of demand curve for health care.

Pauly (2003) further mentions that there is an optimal amount of moral hazard. He believes that policy makers should worry about the moral hazard problem ,if and only if, they can prove that the current utilisation of health care services is in excess of the optimal level of moral hazard or the current moral

hazard is larger than it should be when the level of insurance coverage is given. Otherwise, moral hazard may not be a serious problem.

In sum, "market failures" clearly exist in health insurance market. Asymmetry of information, adverse selection and moral hazard are factors which cause "market failure" in the health insurance market. Risk rating and compulsory health insurance are methods which can deal with adverse selection problem.

Although some health economists such as Mooney (1994) and Pauly (2003) do not think that moral hazard is a significant issue, co-payments, deductibles, co-insurance and health savings accounts have been used to deal with moral hazard problem in many countries. Thus, government intervention is needed in the health insurance market. The role of government and health insurance market is discussed in the next section.

2.6 Government and Health Insurance

Perfectly competitive market theory cannot be applied to insurance markets due to market failure as explained above. Thus, the government has to play an important role in terms of appropriate intervention in health care markets including in the health insurance market. The government intervenes in the health care markets by regulating private suppliers of health insurance and hospitals and providing information to consumers. Witter et al. (2000) shows the types of interventions in health care markets (see table 2.1).

Table 2.1: Intervention in Health Markets

Why intervene?	**Underlying features of health care markets**	***Examples of appropriate types of intervention***
1. To insure against risk	- Uncertainty of health needs - Importance of health - High cost of many health care goods	*- State finance or social insurance and/ or* *- Regulation of private to insurance to ensure access*
2. To increase access to important 'private' health goods	- Poor income distribution in society - Correlation between ill health and poverty - Caring externalities/ altruism	*- State finance of health care* *- Subsidies for basic health package or* *- income transfer through taxation and benefits system*
3. To increase consumption of 'goods' and decrease 'bads'	- Existence of public goods/ free rider problem - Existence of positive and negative externalities - Health as basic right and merit good	*- Subsidies/ taxes to increase/ decrease level of consumption or production* *- Free provision of public goods* *- Health promotion* *- Regulation of advertising*
4. To increase competition amongst suppliers	- Limited resources and unlimited needs in health sector - Need to increase efficiency and quality of services and maximise health gain - Limited number of suppliers and economies of scale or scope	*- Encourage active purchasing by consumers and their agents (e.g., health authorities)* *- Improved incentives for doctors/ hospitals* *- Improved information on performance by doctors/ hospitals* *- Privatisation and/ or 'internal markets' in public sector*
5. To control overall costs	- Agency relationship - Information problems about product - Tendency for cost escalation	*- Maintaining control over finance* *- Encouraging professional self-regulation* *- Active purchasing, using information on cost-effectiveness of treatments*

Source: Witter, Ensor, Jowett and Thompson (2000)

The role of government in developed and developing countries is very important. Smith and Witter (2004) suggest that the role of government in terms of "stewardship" of the health sector, 'community participation' and social solidarity plays a crucial role to support the achievement of a well functioning health insurance system. Carrin and James (2004) agree that the capacity of governments to make health insurance compulsory is necessary for achieving a mature social health insurance system. They mention that strong "stewardship" on the part of governments is needed. They claim that Germany is a good example for this aspect.

Government intervention is necessary to aid in the achievement of equity in the health system. Equity is important as health should be allocated to those with needs not on the basis of ability to pay. Equity is discussed in detail in the next section.

In other words, the government is often lobbied by interest groups who attempt to encourage or prevent public policy for their own benefits, and this result in firms, industries and organisations operating inefficiently and inequitably. (Folland et al., 2001). Appropriate government intervention needs to be carefully designed to improve health care objectives which emphasize equity and efficiency issues.

In short, appropriate government intervention is necessary in health insurance markets due to "market failure". Government intervention also tries to achieve the objectives of equity and efficiency.

2.7 Objectives of Health Care

2.7.1 Equity in Health Care Systems

There are many definitions of equity. Mooney (2003) states that equity cannot be defined in a straight forward way. This is because equity depends on both value judgment and health care objectives.

These might be equality of expenditure per capita, inputs per capita, access for equal need, utilisation for equal need or marginal met need. This is supported by Donaldson et al. (2004) who contend that there is no one universal equity measure but it depends on each health care system to choose its equity objectives.

In general, equity in health care systems is normally referred to as "equal access for equal need" by many health economists. Economists, such as Aday, Anderson, Fleming and Mooney, have strongly supported that access to health care is the key dimension of equity (Rice, 2003). There are also many definitions of "access" and "need" in health care. A wide ranging debate about equity in health care can be found in Culyer and Newhouse (2000).

However, some economists understand "access" as "receipt of treatment" (Wagstaff and Doorslaer, 2000). Tobin (1970) suggests that equality of access means that an individual should be able to get treatments regardless of their ability to pay.

Definition of "Need" in health care can also be very complicated. Williams and Cookson (2005) mention that "need" can be defined in at least three possible ways. These definitions can recommend very different distribution of health care. They show that three definitions of "need" are the person's initial level of ill-health, the person's capacity to benefit from health care and the expenditure required to equalise health (Culyer and Wagstaff ,1993). Capacity to benefit occurs when resources are directed to where people would get the most improvement in their health.

Mooney (2003) states that "need" is always involved with some third party such as a doctor , whereas, "demand" is all about consumer's judgement. He further explains that "need" may be 1) demanded and wanted, 2) undemanded and wanted and 3) undemanded and unwanted. For example, the case of wanted and undemanded need is where a patient may want treatment (want) but does not know how important it is to be treated so she does not go to see her doctor (undemanded). (Mooney, 2003)

Mooney (2003) further asserts that the Capacity-To-Benefit (CTB) approach[4]

According to this section, equity in health care can be very complicated. Economists have further separated "equity" into two types of horizontal and vertical equity in the health care system.

Horizontal equity means that people in equal need of care are treated equally (Van Doorslaer and Masseria, 2004, Mooney, 2003). In the other words, horizontal equity means people who have the same illness should have the same treatment regardless of for example, gender, marital status, nationality and education (Wagstaff and Doorslaer, 2000). Mooney (2003, pp.83) defines vertical equity as "the unequal but equitable treatment of unequals" or people with different conditions should be treated differently. Byrns (2006) further states that, in terms of vertical equity, wealthy people should be required to pay more tax than the poor in absolute terms.

[4] Mooney (2003, pp. 81) notes the sentence which is "the size of the problem should determine the amount of resources to be allocated to trying to fix the problem" can be challenged by using CTB approach. This is because CTB approach focuses on how much good can be done with whatever resources are available instead of focusing on the size of problem.

2.7.1.1 Views of Concepts of Health Equity

There are many concepts of health equity (Sen, 2001). Health equity includes achievement in health and it is not just the distribution of health care. Health equity also includes the fairness of the processes and, thus, it must attach importance to non-discrimination in the delivery of health care. Furthermore, an adequate engagement with health equity requires that the considerations of health be integrated with the broader issues of social justice and overall equity, paying adequate attention to the versatility of resources and the diverse reach and impact of different social arrangements.

An extra-welfarist approach is proposed by Sen rather than a welfare approach. The difference between the two approaches is that a welfare approach only focuses on individual levels of utility. However, for an extra-welfarist approach, there is an acceptance that good health provides people with the opportunity or capacity to achieve other desired things (Sen, 1992). Hence, an extra-welfarist approach holds that more resources would be allocated to poor and disadvantaged groups of people.

of equal access for equal need. may be the most useful approaches for the achievement of some aspects of equity. This approach is recommended because CTB allows added weight to relatively disadvantaged groups.

Another approach of enlarging the individual pursuit of utility when referring to health care is 'communitarianism' a notion developed by Mooney. Mooney (2003) describes 'communitarianism' as that all citizens are members of a society and get some form of utility or increased well-being from being members, being able to make a contribution to that society, and being an active member of that society (Mooney, 1994).

The view of communitarianism is very similar to the notion of social capital. Social capital actually has many definitions, however, social capital is built upon the literature on institutional capacity, social networks and community participation.

Woolcock (2000) notes that those communities who possess a rich stock of social networks and civic associations will be in a better position to deal with poverty and vulnerability, resolve disputes and take advantage of new opportunities (Woolcock, 2000).

There are many views of the concepts of equity. These views are useful to help health policy makers achieving appropriate health care policy in many countries. In additional, in dealing with the difficult issues of equity, many policy makers have to consider the ideologies of the egalitarian and libertarian schools to help them. The next section discusses the egalitarian and the libertarian theory in health care systems from the point of view of egalitarian and libertarian theory generally.

2.7.1.2 Ideology of the Egalitarian and the Libertarian Theory

Many policy makers debate the use of the egalitarian theory and the libertarian theory. Generally speaking, egalitarian theory states that health care should be distributed according to "need", whereas, the libertarian theory believes that health care should be distributed according to ability-to-pay.

Policy makers in most industrialized economies tend to place more emphasis on the egalitarian viewpoint in health care matters rather than libertarian. Hence, the notions of universal and equal access are very clear in most OECD countries. In many countries, policy makers made it clear that access to health care services should depend on "need" rather than on ability to pay. (Wagstaff and Doorslaer, 2000)

In contrast, many policymakers in the U.S.A. take a libertarian view in their health policy development. The reason may be that Americans may hold somewhat different views on the ethics of distributive justice than other countries.

A survey reported by Robert Blendon and his colleagues (1995) found that only 23 percent of Americans agree with the statement of "It is the responsibility of the government to take care of the poor who cannot take care of themselves." Whereas, 50 percent of Germans, 56 percent of Poles, 62 percent of British and French, 66 percent of Italians, and 71 percent of Spaniards aree with the statement.

In sum, equity in health care is complicated. Thus, the appropriate level of equity in health care can be determined by the role of government in terms of "stewardship" of the health sector which depends on each country's characteristics. The appropriate level of equity in health care can also be reached by using the proper definitions, concepts and ideology of "equity" which depend on each country's point of view.

Furthermore, Mooney (2003) suggests if the government acts according to the community's preferences health care systems in the country would be more efficient and equitable.

2.7.2 Efficiency

Efficiency means achieving maximum current welfare, outputs and benefits from existing resources and capabilities (Spechler, 2000). In general, there are two different types of efficiency concepts: technical efficiency and allocative efficiency.

Allocative and technical efficiency are important in health economics and in health care systems including health insurance systems because resource allocation and cost containment problems are a major issue. Resource allocation involves questions of how much of society's scarce resources should be devoted to health care and what are the priorities for health care and health insurance systems. (Mooney, 2003)

Technical efficiency is the best use of scarce resources to achieve useful programs. Technical efficiency is a cost-effective technique to select between alternative means of achieving the same results, and is also known as the pursuit of maximum quantity of output possible from a given allocation of inputs (Donaldson et al., 2004). Technical efficiency is the least costly quantity and mix of inputs which are used to produce the desired outcome. Relative prices of inputs, management and labour costs are very important factors for technical efficiency (Evans, 1984). However, technical efficiency does not imply that the "right" quantities of inputs have been allocated.

Evans (1984, pp.371) contends that "an economy is allocatively efficient if a reallocation of resources from one type of production to another could not be found which could make anyone better off without making someone else worse-off". Evans' statement is based on the concept of Pareto-Optimal Allocation. If there are two people, Pareto-optimal allocation occurs when there are no others allocations that make one of them better off while leaving the other at least as well off. (Eaton, 2002)

The concept of allocative efficiency is based on the utilitarian's idea of the maximisation of satisfaction for the greatest number of individuals who collectively form society (Donaldson and Gerard, 1993, pp.71). McConnell and Brue (2006) explain that allocative efficiency means that resources are being used to produce the goods and services most wanted by society. For example, although manual typewriters may be produced using the least cost techniques, if there is no demand for manual typewriters, then the production is not allocatively efficient.

In sum, there are two types of efficiency which are technical and allocative efficiency. These two efficiencies are important because health care resources are scarce. The concepts of efficiency are much clearer than the concepts of equity. Many health economists normally can use economic evaluation to improve efficiency in health care systems in many countries.

In general, economic systems are characterised by a trade-off between equity and efficiency. Mooney (2003) argues that this trade-off presents only in the vertical equity. In contrast, efficiency and equity move together with horizontal equity. Health care policy makers have to deal with these complicated health care objectives. An achievement of health care objectives depends on the role of government in each country. The next section of, this chapter moves on to discuss in details the development of health insurance systems.

2.8 Health Insurance System Development

There are three aspects that are very important in the development of a health insurance system. These include risk pooling in health care financing, the community's preferences and the willingness to pay for health insurance. The following section will elaborate on these three aspects.

2.8.1 Risk Pooling in Health Care Financing

Risk pooling in health care financing is important in the development of a health insurance system because there is uncertainty in health care expenditure. WHO (2000) defines risk pooling as "the practice of bringing several risks together for insurance purposes in order to balance the consequences of the realization of each individual risk".

Risk pooling means the collections of health revenues are transferred to purchasing organizations. Risk pooling makes sure that the risk related to financing interventions is borne by all the members in the pool and not by each contributor individually (Smith and Witter, 2004, pp. iii). Smith and Witter (2004) classified risk pooling into four types which are no risk pooling, unitary risk pooling, fragmented risk pooling and integrated risk pooling.

The first, no risk pooling means individuals have to pay for their own health care. There is no subsidy for the poor. The poor may be refused treatment due to financial problems. The second, under the unitary risk pool, revenue from general taxation, social insurance and premiums for health insurance is placed in a single pool that aims to cover specific benefit packages (Smith and Witter, 2004)

The unitary risk pool is mandatory for contributors, thus, all people including rich and healthy people must join the pool. Thus, the unitary risk pool is one possible policy response to deal with adverse selection, cream-skimming and transaction costs. However, due to health care providers being paid according to patient demand, there may be a strong incentive for supplier-induced demand resulting in over servicing. Thus, an appropriate payment mechanism such as fixed payment system and capitation method can be introduced that can reduce the incentive to induce demand. (Smith and Witter, 2004)

The third type is fragmented risk pools. Smith and Witter (2004) explain that managerial control and coordination are major problems in the use of a unitary risk pool. Thus, many countries use fragmented risk pools instead. A fragmented risk pool should be implemented according to geography, the nature of employment, socio-economics and personal choice. Members in a particular pool may be voluntary (as in the case of competitive insurers) or mandatory, however, it is desirable that all people are members of at least one pool.

The possible problem in this model is that many small risk pools may cause higher levels of variation in spending, high administration costs and uncertainty. This is supported by Martin, Rice and Smith (1998) who found that the number of pools have a negative effect on the variation in expenditure. Thus, many small risk pools cause higher variation in expenditure.

The last type is known as integrated risk pools. Integrated risk pools mean that finances can be transferred between individual risk pools. Hence, the problems of fragmented risk pools can be eliminated. Smith and Witter (2004) suggest that the operation of the system of transfers between risk pools can take many forms such as the form of central collection of revenues and disbursement to risk pools on the basis of estimated spending.

Under this model, financial transfers from low risk pools to high risk pools may be feasible. The problem in this model is that financial transfers between pools may not be easy. For example, in Thailand, financial transfers or subsidises from social health insurance or low risk pools to the Gold Card scheme have not been successful because the labour union leaders believe that the transfer could affect their benefits in the future. (Pitayarangsarit, 2005)

Risk pooling is very important for the development of health insurance because the uncertainty associated with health care expenditure can be reduced by using a risk pooling model. The more progressively integrated risk pooling means the less uncertainty in health care expenditure. However, in practice, an appropriate risk pooling model depends on the characteristics of each country. Health policy makers have to carefully choose models.

2.8.2 Community's Preferences and Willingness-to-Pay for Health Insurance

2.8.2.1 Community's Preferences

Mooney (2003) suggests that policy makers should issue a health policy according to the community's preferences. The development of health insurance should ideally be carried out according to the community's preferences.

The community's preferences can provide guidance to policy makers by producing an understanding of how consumers' preferences may affect their decision to join a health insurance scheme. Mooney (2003) also believes that eliciting community values is very useful in developing community autonomy such as 'Scandinavian solidarity'.

Dong et al. (2005) found that after eliciting and understanding community's preferences in West Africa, some households simply cannot afford the community-based health insurance in West Africa due to lack of financial resources. Policymakers should aim to subsidise the poor as the only means to guarantee equitable participation in a scheme. Thus, eliciting and understanding community's preferences can be very useful for policy makers in the design of desirable health insurance in many countries.

Another survey was done by Allegri et al. (2006) using a non-structured questionnaire to obtain people's preferences in West Africa. Their survey aims to understand the consumers' preferences and decisions in joining a community-based health insurance pool in rural West Africa.

Consumers' preferences relate particularly to the premium level, the benefit packages, the health service provider network and the managerial structure. They suggest that understanding these preferences may lead to a better accessibility for the poor and protection against the cost of illness.

2.8.2.2 Willingness-to-Pay (WTP) for Health Insurance

WTP approach estimates the maximum amount of money a person is willing to pay to obtain a particular benefit such as a health care service (Kielhorn and Schulenburg, 2000). WTP is a part of the community' preferences because the WTP is part of consumer demand. WTP aims to determine how much individuals are prepared to pay to reduce their risk of mortality and morbidity from the present (Mooney, 2003).

Zweifel and Breyer (1997) conclude that a trade-off between current consumption and probability of being healthy in the subsequent period can represent a short run marginal willingness to pay while marginal willingness to pay can be derived from marginal rate of substitution.

In health care, the use of willingness to pay means that income can influence the absolute level of benefit as those on higher incomes are likely willing to pay more for a unit of benefit than someone on a lower income. (Christophe and Marette, 2000)

Much research has been done in the areas of willingness to pay for health insurance. Dong et al. (2005) found that the mean and median individual and household willingness to pay for community based health insurance in West Africa was significantly higher for the rich than the poor. The Gini coefficient for individual and household willingness to pay and the curves of cumulative percentage of individual and household willingness to pay also suggest that the premium needs to be adjusted for income; otherwise, the poor will have less access to health services than the rich.

Zweifel, Schneider and Wyss (2005) found that distance from a nuclear power plant could have an effect on willingness to pay for health insurance coverage in Switzerland. The result suggests that distance proved to be a significant predictor of marginal willingness to pay for health insurance coverage, however, having the waste disposal problem solved has no effect on willingness to pay for general insurance.

Another study on the willingness to pay for general insurance has been done by Zweifel, Telser and Vaterlaus (2006) who found that consumers in Switzerland only have a small willingness to pay for their health insurance when there is a restriction on the freedom of physician choice and generic substitution. They suggest that restricting the freedom of physician's choice would require compensation for more than one-third of the premium.

Some authors, however, point out that eliciting willingness to pay is sometimes difficult. Ostrom (1998) states that designing mechanisms that accurately reflect beneficiaries' preferences and people' s willingness to pay for public goods is difficult and complex regardless of whether the providing unit is organised in the public or the private sector.

The difficulties and complexities are derived from the problem of preference aggregation which occurs when individuals with radically differing preferences are combined into one collective consumption unit.

Likewise, SHADAC[5] (2001) suggests that some survey questions designed to elicit how much an individual is willing to pay for an item or service are widely considered invalid and unreliable. The reasons are that respondents may overstate their willingness to pay for health insurance due to respondents giving socially desirable responses to a survey on health insurance.

Next, however, many health economists such as Gerard et al. (2008) and Zweifel et al. (2000, 2004 and 2005) believe that eliciting willingness to pay for health insurance is needed for the development of health insurance. Two popular approaches for eliciting the willingness to pay and community's preferences for health insurance are reviewed. The following section also shows that eliciting willingness to pay and community's preferences can be justified if an appropriate approach and survey design are used.

2.8.3 How to Elicit Willingness to Pay and Community Preferences for Health Insurance

There are two approaches for eliciting willingness to pay and community' preferences for health insurance. These approaches are elaborated on below.

[5] State Health Access Data Assistance Center

2.8.3.1 Contingent Valuation (CV) approach

Contingent valuation aims to obtain information on individual preferences by asking direct questions about willingness to pay for public good and services when prices are not available.

CV can normally be achieved by using questionnaires or surveys which ask people what they are willing to pay for a benefit or what they are willing to accept for a specific environmental characteristic. (Costales, 1995)

Diener, O' Brien and Gafni (1998) state that techniques including open-ended questions, payment cards, discrete choice questions and bidding games have been used by in many CV studies. Structured questionnaires with open-ended and closed questionnaires provide useable data that will show the community's preferences and willingness to pay for health insurance, benefit packages and satisfaction with current schemes and the health needs of their community.

Diener, O' Brien and Gafni (1998) also found that there appears to be large variation among health care CV method studies in terms of the type of questionnaires, format and the sampling of respondents.

For example, Dong et al. (2005) use quantitative methods such as a non-structured questionnaire to obtain people's preferences for the benefit package of community-based health insurance in Burkina Faso.

Another method is that of the bidding game used by Dong et al. (2005). They use a two-stage cluster sample in a household survey in Sub-Saharan Africa. Inequalities in willingness-to-pay for community-based health insurance were examined by expenditure quintiles using data collected from a household survey. Interview and bidding game methods were used to elicit willingness-to-pay for community-based health insurance.

However, some researchers note that the contingent valuation method has some weaknesses. The problem with CV is that normally only price is that all attributes of the questions are kept constant except price. It is likely that in, a real life situation, available alternatives are almost always different from the status quo in several attributes. (Zweifel, Telser and Vaterlaus, 2006)

The result from many CV studies may be unreliable for three reasons. First, starting point bias could cause unreliability in many CV studies. Mitchell and Carson (1989, p. 240) explain that starting point bias can occur because "Confronted with a dollar figure in a situation where he is uncertain about an amenity's value, a respondent may regard the proposed amount as conveying an approximate value of the amenity's true value and anchor his WTP around the proposed amount."

Starting point bias problem is agreed by Stalhammar (1996) who found that some studies in health care willingness to pay present evidence on a starting point bias. Diener, O' Brien and Gafni (1998) further mention that starting point bias can be a major problem in the CV methods such as bidding game. Mitchell and Carson (1989, p. 240) state that "Starting point bias occurs when the respondent's WTP amount is influenced by a value introduced by the scenario".

Second, respondents are likely to answer with "yes" when responding to discrete CV questions in order to express their motivations rather than their true preferences and willingness to pay. Third, unreliable preferences and willingness to pay could occur from the constructed market that is not real. (Zweifel, Telser and Vaterlaus, 2006)

It is recommended by Diener, O' Brien and Gafni (1998) that the use of computer-based interviewing will be an important future direction for the health care CV method where the bidding game and other elicitation methods can be used with randomized starting bids and with full multi-media presentation of valuation scenarios. Some health economists such as Zweifel

(2000) and Ryan (2004) believe the weakness of the CV methods can be avoided by using the Discrete Choice Experimental (DCE) method.

2.8.3.2 Discrete Choice Experiment (DCE)

The Discrete Choice Experimental (DCE) approach is an attribute based measure of benefit. There are two assumptions in this approach. First, health care interventions, services or policies can be explained by their characteristics and attributes. Second, an individual's valuation depends on the level of these characteristics. DCE is a very useful approach in public priority setting areas including community's preferences and willingness to pay for health insurance. (Ryan, 2004)

Farrar et al. (2000) find that discrete choice modelling is a very useful approach to be used within priority setting areas. In their study, they claim that discrete choice modelling can help policy makers select the optimal combination of clinical service developments within a limited budget.

Ryan et al. (2001) mention that DCE is useful for two reasons. First, it allows an estimation of the relative importance of the different aspects of care and in particular, the trade-offs between attributes and total satisfaction or utility that respondents gain from health care services. Second, DCE helps with decision making for some aspects in health insurance systems. This is supported by Telser and Zweifel (2005) who highlight that the study of the validity of the DCE approach for health risk reduction provides strong evidence in favour of validity of DCE method.

Zweifel, Telser and Vaterlaus (2006) assert that DCE is a very good method to elicit willingness to pay for health insurance because the disadvantages of contingent value can be avoided by using DCE. DCE is reliable because all attributes including price vary simultaneously in the course of the experiment, thus, marginal rates of substitution between all attributes can be

derived from responses. Thus, respondents' willingness to pay and preferences are able to be elicited more accurately.

DCE enables the drawing of indifference curves in attribute space in non-market goods such as health. DCE helps to determine relevant marginal rates of substitution in health insurance market (Zweifel, Telser and Vaterlaus, 2006). Thus, policy makers can design more appropriate health insurance systems by using the DCE approach.

DCE has been successfully used in market research, transport economics and environmental economics. For instant, DCE was used by the UK Treasury for eliciting quality in the provision of public services. DCE is used in many areas including eliciting community's preferences in the delivery of health services, priority setting in health care systems, developing outcome measures, setting optimal treatments for patients and establishing patients' preferences in the doctor-patient relationship (Ryan and Farrar, 2000). Zweifel et al. (2005, 2006) also use the DCE method in order to elicit willingness to pay for health insurance in Switzerland.

In sum, risk pooling, community's preferences and willingness to pay are very important factors in the development of health insurance systems. Risk pooling can be classified into four types. In additional, understanding community's preferences and willingness to pay are crucial. The Contingent Valuation (CV) and the Discrete Choice Experiment (DCE) are used to elicit community's preferences and willingness to pay for health insurance by many researchers.

2.9 Conclusion

This chapter provides an overview of health insurance systems and problems in the health insurance market. There are four types of health insurance systems which are national health insurance, social health insurance, private health insurance and Medical Saving Accounts. The funding of health insurance is discussed with the application to developing countries. Information asymmetry, adverse selection and moral hazard are mentioned because these three issues cause market failure in health insurance market, thus, government intervention is necessary.

Health care objectives – efficiency and equity are explained in detail. Health care policy makers have to deal with complicated health care objectives. The achievement of health care objectives depends on the role of government in each country. This is because equity in health care is complicated. The appropriate level of equity in health care can also be reached by using the proper definitions, concepts and ideology of "equity" which depend on each country's point of view. The development of health insurance systems which focus on risk pooling and the Willingness to Pay (WTP) and communities' preferences for health insurance scheme are also reviewed and discussed in this chapter.

Chapter 3: Overview of the Health Insurance System in Thailand

3.1 Introduction

Three main issues of public health insurance systems in Thailand are discussed in this chapter. First, an overview of the health insurance system in Thailand is provided. This section shows how Thailand has organised and managed their health insurance system in the 1990s. After the reform of health insurance system in 2001, Thailand has three major public health insurance schemes which are the Social Security Scheme (SSS), Civil Servant Medical Benefit Scheme (CSMBS) and the Gold Card scheme.

These three schemes covered more than 90 percent of the Thai population in 2003 which means that Thailand has moved towards universal coverage. Details of the structures and management of the SSS, the CSMBS and the Gold Card scheme are discussed. The discussion shows that the Gold Card scheme plays a very important role in order to achieve universal health insurance coverage.

Second, the current problems in health insurance systems are presented and analysed. The problem of the CSMBS is cost containment, whereas, the SSS has encountered problems with the quality of health care services. The problems of the Gold card scheme are financing feasibility, additional sources of finance and the problems of contracted hospitals.

Third, the future direction of the health insurance system in Thailand which focuses on additional funding for the Gold Card scheme such as tax reform**,** the development of payment mechanism and health resource allocation and the improvement of equity in the health insurance system should also be considered.

The focus of this chapter is on the Gold Card scheme as it plays an important part of the Thai government's goal to achieve universal coverage by providing coverage for low income households and informal workers in

Thailand. The scheme is currently free to all eligible members. This chapter shows that additional sources of finance are required in order for the Gold Card scheme to continue to provide basic health coverage to its members.

3.2 Overview of Health Insurance System in Thailand

3.2.1 Health Insurance System before the Reform

In the 1990s, the aim underlying health insurance in Thailand was that Thai people should be able to access effective health care services when needed. Health insurance should be able to protect Thai people from expensive medical care. There were four major health insurance schemes in 1990s. These health insurance schemes were established based on the above principle of health insurance.

The four major health insurance schemes were the Medical Welfare Scheme (MWS), Civil Servant Medical Benefit Scheme (CSMBS), Social Security Scheme (SSS) and Health Card Scheme (HCS).

3.2.1.1 Medical Welfare Scheme (MWS)

The MWS was established in 1975. The objective of the MWS was to improve equity of access within the health system. Hence, the poor and their family were the main target of the MWS at the beginning. Later, this Scheme extended to cover the elderly and the disabled.

In 1992, this scheme was extended to cover monks, community leaders, children under 12 years old of age and veterans and their family (HSRI, 2002). The MWS provided free medical care for their insured people. This scheme was expected to cover up to 70 percent of the Thai population, however, the MWS was able to cover only 12 percent of the Thai population in 2001. Thus, the MWS was closed as a part of a reform of the health insurance system in Thailand in 2001. The milestones of MSW are shown in Table 3.1.

Table 3.1: Milestone of the MWS from 1975 to 2001

Year	Important events in the MWS
1975	MSW was established
1979	A person with income under Baht 1000 ($A 34) /month and family with income under Baht 2,000 ($A 68) /month can join the MSW by informing a public hospital.
1981	Income of eligible person for the MWS had been adjusted from Baht 1,000 ($A 34) /month in 1979 to Baht 1,500 ($A 50) /month. Moreover, the MWS card was issued and insured person can go to any public hospitals.
1984	An insured person could go to only two contracted public hospitals which appear on the MWS card (2nd issued).
1987	Only one contracted public hospital appeared in the MSW card (3rd issue)
1989	The MWS provided free medical care for the elderly (over 60 years of age)
1990	The 4th issue of the MWS card was released
1992	The MWS offered free medical care for children under 12 years old, veterans and their family and monks.
1994	New policies of the MSW were declared with the 5th issue of the MWS card. The income of an eligible person and family were adjusted to Baht 2,000 ($A 68) /month and 2,800 ($A 93)/month respectively. Only one contracted health care provider was on the MWS card. The MWS was also extended to cover community volunteers.
1995	The operator of the MWS had been switched from the Ministry of Public Health to the National Health Insurance Office.
1999	6th issue of the MWS had been released. All insured persons must enrol at the specified registration point. Computer systems were introduced at the registration points.
2001	The MWS covered only 12 percent of the Thai population. Thus, the MWS was abandoned due to the reform of health insurance

Source: HSRI (2002)

3.2.1.2 Civil Servant Medical Benefit Scheme (CSMBS)

The Civil Servant Medical Benefit Scheme (CSMBS) was established in 1978. CSMBS covers all government employees, pensioners and their dependents. The CSMBS is operated and monitored by the Comptroller General's Department (CGD). In 1999, CSMBS covered about 7.8 percent of the Thai population (NSO, 2007). The CSMBS offers the most generous health benefit package for their insured people when compared with other health insurance schemes in Thailand. (Jindawattana and Pipatrojanakamol, 2004)

3.2.1.3 Social Security Scheme (SSS)

The Social Security Scheme (SSS) in Thailand was established officially in 1990. The SSS aims to provide health insurance for private employees in the formal sector. The SSS is a contribution scheme shared between the employer and the employee each of 1.5% of payroll, while the government assists with funds to ensure health security for formal sector employees. SSS is managed by the Social Security Office (SSO).

In 1999, the SSS covered about 7.1 percent of the Thai population (NSO, 2007). This may reflect that the formal sector in Thailand was small or there were many Thais who were working in the private sector, but it was not compulsory for them to enrol for the scheme. An example is the self-employed.

3.2.1.4 Health Card Scheme (HCS)

The Health Card Scheme (HCS) was a subsidised voluntary health insurance scheme for people who were not eligible for the MWS, CSMBS and the SSS. The HCS was established in 1983. The HCS aimed to cover rural informal sector workers, the self-employed and employee in small firms.

The principle behind the HCS was that people had to pay an annual premium[6] to get a certain health benefit package[7]. In 1999, the HCS covered up to 28.2 percent of the Thai population before being closed due to adverse selection problems and the reform of health insurance system in 2001. (NHSO, 2002)

The uninsured rate, problems in MWS, problems in HCS and equity issues were major factors leading to reform of health insurance in 2001. In fact, the CSMBS and the SSS also had problems in the 1990s, however, the CSMBS and the SSS schemes are still operating following the reform of health insurance in Thailand. Thus, problems of the CSMBS and the SSS will be described later in this chapter.

Table 3.2: Insured and uninsured rate of Thai population as percentage in 1991, 1996 and 1999

Schemes	1991	1996	1999
MWS	12.7	12.3	12.4
CSMBS	13.2	11.3	7.8
SSS	0	5.5	7.1
HCS	1.4	13.2	28.2
Other schemes	6.2	3.7	4.3
Insured	33.5	46	59.8
Uninsured	66.5	54	40.2

Source: National Statistics Office (NSO), Health and Welfare Survey 1991, 1996 and 1999

6 The card of HCS was Baht 1,500 ($A 50) per year. However, insured household paid only 1/3 of the card and the government paid 2/3 in 2001.

7 There was unlimited access to health care and costs of treatment for the benefit packages in 2001.

According to Table 3.2, although the uninsured rate had declined from 66.5 to 40.2 percent from 1991 to 1999, it has remained high. The MWS and HCS covered only about 12.4 and 28.2 percent respectively of Thai population in 1999, whereas, these schemes were expected to cover more than 80 percent of the Thai population.

3.2.1.5 Problems in the Medical Welfare Scheme (MWS)

Five problems in the MWS during the 1990's were identified. First, many poor people could not get the MWS card, whereas, some middle income people were offered the MWS card due to a very poor registration system. This means that the objectives of the MWS which was to cover the poor and disadvantaged people were not achieved.

Second, the majority of the poor were working in the informal sector. Thus, it was very difficult for the MWS to target the poor (NHSO, 2002). Next, the MWS was short of appropriate human resources and information technology such as computer database, computer systems and health insurance management professional.

Fourth, the conflict between contracted health care providers in the same and different areas caused inequality in access to health care services. Contracted health care providers provided different health care services resulting in insured people in each area receiving different quality and quantity of health care services. Finally, transparency and monitoring in the MWS was needed in order to improve the management efficiency in the MWS. (NHSO, 2002)

3.2.1.6 Problems in the HCS

There were four problems in the HCS. First, The HCS failed to target the people who are not eligible for membership of to the MWS, CSMBS and SSS. Mongkolsmai et al. (1998) found that the HCS covered only 1.3 percent of the poor households in Bangkok and 30 percent of the poor households in Thailand.

Second, some insured people in the HCS held another health insurance scheme such as CSMBS at the same time. It has been said that health care resources were wasted because these insured people were covered by more than one public scheme. (Tangcharoesathien et al., 2002)

Third, adverse selection problem clearly existed in the HCS due to high risk people voluntarily purchasing the card. It was not surprising that the cost of the HCS continually increased. Supakankunti (2001) finds that people and their families who are often sick are more likely to purchase the HCS resulting in greater use of health care resources in the scheme and she suggests that a community-based compulsory health insurance scheme for rural area is needed.

The evidence shows that the average cost of the voluntary health card was about Baht 2,700 ($A 90) per card per year, whereas, the revenue which was the premium for the voluntary health card was only Baht 1500 ($A 50) per card per year (Tangcharoesathien et al., 2002).

This is supported by Srithamrongsawat (2002) who claims that adverse selection already existed especially in the low coverage provinces and in urban areas in 1999. Financial sustainability in the HCS was hotly debated in the 1990s.

A final problem with the HCS was the inefficiency of fund management in the reimbursement system resulted in a high cost of care and cross boundary cases (Srithamrongsawat, 2002).

The other problems encountered in the MWS and HCS were equity of access and finance as these schemes were not providing adequate protection to the poor in Thailand.

There are two issues about equity problems in Thailand. The first problem is equity of access. The HSRI (2000) notes that there was discrimination in the health care services such as differential rates of drug prescription and limited drug items available for insured people in the HCS and MWS. The HCS and MWS' Card holders in the urban areas had direct access to provincial hospitals which had better equipment and staff compared to those insured people who lived in rural areas.

While insured people under the SSS were able to access contracted private and public hospitals, insured people under the HCS and MWS could access contracted public hospitals only. This is supported by Pannarunothai and Renburge (1998) who found that the wealthy used health care services more than the poor when they analysed the Health and Welfare data in 1991.

The second problem is equity in finance. Nitayarumphong et al. (2000) claim that even though the HCS and the MWS covered more of the Thai population than the SSS and the CSMBS, the government subsidies per capita to the CSMBS and SSS were more than those to the HCS and MWS.

This is confirmed by Tangcharoesathien et al. (2002) who show that, in 1999, the expenditure per capita per year made by the government for the CSMBS and the SSS was Baht 2,106 ($A 70)/person/year and Baht 1,558 ($A 50)/person/year respectively, whereas, the expenditure per capita per year for the HCS and MWS were only about Baht 400 ($A 15)/person/year and Baht 550 ($A 18)/person/year respectively. Thus, in terms of equity of finance, the government actually needed to provide more funds to the HCS and MWS.

In short, the uninsured rate, problems in the MWS and HCS and equity issues in the health insurance system in the 1990s lead to the reform of the health insurance system in 2001 in Thailand. The next section presents the reform of the health insurance system in Thailand.

3.2.2 The Reform of Health Insurance System in 2001

As can be seen from the above section, there were up to 40.2 percent of the Thai population who did not have health insurance coverage in 1999. Thus, the major issue in the reform of the health insurance system in Thailand in 2001 was the achievement of universal health insurance coverage for Thai people.

The universal coverage policy was based on the concept that all Thai people should be able to have access to necessary health care services regardless of their ability-to-pay or their income. Two major changes from the implementation of the universal coverage policy were conducted.

The first change was the reform of health care provider payment mechanisms which focused on the use of the capitation method to control the cost of health care. Second, the National Health Security Office and the Gold Card scheme were established to ensure equitable and efficient health care services.

In 2001, Thai-Rak-Thai party won the election and the universal coverage policy was implemented immediately. Pitayarangsarit et al. (2005, pp.5) state "the government's policy declarations on health care financing and health care service delivery systems of the universal coverage of health care policy was one of nine high priority policies."

The universal coverage of health care policy aims to reduce national health expenditures and household health expenditures. The progression of the universal coverage policy is shown in Table 3.3. Table 3.3 shows that the Thai-Rak-Thai party took only 11 months to launch the universal coverage policy. There are five objectives in the universal coverage policy. First, all Thai people are entitled to have equal access health care services.

Second, a tax-based financing system and capitation for payment of health providers should be used in order to reduce national health expenditure and household health expenditure. Households pay Baht 30 ($A 1) per visit to a health care service.

Third, all Thai people should have freedom of choice when considering a health care provider from the public or private sector. Next, the government should guarantee the quality of health care services and the same services should be available in urban and rural areas. Last, the government should aim to improve the equity of the health care financing system by establishing the National Health Security Fund through legislation. (Pitayarangsarit et al., 2005)

The new health insurance scheme called The Gold Card scheme or "Baht 30 Scheme" was implemented in 2001. The MWS and HCS were replaced by the Gold Card Scheme and expanded to the uninsured. The Gold Card scheme is important because the Gold Card scheme is expected to cover all Thai people who are not eligible for the SSS and the CSMBS.

Table 3.3: The Progression of the Universal Coverage Policy in Thailand

Periods	Events of the universal coverage policy in Thailand
January 2001	Election of the Thai-Rak-Thai party.
February 2001	Policy declaration in the parliament on 26-27 February 2001: official announcement of the Gold Card Scheme.
April 2001	The first phase of the Gold Card scheme was implemented in 6 provinces: MWS and the voluntary health card scheme were replaced by the Gold Card scheme.
May 2001	Guidelines for implementation published.
June-October 2001	Phase II. Private collaboration: expansion to 15 provinces with the collaboration of private providers and university

	hospitals.
October 2001	Phase III. Nationwide implementation: expansion of coverage to all provinces except inner Bangkok districts stated from January 2002
April 2002	Phase IV. Expanding coverage to the whole country including the inner Bangkok districts and reaching universal coverage.
November 2001-2002	Parliamentary process of the Nation Health Security Act

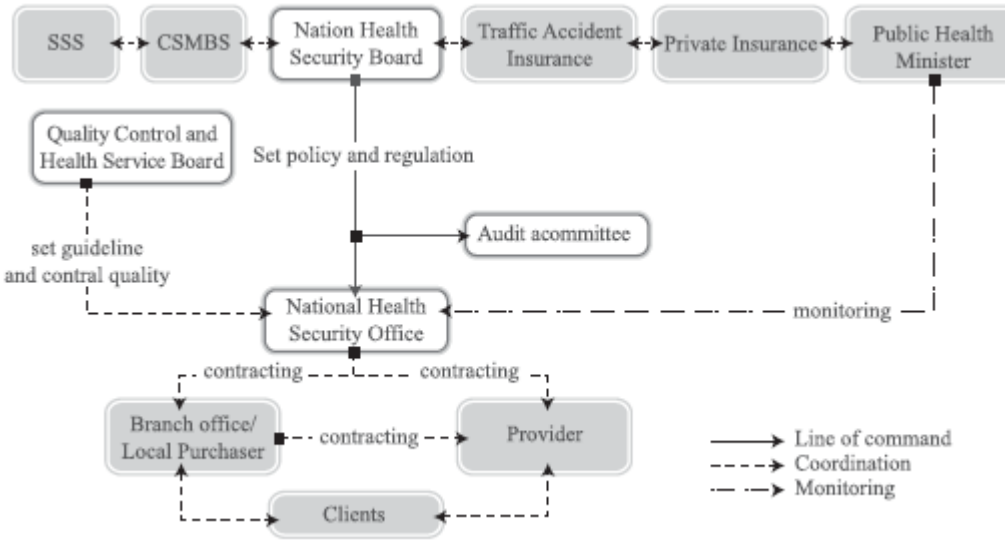
Source: Pitayarangsarit et al. (2005, pp.32)

3.2.2.1 The Implementation of the Universal Coverage Policy

The universal coverage policy consists of three main public health insurance schemes. These public health insurance schemes are the Civil Servant Medical Benefit Scheme (CSMBS), Social Security Scheme (SSS) and the Gold Card scheme. In 2009, the Gold Card scheme covered about 75.77% of Thais. The Civil Servant Medical Benefit Scheme (CSMBS) and Social Security Scheme (SSS) covered 7.85% and 15.32% approximately of Thai people respectively. These three schemes cover more than 98 % of Thais in 2009 and the uninsured rate in Thailand was only about 1.06 % of Thais in 2009. (NSO, 2009)

3.2.2.2 The Organisation Structure of the Universal Coverage System

Figure 3.1: Organisation Structure of the Universal Coverage System in Thailand



Source: Ministry of Public Health (2005)

The organisation structure of the universal coverage system is demonstrated in Figure 3.1. It shows that the National Health Security Board (NHSB) is responsible for setting all benefit packages, standard health care services, criteria for fund management and payment mechanisms. The NHSB also encourages local governments and NGOs to join in the management of the universal coverage system. The NHSB sets policy and regulation for all contracted health care providers in the Gold Card Scheme.

The National Health Security Office (NHSO) is an autonomous organisation which is in charge of the Gold Card Scheme. The duties of the NHSO include collection and analysis of implementation data, registration of beneficiaries, registration of contracted health providers and their networks, management of fund, claim processing and reimbursement, monitoring quality

of contracted health care providers and facilitation of the process of complaint handling (Thammatach and Jongudomsuk, 2004).

In sum, there are three main public health insurance schemes which are the CSMBS, the SSS and the Gold Card scheme after the reform of health insurance in 2001. The next section in this chapter discusses the details of the Gold Card Scheme only because the concepts and characteristics of the SSS and CSMBS are the same as those already discussed in the above section.

3.2.2.3 The Gold Card Scheme

The "Gold Card" scheme which was established in 2001, aims to cover all people who are not eligible for the SSS and the CSMBS. The Gold Card Scheme is managed and organised by the National Health Security Office (NHSO). In 2001, the Medical Welfare Scheme (MWS) which covered the poor and the Voluntary Health Card Scheme (HCS) which covered people who bought the "card" from the Ministry of Public Health was replaced by the Gold Card scheme and coverage was expanded to the uninsured.

The Gold Card scheme plays a very important role in achieving universal coverage in Thailand. This Scheme is funded by the government. Every insured person covered by this scheme must pay a co-payment at the rate of Baht 30 ($A 1) per visit. A special Gold Card was issued for those poor people who do not have to pay co-payment.

However, there was a major change in 2007 when the government decided to abandon the Baht 30 ($A 1) co-payment for all insured people in the Gold Card scheme. Thus, the insured person in the Gold Card scheme can access health care with no co-payment. This action has raised considerable debate. This is discussed in a later section.

The Gold Card scheme was financed largely from tax revenue and minimal co-payment of Baht 30 ($A 1) per visit between 2001 and 2006.The Gold Card scheme uses the capitation method to pay their contracted health care providers. In 2005, NSO (2005) shows that the Gold Card Scheme covered up to 76.4 percent of the whole Thai population. If the government does nothing, the universal coverage policy could be undone in the long term by these problems.

3.2.2.4 Problems in the CSMBS

The Civil Servant Medical Benefit Scheme (CSMBS) covers all government employees, pensioners and their dependents. The scheme is financed and managed by the Ministry of Finance. Cost escalation is a major problem in this scheme. Cost escalation occurs because contracted hospitals in the CSMBS are reimbursed by using the fee-for-service method. Thus, these contracted hospitals have an incentive to provide more medical activities. This is supported by Witter et al, (2000) who state that fee-for–service can lead to moral hazard problems and supplier induced demand.

Gosden et al. (2000) found that fee-for service payment result in more patient visits and greater continuity of care. Thus, it is clearly that the cost (expenditures) per capita of the CSMBS is much higher compared to other public health insurance scheme such as the SSS (see Table 3.8). Smith (1992) further states that the disadvantages of the fee-for-service methods for the insurer are escalating costs because of growing utilisation and the administrative cost of monitoring claims. Moreover, Powell and Anesaki (1990) conclude that doctors paid on a fee-for-service basis are likely to prescribe more drugs and they mention that this is the main reason that Italy changed to a capitation payment system for all general practitioners.

As can be seen from Figure 3.2, the CSMBS expenditure has increased dramatically over the past decade. Medical expenditure of the CSMBS has increased from Baht 3,156 million ($A 105 million) in 1988 to Baht 16,440 ($A 548 million) in 1998. Thus, a direction of reform the CSMBS from 1991 to 1999 has focused on reforming the provider payment mechanism and improving the efficiency of the claim payment.

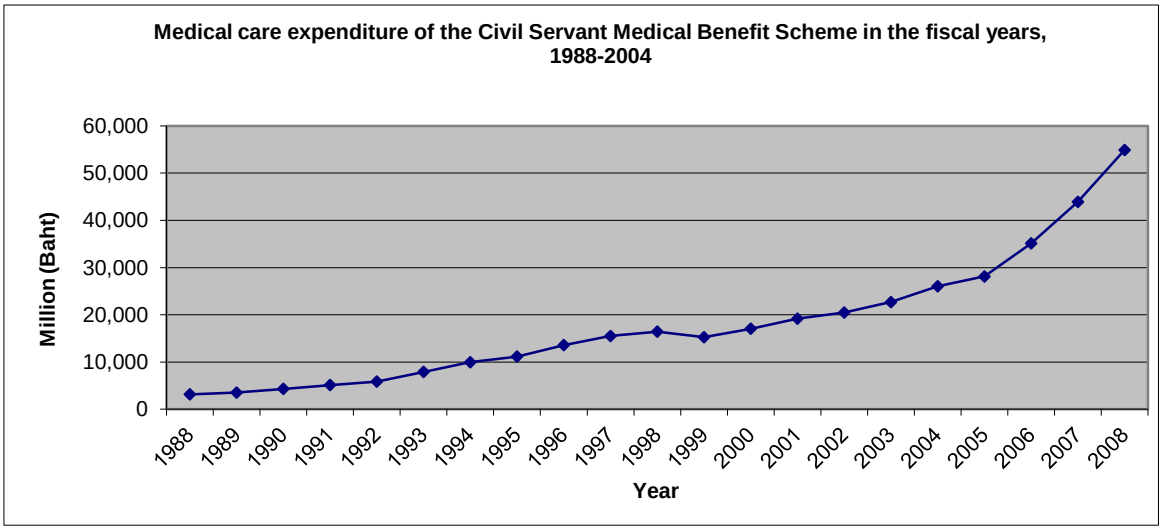
Sriratanaban (2001) discusses reform directions in the Civil Servant Medical Benefit Scheme (CSMBS) and concludes that there needs to be a change of benefit packages which focuses more on health promotion and disease prevention. Modification of provider payment approaches and patient co-payment needs to be considered.

In general, Sriratanaban (2001) suggests that fee-for-service reimbursement needs to be replaced by a global budget. In 2002, the Comptroller General's Department (CGD) assigned three tasks to the Health Systems Research Institute (HSRI) in order to reform health care financing within the CSMBS.

HSRI had to work on three tasks which are the implementation of Diagnosis-Related Groups (DRGs), improving medical audit systems and the reform of prices and eligible drugs which can be claimed. CGD also stated that the fee-for-service method should be replaced by the risk-adjusted capitation method. HSRI was expected to complete these tasks before 2003. (Srianant, 2002)

However, Figure 3.2 shows that the medical expenditure of the CSMBS kept rising from Baht 17,054 million ($A 569 million) in 2000 to Baht 54,900 million ($A 1830 million) in 2008. This means that the reform of health care financing in CSMBS in 2003 discussed above had failed.

Figure 3.2: Medical Care Expenditure of the CSMBS from 1988 to 2008 (Current Prices)



Source: Department of Comptroller General, Ministry of Finance, 2008

The increase in expenditure was even more than expected by Pitayarangsarit et al. (2000) who estimated that medical expenditure of the CSMBS in 2000 should be only Baht 16,770 million ($A 559 million). However, the actual medical expenditure in 2000 was up to Baht 17,054 million ($A 569 million). This means that the CSMBS was actually getting worse in terms of cost containment.

Cost containment has failed for many reasons. TDRI (2001) found that the reform of the CSMBS in 1998-1999 could contain the cost in the short term only. In the long term the expenditure will increase again due to the persistence in using the fee-for-service method and the increase in number of insured people in the CSMBS.

HSRI (2006) states that costs of out-patient care such as services fees and drugs are actually difficult to control and continue increasing, hence, it is not surprising that the medical care expenditure of the CSMBS continues to rise.

Provider payment mechanisms in the CSMBS use fee-for-service method. Contracted health care providers are reimbursed according to the number of services such as consultations, drugs and x-rays provided for patients. Sriratanaban (2001) concludes that the fee-for-service method in CSMBS is the main factor that leads to a higher expenditure, moral hazard and supply-side incentive in the CSMBS. There is evidence to support the claim of over-utilisation of medical services and resources in CSBMS.

For example, in 1998, the average length of hospital stay for insured people in CSBMS was 12-18 days, whereas, the average length of hospital stay for the overall Thai population was only 2-5 days. The average length of hospital stay for insured people in CSMBS was three times higher than other groups. This is supported by Srianant (1999) who states that the hospital admission rate for the CSMBS was two times (0.142 times/person/year) higher than the average hospital admission rate (0.066/ time/person/year).

Sriratanaban (2001) suggests that Diagnosis Related Groups (DRGs) payment should be used to replace the fee-for-service in the short-term reform of the CSMBS in 2001. For long term reform of the CSMBS, contracted health care providers should be reimbursed by using capitation method for out-patient care. Moreover, the CSMBS offers the most generous health benefit package when compared to the other public health insurance schemes in Thailand. Jindawattana and Pipatrojanakamol (2004) state that an average payment per person is highest for the CSMBS which is about Baht 2,000 ($A 67) compared to Baht 1,400 ($A 48) for the SSS and Baht 1,040 ($A 35) for the Gold Card Scheme.

3.2.2.5 Problems in the Social Security Scheme (SSS)

The Social Security Scheme (SSS) has completely different problems to the CSMBS. The SSS is successfully working on containing its cost of the scheme, but is criticised for compromising on quality. Contracted health care providers are reimbursed by using capitation method. Itivaleekul (2002) notes that the capitation payment method under the Social Security Scheme (SSS) contributes in some part to health care reform but it also raises a great deal of debate.

One problem of the SSS arises from contracted hospital being paid by using capitation method. Witter et al. (2000) state that if the payment is made regardless of the complexity of the case, contracted hospitals have an incentive to treat simpler cases, and not admit the more complex so called "cream skimming". Contracted providers have also an incentive to treat fewer patients.

As expected, both patients in the SSS and the press have complained about the quality of services in many SSS's contracted hospitals. This occurs because contracted hospitals may try to keep costs down by employing less staff and equipment due to the capitation payment mechanism.

Rawiwong (2000) used qualitative and quantitative methods to assess problems in the health care system in Thailand. The result shows that the majority of insured people in the SSS confirm that bad services, long waiting lists, poor quality of drugs and lack of specialists in many hospitals are the major problems. Thus, the Social Security Office's urgent task is to develop an easy and understandable quality indicator by installing a better quality assurance program.

There are other two issues that need to be discussed in SSS. First, as can be seen in Table 3.4, insured people in the SSS have limited choice of contracted hospital. The number of contracted public hospitals in SSS has increased slowly from 1996 to 2007, whereas, the number of contracted private hospitals has decreased slightly since 2004.

Table 3.4: Number of Contracted Hospitals in SSS

Year	Public Hospital	Private Hospital	Total
1996	126	72	198
1997	127	69	196
1998	127	78	205
1999	128	103	231
2000	130	114	244
2001	133	128	261
2002	136	132	268
2003	137	131	268
2004	144	134	278
2005	147	127	274
2006	150	119	269
2007	153	113	266

Source: SSO (2007)

Second, health care utilisation in the SSS has increased over time. According to table 3.5, the rate of out-patient care has increased since 2000 from 2.04 times per person per year in 2000 to 2.51 times per person per year in 2006. Moreover, the rate of in-patient care has increased from 0.030 times per person per year in 1996 to 0.046 times per person per year in 2001. However, the rate of in-patient has been steady since 2001.

The point is that all insured people in the SSS are employees who are likely to be young and healthy compared to other people. However, the rate of health care utilisation in the SSS is very similar to that of the general Thai population. (Itivaleekul, 2002)

Table 3.5: Health Utilization Rate in SSS

Type	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Out-patient	1.34	1.52	1.46	2.15	2.04	2.51	2.55	2.54	2.58	2.37	2.51
- Public	1.17	1.44	1.40	2.07	1.85	2.37	2.41	2.41	2.5	2.17	2.38
-Private	1.45	1.59	1.50	2.22	2.18	2.60	2.63	2.63	2.63	2.51	2.61
In-patient	0.030	0.0034	0.032	0.043	0.043	0.046	0.046	0.046	0.047	0.049	0.052
-Public	0.029	0.032	0.031	0.041	0.042	0.041	0.043	0.043	0.045	0.048	0.051
-Private	0.031	0.035	0.033	0.043	0.044	0.050	0.049	0.049	0.048	0.050	0.053

Source: Social Security Office (SSO) (2007)

In short, problems with quality of services, limited choice of health care providers and unnecessary use of health resources are the main problems that need to be solved in the SSS.

3.2.2.6 Problems in the Gold Card Scheme

This chapter has shown that the Gold Card scheme is a new public health insurance scheme which covers the majority of the Thai population. The Gold Card scheme plays a very important role in achieving the universal coverage policy. Unfortunately, there are many problems that need to be rectified in this scheme.There are three problems with this scheme. These problems are financing feasibility, additional sources of finance and the problems of contracted hospitals in the Gold Card scheme. These problems may occur because the Gold Card scheme has been implemented too fast without input from other organisations such as teaching hospitals.

First, financial feasibility issues in the Gold Card scheme are questioned by many researchers .For example, Siamwalla (2002) states that the proper cost of the Gold Card scheme cannot be calculated properly because the Ministry of Public Health has implemented its plans, without consulting other agencies such as the main providers of tertiary care, the main providers of tertiary care, the

Social Insurance Office and the Ministry of Labor and Social Welfare. There is a real need for these organisations to be incorporated under the Gold Card scheme and act together.

Chunharas (2002) also believes that the future collective financing system should be developed based on the new decentralised system which requires a new relationship between the local administration and the service providers along with an aggregated future health insurance system.

Siamwalla (2002, pp.227) further points out that the Gold Card scheme does not allocate enough funds to their contracted health care providers. For example, Towse et al. (2005) discuss that budget deficits in many hospitals in many provinces have occurred in the first two years of the Gold Card scheme's operation.

This is supported by NHSO (2008) which show that the capitation cost required for maintaining the standard of health care services is expected to be about Baht 2,000 ($A 67) per person per year in 2005. However, the government granted only Baht 1,396 ($A 47) per person per year in 2005.

Moreover, although the government promises to provide up to Baht 1,899 ($A 64) /Person/Year, the actual capitation rate is only 1,659.20 Baht ($A 55)/Person/Year in 2007[8]. When the capitation cost is calculated with the growth of public employee's salary, the total cost of the Gold Card scheme will be Baht 100-136 billion ($A 3.3-4.5 billion) in 2005-2009. Thus, Chanduaywit et al. (2006) found that, at least, Baht 31-46 billion ($A 10-15 billion) will be needed to finance the Gold Card scheme in the long-run. Thus, the Gold Card scheme clearly requires more funds.

[8] NHSO proposes the capitation rate at 2,089.20 Baht($A 70)/Person/Year for 2007, however, only 1,659 Baht/Person($A 55)/Year was granted in 2007.

The second problem is to find additional source of finance. This problem may be getting worse because of cancellation of the "Baht 30" co-payment. The Gold Card scheme was financed largely from tax revenue and a co-payment of Baht 30 ($A 1) per unnecessary utilisation and to provide additional funds. However, this co- visit between 2001 and 2006.The co-payment in the Gold Card scheme was proposed to prevent excessive and payment was abandoned by the government after the Thailand coup in 2007. The reasons of the cancellation of the co-payment are explained by Tangcharoensathien et al. (2005).

They suggest that the co-payment is not a significant source of financing in the Gold Card scheme. They further suggest that co-payment for inpatient care and out-patient in primary care should be abandoned because they believe that moral hazard does not exist. Thus, if the co-payment is used to deal with the moral hazard problems, the co-payment is not necessary unless moral hazard can be shown to be a significant problem.

Srithamrongsawat (2007) states that although the cancellation of the co-payment leads to the loss of Baht 2,000 million /year ($A 667 million), he believes that insured people should not pay co-payments, unless moral hazard problems can be proven. Srithamrongsawat (2007), however, notes that the loss of Baht 2,000 million /year ($A 667 million) definitely affects many small contracted hospitals. He suggests tax-reform and other sources of finance need to be identified.

Although the above evidence shows that there are not sufficient funds for the Gold Card scheme, the cancellation of Baht 30 co-payment lead to the loss of 2,000 million Baht/year ($A 667 million) which is only a small portion of the cost of the Gold Card Scheme. The question of what additional sources of fund can be used to compensate for the loss from the cancellation from the co-payment is still left unanswered. Next the problem of contracted hospitals in the Gold Card scheme is discussed.

The third problem is the number of Contracted Health Care Providers in the Gold Card scheme. Table 3.6 shows that although contracted public hospitals have increased from 896 in 2003 to 1,134 in 2007, the number of contracted private hospitals have declined dramatically from 95 in 2002 to 60 in 2007. Pitayarangsarit (2005) points out that the lack of adequate information causes private hospitals to not want to join the Gold Card scheme.

Table 3.6: Number of Contracted Hospitals in the Gold Card Scheme

Year	Public Hospital	Private Hospital	Total
2002	912	95	1,007
2003	896	85	981
2004	1,024	71	1,095
2005	1,047	63	1,110
2006	1,094	61	1,155
2007	1,134	60	1,194

Source: NHSO (2007)

Srithamrongsawat and Torwatanakikul (2005) argue that insufficient funding and workloads in many contracted hospitals in the Gold Card scheme are the main factors which actually cause these problems. First, under-funding in the Gold Card scheme is the main reason that private hospitals have no incentive to join the Gold Card scheme.

Under-funding in the Gold Card scheme affects contracted public hospitals. The evidence shows that the affluent provinces and provincial hospitals with a relatively high number of health staff in relation to their population receive less funds than the provinces in the northeast and district hospitals with relatively low numbers of health personnel in relation to their population. Many contracted public hospitals are short of money and could face bankruptcy (Srithamrongsawat and Torwatanakikul, 2005).

Second, the workload has increased for health care workers in many contracted hospitals. The Gold Card scheme may raise the demand for health services because the previously uninsured people are now covered by the Gold Card. Thus, more than 70 percent of health staff claims that their workload has increased with the implementation of the Gold Card scheme in 2001. (Srithamrongsawat and Torwatanakikul, 2005)

As can be seen in Table 3.7, the health care utilisation rate after the implementation of the Gold Card scheme in 2001 increased about 25 percent for out-patient care compared to the previous health insurance arrangements in 2001. The admission rate also has increased by about 9 percent since 2001. However, the rate of out-patient and in-patient care in private hospitals has declined after the implementation due to the decrease in private contracted hospitals. (Srithamrongsawat and Torwatanakikul, 2005)

Table 3.7: Use of Health Facilities in the Gold Card Scheme between 2001 and 2003

	Out-patient visits			Hospital admissions		
	2001	2003	% Change	2001	2003	% Change
Utilization rate (visit / person / year)	2.846	3.547	24.6	0.076	0.083	8.8
Private hospital	2.6	2.5	-3.0	11.0	9.7	-11.9

Source: The 2001 and 2003 Health and Welfare surveys

Note: Those previously uninsured and those covered by the MWS and the VHCS are grouped as universal coverage beneficiaries in 2001.

Although doctors agree with the motivation for the Gold Card scheme, most of them strongly disagree with the current system of the Gold Card scheme (HISRO, 2006). Most medical practitioners claim that the current Gold Card

policies force them to reduce the costs of hospitalisation by using less medicines and equipment in treatments.

It is not surprising that the rise in demand for health care together with problems on the supply side cause problems in the quality of health services. An ABAC poll (2003) has shown that the Gold Card scheme is the least efficient compared to the SSS and the CSMBS in terms of quality of health services in 2003. This is supported by the Suan Dusit poll (2004) which found the same result in their survey of quality of health care services in public health insurance schemes in 2004.

3.3 Current Health Provider Payment Methods in Thailand

3.3.1 The CSMBS

Fee-for-service reimbursement is the main health care provider payment systems in the CSMBS (CSMBS, 2007). However, Diagnosis-Related Groups (DRGs) for in-patients were introduced in 2007. Implementation of DRGs aims to contain the cost of CSMBS which has been increasing over the last decade (Figure 3).

For out-patient cases, the Comptroller General's Department (CGD) is still using the fee-for-service reimbursement method. However, the CGD plans to introduce the risk-adjusted capitation reimbursement method for those patients who have chronic diseases and high costs of medical treatment. (Srianant, 2002)

3.3.2 The SSS

The capitation method has been used in order to contain the cost of the SSS. The SSS has separated the payment for their contracted health care provider into two ways. First, the contracted health care providers are paid according to their number of registered insured patients at the rate of Baht 1,250($A 42) /patient/year (SSO, 2007).

Second, in order to induce contracted health care providers to provide more services, additional payments have been made. Additional payments for risky diseases[9] and DRGs were also introduced for in-patient cases (SSO, 2007). Thus, the SSS expects that the new health care provider payment mechanism should improve the quality of health services in the future.

3.3.3 The Gold Card Scheme

The capitation and DRGs payment method are the main health care provider payment methods in the Gold Card Scheme. Current health care financing arrangements in the Gold Card Scheme can be discussed with respect to two aspects of contracted hospitals and inequity.

3.3.4 Contracted Hospital

There are three types of contracted hospitals in the Gold Card scheme. First, dependent contracted hospitals which are managed by the Ministry of Public Health. Second, independent contracted hospitals which are not managed by the Ministry of Public Health. The third type is contracted private hospital. The capitation payment for dependent contracted hospitals is Baht 1,659.20($A 55) /Person/Year in 2007 (HISRO, 2007).

The payment for independent contracted hospitals varies. First, there is a differential capitation payment method depending on geographic, utilisation rate and locations have been used in many provinces. Next, exclusive capitation where the capitation payment rate is separated between out-patient care and preventive health care has been used. DRGs with global budget also have been used for in-patient care. (HISRO, 2007)

---

[9] Risky diseases including Diabetes mellitus, Hypertension, Chronic hepatitis, Cirrhosis of liver, Congestive heart failure, Cerebrovascular accident, Malignancy, AIDS, Emphysema, Chronic renal failure, Parkinson's disease, Myasthenia gravis, Diabetes insipidus, Multiple sclerosis, Dyslipidemia, Rheumatoid arthritis, Glaucoma, Nephrotic syndrome, SLE, Aplastic anemia, Thalassemia, Hemophilia, Proriasis, Chronic vesiculobullous disease, ITP and Thyrotoxicosis.

The payment of contracted private hospitals is very similar to the payment of independent contracted hospital. First, the differential capitation has been implemented as above. Second, the contracted private hospitals have two choices between inclusive capitation and exclusive capitation for out-patient care and prevention care. Inclusive capitation is calculated by using the budget for both out-patient care and prevention care while the payment for in-patient care is calculated from the number of out-patients. (HISRO, 2007)

If the contracted private hospitals choose the exclusive capitation method, the budget can be provided by separating the budget for out-patient and prevention care, whereas, in-patient care is paid according to the DRG system together with global budget. (HISRO, 2007)

Hence, the above discussion of the current health provider payment methods in three public health insurance schemes shows clearly that inequity in health care financing in Thailand should be also investigated and discussed.

3.4 The Current Equity in Health Care Financing in Thailand

3.4.1 Inequity in Health Care Financing in Health Insurance Schemes

Financial allocation in favour of affluent provinces and provincial hospitals raises concerns about inequitable financial allocation. The current financial allocation can impede the achievement of equity goal in the universal coverage policy. (Srithamrongsawat and Torwatanakikul, 2005)

Table 3.8 shows that the Gold Card scheme has had the highest overall budget when compared to the CSMBS and the SSS since 2003. For example, the overall budget for the Gold Card scheme is Baht 79,226.80 million ($A 2,640 million), whereas, the overall budget for the CSMBS and the SSS is Baht 37,004.45 million ($A 1,233 million) and Baht 21,650.89 million ($A 721 million) respectively in 2007. The reason is that the Gold Card scheme covers up to 76 percent of the Thai population.

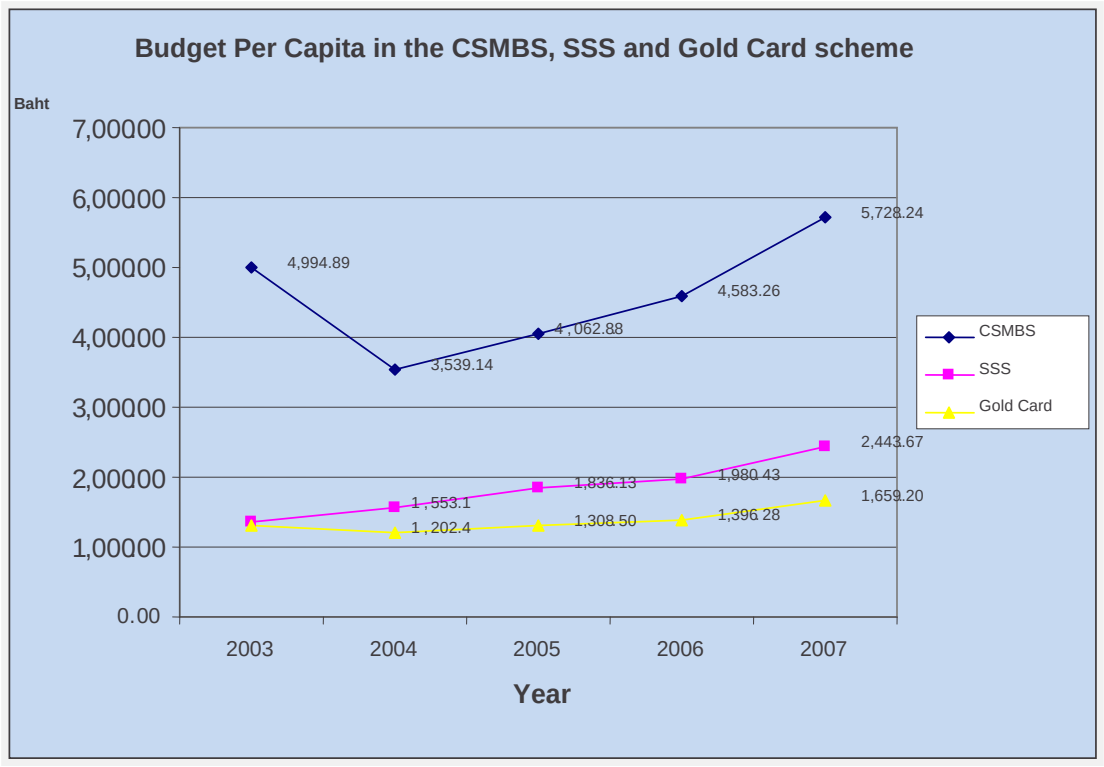
Figure 3.3 clearly shows that although the Gold Card scheme has the highest overall budget, the Gold Card scheme has the lowest budget per capita compared with the CSMBS and the SSS since 2003. The CSMBS has had the highest budget per capita since 2003. For instant, the budget per capita for the CSMBS is Baht 5,728.24 ($A 190) /person/year in 2007 , whereas, the budget per capita for the SSS and the Gold Card scheme is only Baht 2,443.67 ($ A81)/person/year and Baht 1,659.20 ($A 55)/person/year) in 2007 respectively.

Table 3.8: Number of Insured People, Overall Budget and Budget Per Capita in Three Health Insurance Schemes from 2003 to 2007

	2003			2004			2005			2006			2007		
	No. Insured People (Million)	Overall Budget (Million Baht)	Per Capita Budget (Baht)	No. Insured People (Million)	Overall Budget (Million Baht)	Per Capita Budget (Baht)	No. Insured People (Million)	Overall Budget (Million Baht)	Per Capita Budget (Baht)	No. Insured People (Million)	Overall Budget (Million Baht)	Per Capita Budget	No. Insured People (Million)	Overall Budget (Million Baht)	Per Capita Budget (Baht)
The CSMBS	4.70	23,476	4,994.89	6.41	22,685.89	3,539.14	6.41	26,043.11	4,062.88	6.41	29,380.03	4,583.46	6.46	37,004.45	5,728.24
The SSS	7.0	9,577	1,368.14	7.6	11,803.56	1,553.1	8.03	14,744.09	1,836.13	8.47	16,774.27	1,980.43	8.86	21,650.89	2,443.67
The Gold Card Scheme	45.37	59,878	1,319.77	46	55,310.40	1,202.40	46.82	61,263.97	1,308.5	47	65,625.16	1,396.28	47.75	79,226.80	1,659.20

Source: HSRI (2007)

Figure 3.3: Budget per Capita in Three Health Insurance Schemes in Thailand



Source: NHSO (2008), SSO (2008) and CSMBS (2008)

Figure 3.3 shows that the budget per capita for the CSMBS is on average four and three times higher than the Gold Card scheme and SSS respectively. The budget per capita in the SSS is also about two times higher than the Gold Card scheme. Thus, inequity in financing health insurance schemes is of some concern in Thailand.

3.5 Post- Universal Coverage Policy Implementation and Equity in Health Insurance System

Suraratdecha, Saithanu and Tangcharoensathein (2004) found that the Gold Card scheme had been successful in ensuring higher coverage and extending insurance to the uninsured. However, their supplementary survey in

three low-income provinces indicates that the poor are still disadvantaged as other insurance schemes tended to favour the rich. The rich tend to have more than one type of health insurance.

They used a questionnaire survey to collect information and ideas from stake holders. The result is that the poor were more likely to be uninsured. They left questions to be answered about the unnecessary use of services, the quality of services and the use of co-payments and their impact.

In contrast, Limwattananon et al. (2005) examine the distribution of health care utilisation and out-of-pocket payments before and after the implementation of the universal coverage policy in 2001. They also further used a Benefit Incidence Analysis method to analyse health care utilisation and public subsidy and catastrophic health expenditure and impoverishment. They found that the implementation of the Gold Card scheme could reduce health inequity especially for the poor. They use the Kakwani index to confirm inequity reduction in all phases after the implementation of the Gold Card scheme.

The Gold Card scheme also has had a significant impact on the reduction of the incidence of catastrophic expenditure, out-of-pocket payment, and intensity of poverty gap with a favourable effect on the poorest and the poor. However, they note that catastrophic health expenditure could still impact on cancer patients, renal patients and kidney patients where the treatment is not covered by the Gold Card scheme (Limwattananon et al., 2005).

This is supported by Srirattanban (2006) who agrees that the Gold Card scheme could reduce catastrophic health expenditure and poverty for the poor. For example, Srirattanaban (2006) claim that the Gold Card scheme could reduce the number of the poor by 14 percent or about one million Thai people from 1993 to 2003.

He further notes that although the Gold Card scheme also reduces the general health expenditure for the poor, the middle income group received the most benefit. In sum, the implementation of universal coverage policy in Thailand is in a transitional position. Although, the policy has already provided better health outcomes than the previous health insurance arrangements, there are many problems that need to be ratified. Thus, the future direction of the health insurance in Thailand depends on the right policies and solutions.

3.6 Future Direction of the Health Insurance System in Thailand

The future direction of the health insurance system should focus on three issues of the additional funding for the Gold card scheme**,** the development of payment mechanism and resource allocation in Thailand's health insurance system and the improvement of equity in the health insurance system.

3.6.1 The Additional Funding for the Gold Card Scheme

As can be seen from the above discussion, additional sources of finance need to be found due to lack of funds and the cancellation of co-payment for the Gold Card scheme. HISR (2006) estimates that Baht 30,000-46,000 million ($A 10,000-15,500 million) is needed for the Gold Card scheme.

Sriratanaban (2006) suggests that the budget per capita for the Gold Card scheme needs to be increased by up to Baht 2,000 ($A 67) per person/year which means that additional funding is urgently needed. He points out that the extension of health coverage from the SSS and tax reform are important sources of fund for the Gold Card scheme. These are discussed in the next section.

Furthermore, another source of finance for the Gold Card scheme may come from demand-side which can be identified by eliciting the Willingness to Pay (WTP) for the Gold Card scheme.

WTP for the Gold Card scheme will help a policy maker to predict the direction of the Gold Card scheme in the future including the improvement of social welfare for Thailand. WTP and eliciting WTP are discussed in the next chapter.

3.6.1.1 The Extension of Health Coverage from the SSS

Some researchers believe that an extension of health coverage from the SSS could relieve the financial constraints of the Gold Card scheme. Na Ranong (2006) believes that the SSS should extend the coverage to their insured's spouse. Na Ranong (2006) estimates that the number of insured people will increase by about 21-23 percent in the SSS as a result of extending the policy to include the spouse of the insured. He also believes that the extension of the SSS can be done without any financial imposition which would mean that all contribution rates can be still the same.

Na Ranong (2006) states that if the SSS extends their coverage, the expenditure for the SSS will be significantly increased by about 58 to 89 percent. However, he believes that the SSS will not have any problems with this increased expenditure at all because the SSS has a reserve fund of about Baht 228,132 million ($A 7,604 million) in 2003.

In short, the SSS may be able to assist the Gold Card scheme which is short of funding. The extension of health coverage from the SSS could be another way to help the Gold Card scheme. The next option of additional funding for the Gold Card scheme is the reform of the taxation system which is discussed next.

3.6.1.2 The Reform of Taxation

Research done by Chanduaywit in 2006 suggests that, first, tax on petrol should be raised about 30 percent because the petrol price in Thailand is significantly lower than many countries. Increasing the tax on petrol will provide

about Baht 30 million ($A 1 million) for the Gold Card scheme together with an increase in efficiency in the use of petrol in Thailand.

Chanduaywit (2006) further suggests that raising taxes on tobacco, liquors, petrol and entertainment could be an additional certainty fund for the Gold Card scheme. Chanduaywit (2006) uses Computable General Equilibrium modelling to analyse and estimate the extra income for the Gold Card scheme when increasing tax on goods and services is implemented from 2005 to 2009.

The results show that when tax is increased by 70 percent for tobacco, the additional income will be about Baht 20,000 million ($A 667 million) in three years. Whereas, raising tax on petrol by 30 percent could provide more funds of up to Baht34,000- Baht 47,000 million ($A 1,134-1,567 million) in three years.

Chanduaywit (2006) concludes that the best way to get extra funding for the Gold Card scheme would be to increase tax on petrol, electricity and entertainment, such as cell phones and luxury clothes. Especially, raising tax on petrol by 30 percent could provide an extra Baht 30,000 million ($A 1,000 million) in three years.

There is some debate as one view holds that increasing the tax on the petrol could cause inequity in income distribution and increase the inflation rate because tax on petrol would result in a decrease in the net income tax on many middle income households. In contrast, Huges (1987) argues that increasing tax of petrol in Thailand has no negative effect on vertical equity in Thailand.

3.6.2 The Development of Payment Mechanism and Resource Allocation in Thailand's Health Insurance System

The improvement of efficiency, equity and quality in Thailand's health insurance system can be developed through a payment mechanism and resource allocation in the Gold Card scheme. There are six recommendations to develop the payment mechanism and resource allocation in this section.

First, the government should review the current capitation method which is paid directly to provinces for the Gold Card scheme. The new capitation system also should be focused on hospitals' workload. (Sriratanaban, 2006)

The second recommendation is that risk adjusted capitation payment should be introduced. Factors such as gender, age and chronic disease should be used to calculate the capitation rates for the Gold Card scheme. The third, a global budget for in-patient care should be calculated according to the risk and geographic areas for each health care provider. The DRGs system also needs to be reviewed and revised then the government can continue to monitor the financing of all contracted health care providers in the Gold Card scheme. (Sriratanaban, 2006)

Next, funds for health prevention may be needed. Fund allocation for health prevention should be allocated sufficiently to focus on targeted areas, socio-economic indicators and the environment. Fifth, the Ministry of Public Health needs to clearly separate the budget for people in the Gold Card scheme and people who are not in the Gold Card scheme. (Sriratanaban, 2006)

The last recommendation is that the payment mechanism of the Gold Card scheme, the SSS and the CSMBS should be changed to be the same or very similar mechanism. (Sriratanaban, 2006)

3.6.3. The Improvement of Equity in Health Insurance System in Thailand

Equity of access to services via the three insurance schemes requires improvement. For example, insured people in the CSMBS have better health benefits compared to the SSS and the Gold Card scheme (Tangcharoensathien et al., 1999, 2000). Sriratanaban (2006) suggests that the reform of health benefit packages and new management system such as a decentralisation system could improve the "equity" in health insurance system in Thailand.

3.7 Conclusion

This chapter reviews the health insurance system in Thailand. There are three major public health insurance schemes in Thailand which are the Social Security Scheme (SSS), Civil Servant Medical Benefit Scheme (CSMBS) and the Gold Card scheme. These three schemes cover more than 90 percent of Thai population. Thailand has been moving toward universal coverage since 2003. Structures and management of the SSS, the CSMBS and the Gold Card scheme are discussed in detail. The discussion shows that the Gold Card scheme plays a very important role in order to achieve the universal health insurance coverage.

The current problems of the SSS, the CSMBS and the Gold Card scheme are explained. The SSS has the problem with the quality of health care services, whereas, the problem of the CSMBS is cost containment. The problems of the Gold card scheme are financing feasibility, additional sources of finance and the problems of contracted hospitals in the Gold Card scheme.

The recommendations of the extension of health coverage in the SSS and tax reform which should be considered for additional fund for the Gold Card scheme cannot be carried out easily. Thus, this research suggests examining the Willingness to Pay (WTP) of members in the Gold Card scheme to assess whether it is possible to provide more funds from the demand-side. WTP will help policy makers to assess likely future direction of the Gold Card scheme. In the next chapter, the theory of Willingness to Pay (WTP) is discussed.

Chapter 4: Willingness to Pay in Health Care

4.1 Introduction

This study focuses on eliciting Willingness to Pay (WTP) for health insurance in Thailand. Willingness to pay is important because it enables the community to have a voice and represent their demand for services in the absence of a price mechanism.

There are three main points in this chapter. First, the background of welfare economics and associated applications such as the Edgeworth box and Pareto optimality are presented as they provide the theoretical foundations of WTP. Second, Compensating variation (CV) and the Equivalent Variation (EV) are illustrated. CV and EV can be used to measure the WTP and the change in social welfare.

Third, WTP for uncertainty and WTP-locus theory and insurance are presented in the last section. WTP-locus and insurance are important applications which can be used in analysing WTP for health insurance.

4.2 Willingness-to-Pay (WTP) in Health Care

"What is needed most fundamentally if health care systems are to change and become more socially efficient and equitable is to listen to the informed community voice and to act accordingly" (Mooney, pp.138, 2003).

WTP is a part of the community' preferences because the WTP is part of consumer demand. WTP aims to determine how much individuals are prepared to pay to reduce their risk of mortality and morbidity from the present (Mooney, 2003). "How much would you be willing to pay to get the prescription rather than endure the pain? It is difficult to say, and it may be impossible to work out when you are in pain. It is also difficult to sleep, or even enjoy watching television. You might be willing to pay as much as $150 for relief from pain for the next ten days. This willingness to pay (WTP) is the correct measure of the

value of benefit received. WTP is the mirror image of opportunity cost, the "highest valued opportunity forgone." (Getzen, 2004, pp.37)

The foundation of WTP theory comes from the application of welfare economics, therefore, this chapter introduces briefly the theory of welfare economics. Further details of welfare economics can be found elsewhere in economics text books such as Freeman (2003) and Mooney (2003).

4.3 Welfare Economics

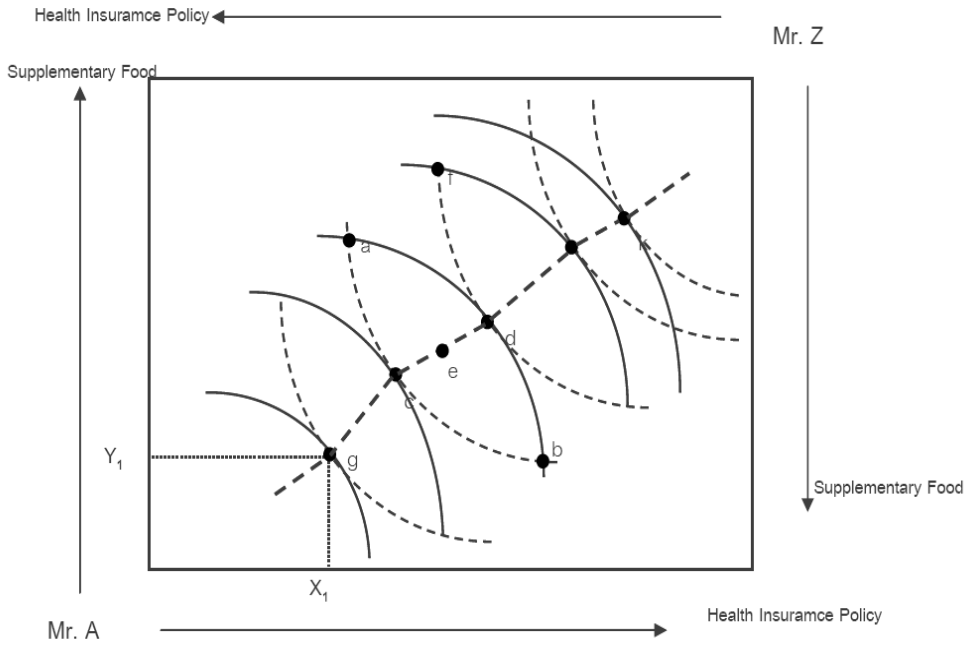
"Welfare economics or welfarism is generally defined as the systematic analysis of the social desirability of any set of arrangements for example, a state of the world or allocation of resources, solely in terms of the utility obtained by individuals." (Morris et al., 2007, pp.210)

Welfare economics is the principal normative tradition in economics. It can be used to reach a logical and consistent ranking of all alternative social states, for example, which program should be implemented in a community between HIV programs and non-smoking programs. The answer relies upon the community's judgments about what is the best for this community.

A basic element of welfare economies is the Pareto principle. A goal of the Pareto principle and welfare economics generally is to sum up individual preferences to produce a social welfare ordering that is a complete and consistent ranking of all possible states in terms of their social desirability.

The principle of Pareto can be explained by an Edgeworth box as in Figure 4.1. The Edgeworth box is constructed from the indifference curve maps of two individuals where the walls of the box are the axes for Mr. A and Mr. Z. The indifference curve for Mr Z can be viewed by rotating the box 180 degree onto that of Mr. A. The Pareto principle in Figure 4.1 shows the possibilities for allocating a certain quantity of two goods, for instance, health insurance policy and supplementary food between Mr. A and Mr. Z.

Figure 4.1: Edgeworth Box[10]



Source: Morris et al. (2007)

The Edgeworth box explains three important things. The first is what is called a weak Pareto improvement, which means a change in the policy increases the utility of all people in society. For example, from point *b* to *e* in the Edgeworth box is a weak Pareto improvement because both of Mr. A and Mr. Z have a higher utility at point *e* when compared to point *b*.

The second thing explained by the Edgeworth box is a strong Pareto improvement. This refers to a change in policy that increases the utility of at least one person, and does not reduce the utility of anyone else. For example, moving from point *a* to *c* is a strong Pareto improvement because Mr. A still has the same utility, whereas, the utility has increased for Mr Z.

[10] This figure is adapted from Morris et al., 2007, Chapter 8

Third, points such as *g, c,* and *d*, where the marginal rate of substitution of both health insurance policy and supplementary food are equal, are called Pareto efficient or Pareto optimal. Pareto optimal means that further exchanges of goods and services can only increase one person's utility by reducing the utility of the other.

There are, however, two criticisms about welfarism and the Edgeworth box. First, welfarism focuses only on individualism which is the view of individuals affected by choice, however, social welfare which is a measure of the well-being of society as a whole is excluded from an individual's utilities.

Second, the utilities in the welfarism are created only from consumption of specific types and quantities of goods and services, whereas, externalities and the consumption of others which may impact on individuals' welfare are ignored. Therefore, extra-welfarism approach aims to overcome the weakness of welfarism by relaxing assumptions of welfarism. Two main assumptions of welfarism are, first, social welfare is a function of individual utilities and, second, individual utilities are a function of the commodities consumed by individuals (Culyer, 1991).

Extra-welfarism, then, allows non-goods characteristics to be included in the function and the effect of non-goods characteristics is not determined by the individuals' utilities. Culyer (1976) argues that non-goods characteristics can actually be used in welfairism. He uses the example of 'caring externalities' as one of the considerations under extra-welfarism, under which individuals gain utility from their own consumption and also that of others.

Birch and Donaldson (2003) argue that extra-welfarism in health areas does not offer anything extra to the welfarism theory for three reasons. First, they believe that individuals' utilities should be important.

Second, the normative position that states of the world are determined to be better – ceteris paribus- when people are healthier than when they are not under extra-welfarism is the same as welfarism. Third, the normative position of both welfarism and extra-welfarism may be not fully accurate as health is not the only factor that can be changed in the real world. Health care intervention affects not only the health of individuals but it affects non-health aspects as well. Thus, people may not necessary prefer a state of the world where some people are healthier than other who are less healthy. Furthermore, there are weaknesses of the Edgeworth box. First, the Edgeworth box cannot rank all non-optimal points against each other such as point *a b* and *f*. Second, the Edgeworth box does not permit economists to rank all Pareto non-optimal points such as point *f* against all Pareto optimal points such as point *c*. Third, the Edgeworth box cannot rank Pareto optimal points against each other such as points *d* and *c*. Thus, economists cannot tell, for example, if point *a* is better than point *f* or if point *d* is better than point *c*.

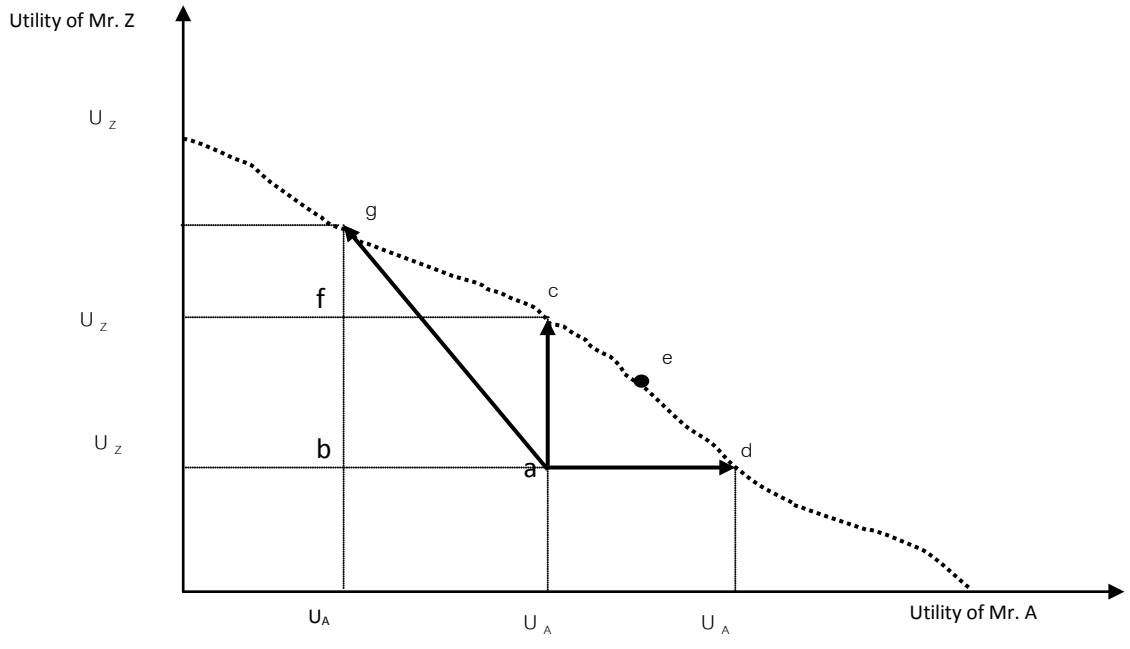
Hicks (1939) developed a new principle in order to overcome the weaknesses of welfarism and the Edgeworth box. Hicks' concept is that benefit (loss) may be defined as the maximum (minimum) amount of money that must be paid from (or given to) a person so that he or she is better off after the change in policy. The concept of Hicks is called the *compensation tests* which simply involves adding up the monetary gains and losses in a community so that economists can rank non-optimal points against any Pareto optimal point. The maximum amount of money that must be paid from a person sometimes is known as Willingness-to-Pay (WTP).

The concept of compensation tests is still based on the Pareto principle. Morris et al. (2007, pp.218) state that "The compensation tests preserve the spirit of the Pareto principle.

If those who gain do so to such an extent that they could hypothetically fully compensate those who lose and still be better off themselves, this is a strong potential Pareto improvement. If those who gain do so to such an extent that they could hypothetically make a payment to the losers which is greater than the amount the losers require as full compensation, and still be better off themselves, then both could be made better off, which is a weak potential Pareto improvement."

The concept of compensation tests allows economists to compare non-optimal points against Pareto optimal points. For example, point *a* and *g* in Figure 4.1 can now be ranked under the concept of compensation tests. The concept of compensation tests can be clearly explained by using a utility possibility frontier which can be derived from the Edgeworth box.

Figure 4.2: Potential Pareto Improvements Explained Using a Utility Possibility Frontier



Source: Morris et al. (2007)

According to Figure 4.2, optimal points such as point *c d* and *g* from Figure 4.1 lie on the utility possibility frontier. However, non-optimal allocation of goods such as point *a b* and *f* from Figure 4.1 lie inside of the frontier.

Thus, the frontier tells that shifting from point *a* to *c* or *d* will be a strong Pareto improvement. For example, from point *a* to *d*, utility for Mr. A has increased while Mr. Z has the same utility at point *d*.

In contrast, shifting from point *a* to *e* will be a weak Pareto improvement because both Mr. A and Mr. Z have increased their utility at point e. The compensation tests allow any non-optimal points within the frontier to be ranked against any points on the line of the utility possibility frontier. For instance, a shift from *a* to *g* does not actually improve social welfare because utility for Mr. A has decreased, however, the improvement in overall efficiency associated with that change enables transfers to take place between Mr. A and Mr. Z such that a movement to a point such as *c* is possible.

The main argument of the compensation tests is that compensation tests do not allow Pareto optimal points to be ranked against each other. Hence, point *g, c, e* and *d* still cannot be ranked by using compensation tests. More details about the compensation tests can be found in Freeman (2003) and Morris et al. (2007). Pareto principle and compensation tests provide an insufficient analysis to obtain a complete and consistent ranking of all states of the world which mean that the social welfare ordering is needed to be developed.

4.4 Social Welfare Function

Although the above social welfare ordering including Pareto concept and compensation tests can rank some states of the world, the above section shows that there are many states of the world that still cannot be ranked. Thus, the social welfare function has been constructed to overcome this problem.

The difference between social welfare ordering and social welfare function is that the social welfare ordering is expressed in ordinal terms, whereas, the latter can be expressed in cardinal terms or in real numbers as a function of its members' individual utilities. (Morris et al., 2007).

The most general form of the SWF is called the Bergson social welfare function. The level of social welfare (W) associated with any given state of the world (x) and health status (z) is a function of the utility obtained by each individual $U_{A(x)}$, $U_{B(x)}$,....., $U_{n(x)}$ in that state. Utility maximisation and indirect utility which is explained in the next section can be written as:

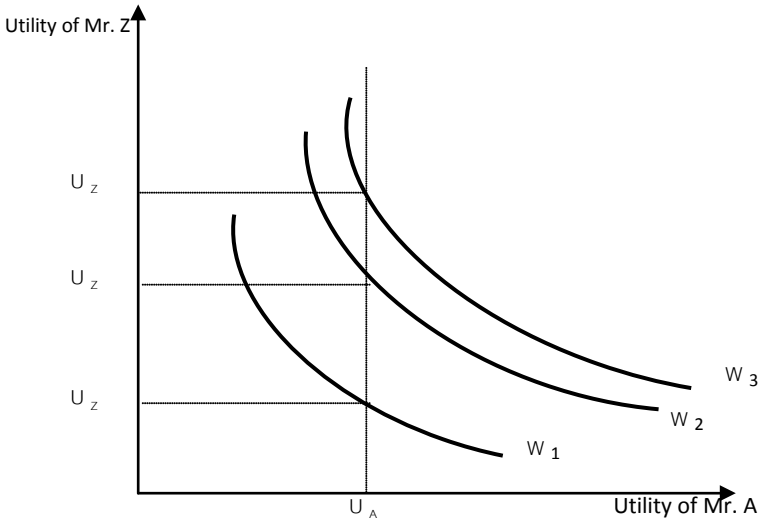
$$MaxU = U(x,z)$$

$$\mathrm{V} = \mathrm{U}[x(p,y),z] = \mathrm{V}(p,y,z) \quad \text{;where } p \text{ is price and } y \text{ is income}$$

$$v(p,y,z) = MAXu(x,z)$$

$$W(x) = f(U_{A(x)}, U_{B(x)}, ..., U_{n(x)}) \tag{4.1}$$

Figure 4.3: The Social Welfare Function



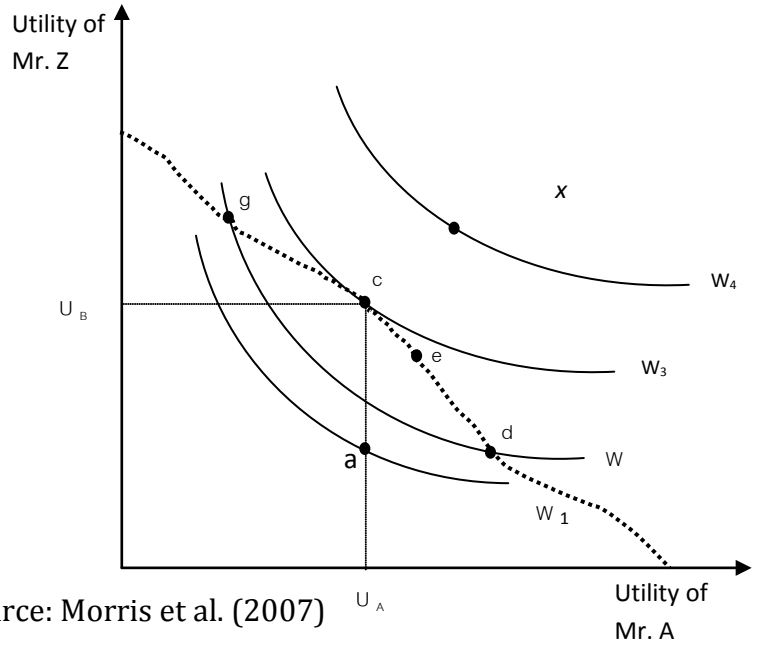
Source: Morris et al. (2007)

According to Figure 4.3, the Bergson welfare function is normally drawn as convex meaning that Mr. Z's utility must decrease given an increase in Mr. A's utility for social welfare to remain constant. The level of social welfare is higher when moving to a higher welfare function such as W_1 to W_2

Economists can combine a convex SWF with the utility possibility frontier for explaining the maximisation of social welfare. For example, according to Figure 4.4, point *a* is not efficient because Pareto improvements are possible by movements to point *g ,c, e* and *d*. Although, points such as point *x* are preferred, the current resources and existing technology do not allow the society to achieve point *x*. Point *g, c, e* and *d* are all optimal Pareto which means that neither the Pareto principle nor compensating tests can rank them.

Figure 4.4 shows that point *c* is the best distribution of utility between Mr. A and Mr. Z because it generates the highest possible level of social welfare (W_3). This point is called 'maximum ophemality' (Pesky 1992). Thus, the optimal Pareto can be ranked under the SWF principle.

Figure 4.4: the Maximisation of Social Welfare



Source: Morris et al. (2007)

The social welfare function can be useful in three ways. First, the only determinations of *W* are the utilities of individual people, thus, it is based on welfarism concept. Second, the SWF is still based on the Pareto criterion. Third, the SWF can cope with situations where the relative desirability of states depends on what sort of trade-offs are possible between individuals' utilities. Thus, the problems of Edgeworth box can be mitigated. More details of the SWF can be seen in Morris et al. (2007). Some basic concepts of welfarism and its development are provided in the above section. A discussion of the theory of the WTP is presented next.

4.5 Willingness-to-Pay

The Willingness to Pay (WTP) approach is used in cost –benefit analysis where money is used as a proxy for utility. The theory of the WTP can be related to welfare economics and Hicks's compensation tests which are mentioned in the above section. The basic theory of welfare economics assumes that each person can maximise their utility. Each person also has a limited income –after tax- (y) which they want to spend on n different goods with quantities of x which $x = (x_1, x_2, x_3, \ldots, x_n)$. Each of these n goods has an price of p where $p = (p_1, p_2, p_3, \ldots, p_n)$. Each person's utility is expressed by

$$U = U(x) \tag{4.2}$$

In health care areas, health status (z) can be put into the utility function which can be expressed by

$$U = U(x, z) \tag{4.3}$$

and the maximisation of the utility is

$$MaxU = U(x, z) \text{ Subject to } p^{*}x \leq y \quad (4.4)$$

Using function (4.3), economists can create measures of welfare change in terms of monetary units for consuming goods (x) and health status (z) as the metric for economic evaluation. There are two tools of using money to measure changes in utility. These two tools are known as the compensating variation and the equivalent variation. The first, the concept of the compensating variation can be described as follows:

"*The* compensating variation *approach seeks monetary amounts that represent the impact on a person of any given change considered ex post, relative to their initial levels of utility." (Morris et al., 2007, pp.227).*

The compensating variation is often interpreted as the maximum amount of money that a person would be willing to pay for the chance to consume goods and services at the better-off position when compared to their status quo. In contrast, in case of worse-off position such as a price increase, the compensating variation measures the amount of payment or compensation to a person to make that person feel indifferent between their status quo and the worse-off position. The second, the concept of the equivalent variation can be explained as:

"The equivalent variation approach seeks monetary amounts that represent the impact on a person of any given change considered ex ante, relative to the new level of utility that the change is anticipated to bring." (Morris et al., 2007, pp.227).

The equivalent variation can be interpreted as the amount of money that would need to be given to a person before the policy change that would increase their utility to a new higher level so this person would be willing to refuse the new policy. Whereas, the equivalent variation measures a person's WTP before the change so that the person can avoid a reduction in their utility resulting from

the change such as price increase. Table 4.1 provides a summary of the compensating variation and the equivalent variation.

Table 4.1: The Compensating Variation (CV) and the Equivalent Variation (EV) for Gains (Price Decrease) and Losses (Price Increase)

	For a gain (better-off) arising from a change in the state of the world:	For a loss (worse-off) arising from a change in the state of the world:
CV	The amount of income that would have to be *taken away* from an individual *following* this change, in order that they return to their *origina*l level of utility	The amount of money that must be *given* to the individual *following* this change, in order that they return to their *original* level of utility
EV	The amount of income that would have to be *given* to the individual *before* this change, that would increase their utility to the *new* (higher) levels they would obtain ,if the policy were to proceed	The amount of money that would have to be *taken away* from the individual *before* this change that would give a reduction in their utility to the *new* (lower) level they would experience ,if the policy were to proceed

Source: Morris et al. (2007, pp.227)

Economists need to construct the indirect utility function in order to estimate the compensating variation and equivalent variation. Morris et al. (2007) show that from equation (4.4) x is constrained by the person's price (p) and income (y), that is

$$x = x(p, y) \tag{4.5}$$

Substituting (4.5) into equation (4.3) provides an expression for the indirect utility function:

$$V = U[x(p, y), z] = V(p, y, z)$$

and the consumer's problem is

$$v(p, y, z) = MAXu(x, z) \tag{4.6}$$

Equation (4.6) tells that indirect utility (V) is a function of price (p), post-tax income (y) and health status (z). Equation (4.6) also tells that for any change of health status such as receiving health care will change the person's utility. The change in utility (ΔV) following the change in health status is written as

$$\Delta V = V(p, y, z_1) - V(p, y, z_0) \tag{4.7}$$

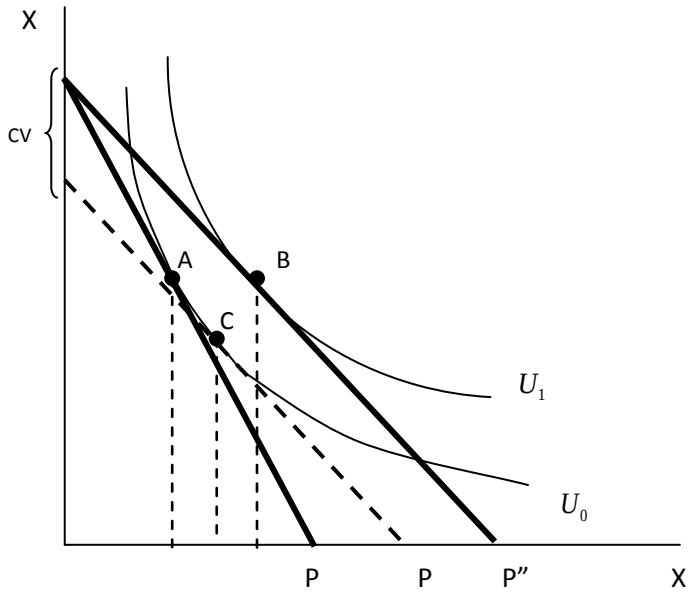
Where z_0 is the person's initial level of health (state 0) and z_1 is the person's final level of health (state1) in which, p and y are assumed to be constant. According to equation (4.7), ΔV is positive if $z_1 > z_0$ or health status is improved. Hence, economists want to value in monetary terms that change in utility (ΔV) arising from a change in health. (Freeman, 2003)

Morris et al. (2007) further state that if health improves (the same mechanism as the better-off case in table 4.1, the compensating variation is the maximum amount of money that a person is willing to pay after the improvement, leaving them as well off as they were before the change which can be written as

$$V(p, y\text{-}CV, z_1) = V(p, y, z_0) = U_0 \quad (4.8)$$

This is known by economists as the *Willingness to Pay (WTP)* for an improvement in health or a reduction in the risk of ill-health. Equation (4.8) indicates that after a person has paid the maximum amount of money (CV in equation (4.8), their utility is equal to U_0 which is the person's utility before the improvement in health. In contrast, for health losses, the CV is the minimum amount of money that must compensate the person for their loss in health. The CV can be explained more clearly by Figure 4.5 which is from Freeman (2003) and Hick (1939).

Figure 4.5: Compensating Variation



Source: Freeman (2003)

According to Figure 4.5, the original position of a person is at point A. If the person's health can be improved, this person can work more in the future. Thus, the after-tax income for this person will be increased and the utility

increases to U_1 (a movement from point A to B). Hence, if this person wants to reach point B, he/she has to pay money for the health improvement by amount of CV to reach point B. The amount of CV is known as the *Willingness to Pay* (WTP) for this person. (Freeman, 2003)

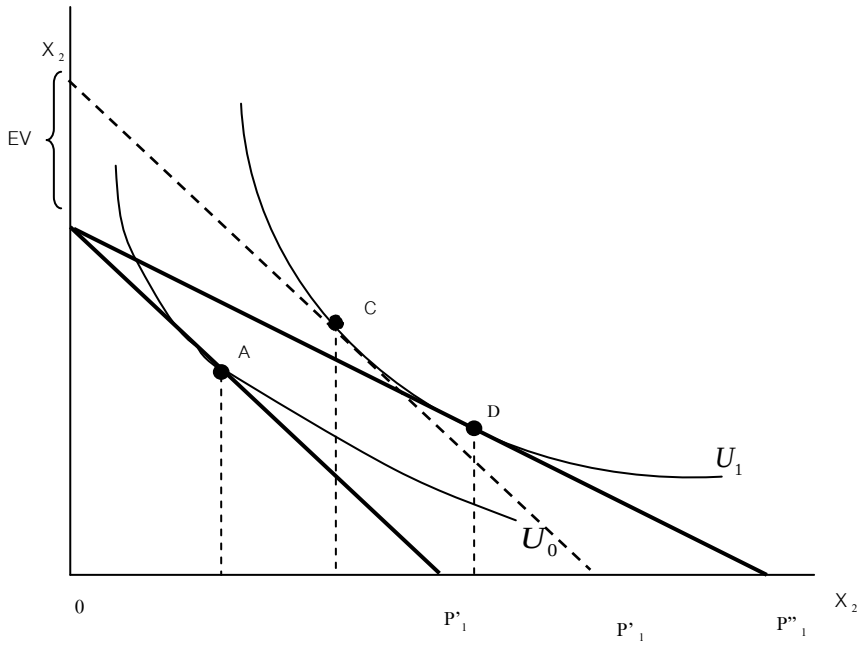
If this person is already at point B, their income could still be decreased by CV (to point C) so that they would be as well off as before the health improvement (point A), leaving them on same indifference curve (U_0). For the health losses, the CV measures what must be paid to the person to make that person indifferent to the health losses. For health improvement, the CV or WTP cannot be greater than the person's income, however, for the health losses, the CV or compensation could be larger than the person's income. (Freeman, 2003)

For the equivalent variation for health improvement, equation (4.9) shows that the EV is the minimum amount of money that must be paid to the person to make them as well off as they would have been before the improvement in health, written as

$$V(p, y+EV, z_0) = V(p, y, z_1) = U_1 \quad (4.9)$$

This is known as the *Willingness-to-Accept* (WTA). U_1 is the person's level of utility after the health improvement. For health losses, EV is the Willingness to Pay (WTP) for protecting the health losses. The EV can also be explained by Figure 4.6 which is also adapted from Freeman (2003).

Figure 4.6: Equivalent Variation



Source: This figure is from Freeman (2003)

Figure 4.6 shows that if health is improved, a person could reach the U_1 (from point A to point D) with an income increase equal to EV. The EV is the minimum compensation that can induces a person to refuse the opportunity to achieve a health improvement. (Freeman, 2003)

In sum, the compensating variation for an improvement in health is equal to the equivalent variation for the health losses, and is known as "Willingness to Pay (WTP)". The compensating variation and the equivalent variation can be used to measure the change of social welfare. For example see Morris et al. (2007, pp.230). This chapter does not mention these issues as this thesis is concentrating on the WTP. Next, other concepts which are WTP for uncertainty and WTP-locus are discussed

4.6 Willingness-to-Pay for Uncertainty

Timing of access to health and health outcome are both uncertain. Normally, economists, describe "uncertainty" in terms of two aspects. First, sets of possible adverse events that occur in the world. Adverse events can be the number of days someone has off sick. The second aspect is the probability distribution across risky consequences. In health care, a person is willing to pay for reducing these two aspects called *"willingness to pay for risk reduction"*.

A person who is willing to pay for reducing these two aspects together with a willingness to pay for future safety such as, willingness to pay for regulations for smoking is called "*willingness to pay for risk prevention*". Freeman (2003) notes that risk reduction and risk prevention may sometimes be similar. This chapter will only focus on the case of risk reduction because willingness to pay for health insurance which is the objective of this study is about risk reduction.

4.6.1 Individual Preferences and Expected Utility

WTP in an uncertain world and WTP-locus has been developed by Graham (1981). First, individual preferences and their expected utility require construction for analysing WTP-Locus. In events involving risk, Freeman (2003) assumes that an individual has a well-behaved preference ordering over bundles of goods X and there are some adverse events. The variable A means the severity of the adverse event. Thus, $A=A^*$ represents the occurrence of the adverse event and $A=0$ means the adverse events have not occurred. Freeman (2003) further states that A^* has a probability of $\prod$, whereas, $A=0$ has a probability of $1-\prod$.

Freeman (1984b, 1985 and 1989) construct an *ex-post* indirect utility function following as

$$U=v\,(Y, P, A) \tag{4.10}$$

where Y is income and P is a vector of prices. Equation (4.10) shows the maximum attainable utility given Y, P and A. WTP for risk reduction is about avoidance either $\prod$ or A^*. Freeman (2003) assumes that there is no chance to buy any protective activities. This means that a person could not reduce either $\prod$ or A^* by self-protection (for reducing $\prod$) or self-insurance (for reducing A^*).

Let D denote that monetary value of the damages caused by the occurrence of the adverse event. D is the maximum sum of money that a person would give up to meet A=0 rather than $A=A^*$. In other words, D in the equation (4.11) is *the willingness to pay ex post* or the monetary value of the damage cause by A^*. D also is a form of compensating surplus (CS) measure of social welfare change. It can be expressed as

$$v\,(Y, A^*) = v\,(Y-D, 0) \tag{4.11}$$

Moreover, when people make *ex ante* choice, that is choices made before the state of nature is revealed, they are then about to maximise their expected utility where expected utility is

$$E[u] = [\prod.u(X, A^*)] + [(1-\prod).u(X, 0)] \tag{4.12}$$

Where X is bundles of goods X

Willingness to Pay (WTP) *ex ante* is the maximum payment that a person would make to change from the status quo risk to a situation in which A^* would not occur. This is very similar to the definition of the Compensating Variation (CV). WTP *ex ante* which denotes as WP is the solution to

$$[\prod.v\,(Y, A^*)] + [(1-\prod).v\,(Y, 0)] = v\,(Y-WP, 0) \tag{4.13}$$

D in equation (4.11) and *WP* in (4.13) do not need to be equal because *D* is *ex post* change in *v* (.), whereas, *WP* is *ex ante* change in *E[u]*. For more reviews about WTP *ex ante*, see Bishop (1982) and Smith (1983).

4.7 Willingness to Pay – Locus

Welfarism assumes that individuals maximise their expected utility, thus, the equation (12) can be changed to

$$\text{Max: } E[u] = [\prod.u(X, A^*)] + [(1-\prod).u(X, 0)] \quad (4.14)$$

subject to the normal budget constraint that expenditure equal to income (Y) and the solution of this problem is denoted as E_1.

According to the above section, if the government introduces a health care policy which could reduce the size of an adverse event from A^* to 0, in the *ex post* change in utility, a person is required to pay *D* to take this program in order to avoid the adverse effects if the event occurs. This person may pay nothing if he or she does not want to avoid the adverse event. Thus, the expected utility from paying *D* and paying nothing would not be changed.

For the *ex ante* change in utility, a person will pay *WP* before the uncertainty is resolved or pay nothing. In this case, the expected utility between pay *WP* and pay nothing also would not be changed. The set of these payments is expressed by:

t^* = payment given that state in which the adverse event occurs

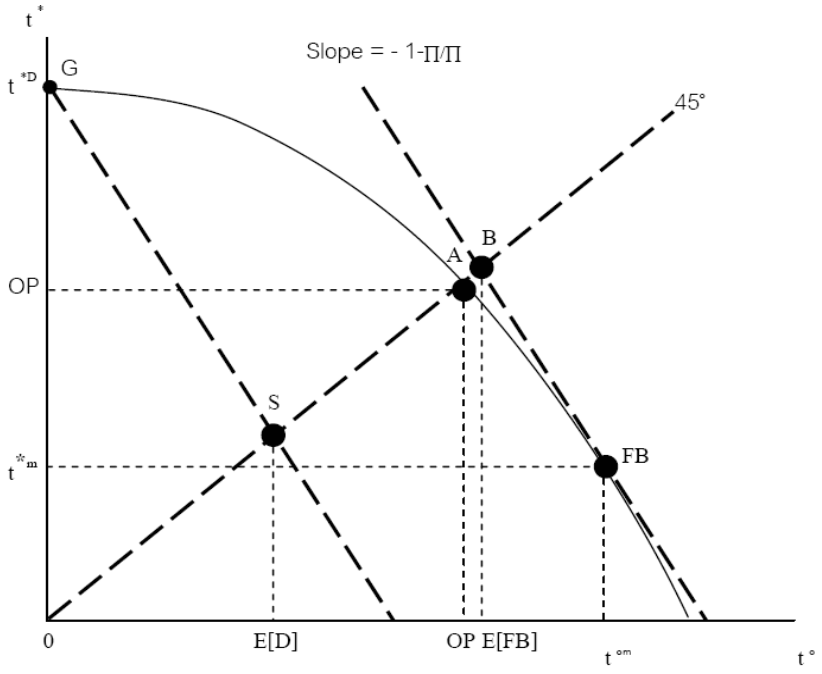
t^0= payment given the state in which adverse event does not occur

Freeman (2003) points out that these payments satisfy the following condition:

$$E_1 = [\prod.v\ (Y-t^*, 0)] + [(1-\prod).u(X, 0)] \quad (4.15)$$

The equation (4.15) is called Graham's WTP locus which is shown in Figure 4.7. The equation (4.15) presents the case of risk reduction which is the focus of this chapter. The risk prevention case can be seen in Freeman (2003). The WTP-locus is concave to the origin in the Figure 4.7 due to risk-averse assumption. However, WTP-locus can be linear if a person is risk neutrality with a constant marginal utility of income.

Figure 4.7: WTP-Locus



Source: Figure is from Freeman (2003)

There are three interesting issues in the WTP-locus. First, point G, in the case where the adverse events has not occurred, shows that a person would pay nothing and there is no damages estimation. However, a person would pay t^{*D} if the adverse event does occur. The payment of t^{*D} is the maximum payment the person would pay to avoid the consequence A* to meet the consequence 0.

There is a line called iso-expected payment line which runs from point G with a slope $-(1-\prod)/\prod$ and represents the locus of all pairs of monetary values that have the same expected value as t^{*D}. *A** has a probability of $\prod$, whereas, $A=0$ has a probability of $1-\prod$. For any t*, these loci satisfy

$$E[t] = \prod.t^* + (1-\prod).t_0 \qquad (4.16)$$

Differentiating, this gives

$$dt^*/dt_0 = -(1-\prod)/\prod \qquad (4.17)$$

The iso-expected payment line from point G intersecting the 45º line can be used to find the expected value of damages (E[D]). This is the willingness to pay *ex post* (D) measure of the welfare change of avoiding the event of A* where an adverse event has occurred.

Second, A is a point where $t^* = t_0$ =OP. OP is known as *the willingness to pay ex ante*. Figure 4.7 shows that OP is greater than *E [D]*, however, this will not always be the case. The difference between OP and *E [D]* can be either positive or negative. For examples, see Graham (1981) and Freeman (1984b, 1985, 1989).

Third, point FB is called "fair bet point". This point represents an optimum contingent payment scheme. Fair bet point is the condition for the efficient distribution for risk and for the optimum purchase of contingent claim[11] at actual fair price.

---

11 Freeman (2003, pp.217)) states that "A contingent claim is contract specifying in advance a set of payments or receipts, or both, in which the amounts depend on the state of nature. An insurance policy is a contingent claim."

This point also represents the state-dependent scheme, t^{*m}, t^{om} that maximises the expected value of the person's payments (E [FB]). At FB point, the marginal utility of income are equal in the two stages between A = 0 and A* because the slope of the WTP-locus and iso-expected payment line are equal.

4.7.1 WTP-Locus and Insurance

The usefulness of the WTP-locus is to explain the WTP when a person considers buying an insurance policy. Freeman (2003) assumes that a person would buy an insurance policy by paying premium (*P)* -the averse event is yet to occur (A=0) - and receiving reimbursement (*R*) when the adverse event has occurred (A*). Hence, the maximum expected utility of a person in the case of insurance can be written as

$$E[u] = \prod.v\,(Y+R-P, A^*) + (1-\prod).v\,(Y-P, 0) \qquad (4.18)$$

The equation (4.18) is subjected to the constraint that a person can exchange income across states of nature, according to $P/(R-P) = k$ where k is the premium of insurance policy. The premium of insurance is fair when $k = \prod/(1-\prod)$ and the marginal utility of income when no adverse event is equal to the marginal of income when adverse event is occurred or $v_{M^*}=v_{Mo}$[12].

Suppose that a person is asked to make the payment amount of t* when the adverse event happens and pay nothing when adverse event does not occur. This means that this person is actually at point G in Figure 4.17.

[12] v_{M^*} is the marginal utility of income evaluated at M-t*
v_{Mo} is the marginal utility of income evaluated at M- t^0

However, if this person is able to buy an insurance policy at a fair price, the iso-expected payment line through point G shows that the person could buy an insurance policy that would require the person to pay premium *E [D]* ,which is derived from point S, when the adverse event does not occur. In contrast, this person would get a net payment of *E [D]* if the adverse event does occur.

The interesting point is that the point S is inside the WTP-locus, it results in a higher expected utility than could be realized in the absence of the insurance policy that would reduce *A** to 0.

In short, if an insurance policy is available, the person would be willing to pay more than *D-the damage from the adverse event* for the insurance policy that reduces *A** to 0. Thus, researchers need to account for the individual's opportunities for diversifying risk through insurance, otherwise, the expected damage measure of welfare change underestimates the true WTP of the individual.

The above discussion focuses on the usefulness of WTP-locus which shows that WTP can play an important role in measuring the change of social welfare in an uncertain world. However, there are many questions which the WTP-locus cannot answer. For example, Freeman (2003, pp.218) quotes the WTP-locus that "If welfare change is to be measured by the maximum payment that holds expected utility constant, which pair of state-dependent payments is the best welfare measure? We are not ready to answer this question because how welfare is to be measured depends in part on the form of the social welfare criterion."

4.8 Conclusion

Willingness to Pay (WTP) as a concept owes its developments to welfare economics. Willingness to Pay presents the community's preferences. Welfare economics including the Edgeworth box and Pareto theory should be understood before moving to study WTP theory. The concepts of the compensating variation and the equivalent variation are important for studying WTP.

Both the Compensating Variation (CV) and the Equivalent Variation (EV) can be used to measure WTP and the change of social welfare. The CV is often interpreted as the maximum amount of money that a person would be willing to pay for the chance to consume goods and services at the better-off position when compared to their status quo. In contrast, in the case of the worse-off position such as a price increase, the compensating variation measures the amount of payment or compensation to a person to make that person feel indifferent between their status quo and the worse-off position.

On the other hand, the EV can be interpreted as, in case of the better-off position such as a price decrease, the amount of money that would be given to a person before the change that would increase their utility to the new higher levels they would gain from the new policy.

WTP for uncertainty issues and the willingness to pay –locus explains how a person would be willing to pay for a health insurance policy to reduce their risk. WTP-locus shows that if an insurance policy is available, the person would be willing to pay more than the damage from adverse event for the insurance policy. Thus, researchers need to account the for individual's opportunities for diversifying risk through insurance, otherwise, the expected damage measure of welfare change underestimates the true WTP.

Chapter 5: Model of Eliciting Willingness to Pay- Discrete Choice Experiment

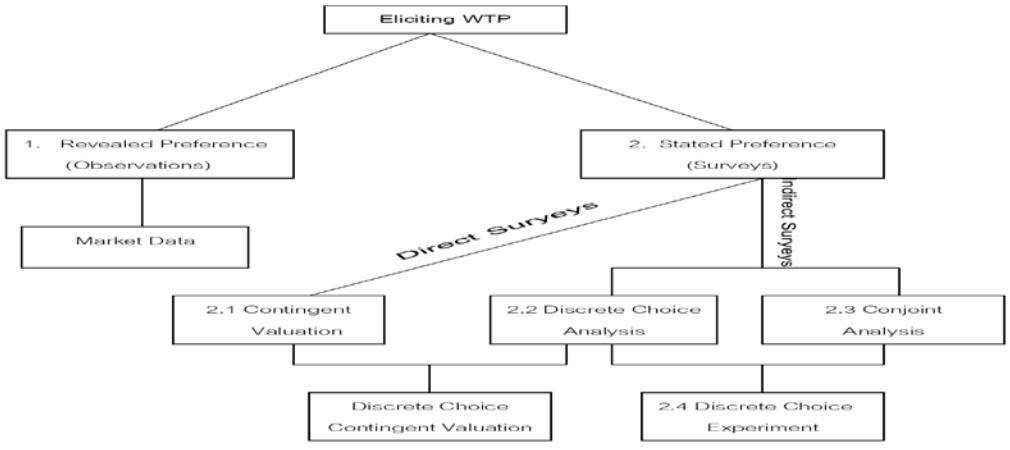
5.1 Introduction

This chapter shows how Willingness to Pay (WTP) can be elicited. WTP can be elicited directly or indirectly from estimating monetary valuation for specified goods and services even in the absence of conventional market transactions. There are two main approaches which can be used to elicit WTP. The first approach is Revealed Preference which focuses on observation. The second approach is Stated Preference which focuses on survey and experiments.

This study uses the Stated Preference approach of Discrete Choice Experiment (DCE) to elicit WTP for health insurance in Thailand. Three other topics are addressed. First, the theoretical framework of DCE which is the random utility theory is presented. Second, the logit model which is used by this study to estimate and interpret DCE data is discussed. Third, the use of the dominance approach to check whether respondents are responding to the DCE rationally is discussed.

Methods of eliciting WTP

Figure 5.1: Chart of Methods for Eliciting of WTP



Source: Hensher (2005)

Figure 5.1 shows Willingness to Pay (WTP) can be estimated via the two approaches of Revealed Preference and Stated Preference.

5.2 Revealed Preference

Morris et al. (2007, pp.266) explain that "Revealed preference refers to valuations of goods and services that can be inferred from real choices that are made in the everyday world. It is based on the theory that the choices that people make, arise from a comparison of the benefits of alternatives with their opportunity costs. Individuals assess these benefits according to their preferences."

Breidert (2005) further simply explains that Revealed Preference refers to observations. For example, if researchers observe that people are not willing to purchase a health insurance scheme for $A 200/annum, but will purchase one for $A 100/annum, they can infer a WTP between $A 100 and $A 200 per annum.

If researchers are able to vary prices between these two prices and observe people's choice, the WTP for this health insurance scheme can be estimated. Figure 5.1 shows that Revealed Preference can be achieved by using market data.

One major problem of Revealed Preference is that there are no prices directly charged in many non-markets and regulated activities such as health care programs. Thus, researchers cannot construct a demand curve and estimate WTP accurately. For instance, governments often subsidize many health care programs,

Two solutions are introduced for dealing with this problem. The first solution is based on the observation that people may have to bear many different costs to obtain goods and services. These costs are not just the direct cost of buying goods and services at the point of consumption.

For example, although the government may offer health insurance for free, the beneficiaries may incur monetary outlays such as the cost of travel to contracted hospitals and other opportunity costs. Thus, researchers should be able to construct a demand curve and estimate WTP from these costs.

The second solution is to measure benefits which have been occurred from goods and services. These benefits may not be occurred directly, however, it is possible to infer benefits from other markets in which these benefits are also accessed. Viscusi (2004) states that if researchers are interested in measuring the value of health changes as part of an assessment of benefits of health care, it is possible to do so by examining a person's consumption decisions for goods and services that decrease the risk of illness.

As an example, if a person is about to pay $A 20,000 for a car with additional safety features that reduce the person's possibility of death from a car accident by 0.001. The value of life is estimated as $A 20,000/0.001 = $A 20 million. (Morris et al., 2007)

Another weakness of the Revealed Preference approach is that it is not good for eliciting non-use values. Non-use values are goods, services and resources for which a person may be able to express their WTP and preferences, however, this person may not actually need to use these goods, services and resources. For example, Mr. A may be able to express his WTP for breast screening even though he will never use it ever. Freeman (2003) notes that if non-use values are large, policy makers could interpret data in the wrong way.

5.3 Stated Preference

Stated Preference is based on surveys and experiments. Stated Preference can be used for eliciting monetary values for specified commodities or welfare changes.

The important assumption for Stated Preference is that "the values that people state are really those that underlie their choices in the everyday world, and that the choices that they make within the survey are those that they would make if they really faced with the alternatives offered." (Morris et al., 2007, pp. 267)

Figure 5.1 shows that there are three common methods in Stated Preference. These methods are Contingent Valuation, Conjoint Analysis and Discrete Choice Analysis. Details of Contingent Valuation, Conjoint Analysis and Discrete Choice Analysis can be found in Smith (1997), Welsh and Poe (1998), Farrar (2000), Sjostrom (2000), Riedesel (2001), Christian et al. (2003), Freeman (2003), Morey and Rossmann (2003), Binam, Nkama and Nkendah (2004), Busch et al. (2004), Olsen and Smith, 2004, Larissa et al. (2004), Finkelstein et al. (2005), Breidert (2005), Cawley (2006), Donaldson, Mason, and Shackley, 2006. This study uses DCE which is a mix between Conjoint Analysis and Discrete Choice Analysis for eliciting the WTP.

5.4 Discrete Choice Experiment

DCE combines features of Conjoint Analysis and Discrete Choice Analysis and it is very similar to the Conjoint Analysis method. The difference between DCE and Conjoint Analysis is that DCE offers a choice between pairs of scenarios and uses closed-ended questionnaires, whereas, Conjoint Analysis offers only scenarios that are made up of different levels of attributes and respondents are asked to rank and rate all products. In addition, Conjoint Analysis uses open-ended questionnaires. Furthermore, WTP estimates are obtained by using DCE at the aggregate level, whereas, Conjoint Analysis elicits welfare change at the individual level.

Ryan et al. (2001, pp. i55) state that "Discrete choice experiments are based on the premise that, firstly, any good or service can be described by its characteristics (or attributes) and, secondly, the extent to which an individual values a good or service depends upon the nature and levels of these characteristics. The technique involves presenting individuals with choices of scenarios described in terms of characteristics and associated levels."

Ryan et al. (2001, pp. i55) further explain that "For each choice they are asked to choose their preferred scenario. Response data are modelled within a benefit (or satisfaction) function which provides information on whether or not the given characteristics are important; the relative importance of characteristics; the rate at which individuals are willing to trade between characteristics; and overall benefit scores for alternative scenarios."

Box 5.2: Examples of the DCE Approach

Scenario 1

	The Current Health insurance Plan	**Alternative Health insurance plan no.1**
Long term care (LTC)	All LTC are covered for a person above 50 years old	unchanged
New method of treatment	Not covered	The first 2 years of new treatment are not covered
Choices for drugs	Only generic drugs are covered	Not covered
Choices of hospitals	All public hospitals	All public and Private hospitals
Premium (per annual)	$A 300	$A 700

Which health insurance plan would you prefer (tick one box only)? □ The current □ Plan No.1

This box is modified from Zweifel et al. (2006)

Box 5.3: Examples of the DCE Approach

Choice 1	Test A	Test B
Information	Simple	Comprehensive
Waiting time to receiving Results (days)	2	8
Cost of scanning test (£)	20	100
Please tick on the screening Test you would choose	☐	☐

Source: Ryan et al. (2008, pp.75)

For DCE, the utility structure is elicited based on a choice set which is available to all respondents. A choice set consists of many scenarios. Each scenario consists of alternatives. For an example of a scenario in DCE, see Box 5.2 and 5.3. Respondents are presented all different scenarios and choose only one alternative from each scenario. Researchers also can provide an opt-out alternative in which respondents are able to express that they do not want to choose any of the presented scenarios. Some researchers such as Zweifel et al. (2005) have used DCE to elicit community's preferences and WTP in many health care areas including health insurance.

This study uses DCE for five reasons. First, DCE overcomes problems of Revealed Preferences. Second, respondents are faced with more reality about choice decision making. Third, DCE allows different alternatives to be described by a wide range of attributes. Next, respondents are able to deal with more numerous attributes in DCE than Conjoint Analysis (Riedesel, 2001). Last, problems of Contingent Valuation such as strategic biases and warm glow effect can be avoided by using DCE (Ryan et al. 2000).

A weakness of DCE is that respondents sometimes experience difficulties when answering the DCE questions. Ryan et al. (2000) assert that some difficulties have been reported when respondents are answering DCE questions.

5.4.1 Theoretical Framework of DCE

The theoretical framework of DCE is based on the random utility theory and the ideas of Lancaster (1966). Hanemann (1982) further explains that discrete choice theory deals with a finite number of choices which means respondents choose only one alternative in each presented scenario and discrete choice theory holds that individual choice is random.

5.4.2 The Random Utility

The concept of random utility is that people create what is called "indirect utility". Indirect utility is the maximum utility that is reachable under a given price and income. Jehle and Reny (2001, pp.27) explain that the consumer chooses a utility-maximising bundle of goods at a certain price and income. Thus, the levels of maximised utility can differ when the prices and incomes are altered, giving different budget constraints which force the consumer to make a different choice.

Ryan et al. (2008) conclude that it is impossible to elicit all attributes affecting individuals' preferences. Hence, latent utility is suggested to deal with this issue. Latent utility can be explained in the following equation (5.1).

$$U_{\text{in}} = V\left(X_{in}, \beta\right) + \varepsilon_{in} \tag{5.1}$$

Latent utility of an alternative i in a choice set C_n which is chosen by individual n can be separated into two parts. The first part is V (X_{in},β) which is an

explainable or systematic component that is related to a function of the attributes of the alternatives.

The second part is ε_{in} which is a random or unexplainable component that represents unobservable attributes in preferences. Manski (1977) states that the random component exists due to differences in individuals' tastes and measurement errors.

The important assumption for equation (5.1) is that individual *n* will choose alternative *i* from all *j* alternatives included in the choice set C_n when alternative *i* maximises the individual's utility. This statement can be expressed by:

$$y_{in} = f(U_{in}) = \begin{cases} 1 if U_{in} = \max\{U_{ij}\} \\ 0 \text{ otherwise} \end{cases} \forall j \neq i \in C_n \tag{5.2}$$

where y_{in} is a choice indicator equal to 1 if alternative *i* is picked and *vice versa* for 0. An individual chooses alternative *i* when:

$$(V_{in} + \varepsilon_{in}) > (V_{jn} + \varepsilon_{jn}) \forall j \neq i \in C_n \tag{5.3}$$

or

$$(V_{in} - V_{jn}) > (\varepsilon_{jn} - \varepsilon_{in}) \tag{5.4}$$

However, it is not possible to estimate the term of $(\varepsilon_{jn} - \varepsilon_{in})$, thus, researchers cannot exactly say if $(V_{in} - V_{jn})$ is actually more than $(\varepsilon_{jn} - \varepsilon_{in})$. The only thing that researchers could tell is the probability of occurrence that individual *n* will choose alternative *i*. (Ryan et al., 2008)

McFadden (1974) shows that the probability that a sampled individual *n* will choose alternative *i* is equal to the probability that the difference between the random (unexplained) component of any other alternative *j* and the chosen alternative *i* is less than the difference between explainable utility levels of alternatives *i* and *j*, for all *J* alternatives in the choice set C_n. This can be expressed as:

$$
\begin{aligned}
&P_{in} = \Pr(y_{in} = 1 / X_{in}, \beta) \\
&= \Pr(U_{in} > U_{jn}) \forall j \neq i \in C_n \\
&= \Pr(V_{in} + \varepsilon_{in} > V_{jn} + \varepsilon_{jn}) \forall j \neq i \in C_n \\
&= \Pr(\varepsilon_{jn} - \varepsilon_{jn} < V_{in} - V_{jn}) \forall j \neq i \in C_n
\end{aligned}
\tag{5.5}
$$

According to the equation (5.5), the actual distribution of $\varepsilon_{jn} - \varepsilon_{in}$ across the population still cannot be estimated, however, it can be assumed that $\varepsilon_{jn} - \varepsilon_{in}$ relates to the choice of probability according to some distribution or density function $f(\varepsilon_{in})$ (Ryan et al., 2008, pp.15-16).

Train (2003) points out that the distribution of $\varepsilon_{jn} - \varepsilon_{in}$ is very important to the researcher's interpretation. For example, the distribution of $\varepsilon_{jn} - \varepsilon_{in}$ can present the effect of unobserved factors that induce respondents to choose alternative *i*.

5.5 DCE Model Estimation and Interpretation

The analysis of DCE is based on the extension of the discrete choice model. WTP can be estimated by attributes which provide a monetary measure. Suppose that a person is asked to choose the most preferred alternative or to rank a set of alternatives $Y(Y = y_1, y_2, ..., y_i, ..., y_n)$. Each y_n in Y can be described by its price (p_i) and a vector of non-price attributes $Q(Q = q_1, q_2, ..., q_j, ..., q_m)$. Then, indirect utility of the person associated with alternative *i* will consist of two components.

First, the observable component can be expressed by $v(M, P_i, Q_i, C)$ where C is a vector of individual taste parameters and M is income. Second, the unobservable component is ε_1 which is assumed to be random.

Freeman (2003) uses mathematics to derive the probability of the person choosing alternative 1 or ranking it first as:

$$Pr[u_1 > u_j \text{ ; for all } j \neq 1] = \frac{e^{v_1}}{\sum_{i=1}^{n} e^{v_j}} \qquad (5.6)$$

In the case of contingent ranking, a person is assumed to have values and the alternatives in the following order from the most preferred: $y_1, y_2, ..., y_n$. The probability of ranking y_1 above the remaining $n-1$ alternatives times the probability of ranking y_2 above the remaining $n-2$ alternatives, and so on. This can be expressed in equation (5.7) as:

$$Pr[u_1 > u_2 > ....u_n] = \prod_{i=1}^{n} \left[\frac{e^{v_r}}{\sum_{j=r}^{n+1-r} e^{v_j}} \right] \quad (5.7)$$

where *r* is the rank ordering of the alternatives. If the observable component of the indirect utility function or $v(M, P_i, Q_i, C)$ has been specified, its parameters can be calculated from data on the ranking from a sample by using likelihood methods. Thus, WTP can be elicited by calculating the marginal rate of substitution between any attributes and any of elements of price attributes *(* p).

This study uses the logit model to estimate and interpret WTP from DCE data. The logit model is discussed in the next section. Amaya-Amaya et al. (2008) suggest that researchers should conduct their DCE studies by using the simple logit model in order to ensure minimal error in the estimation process. However, if the problem such as the Independence of Irrelevant Alternatives (IIA) which is explained in the next section needs to be relaxed, the nested logit models, the hetetoscedastic models, multinomial probit models, the mixed logit model and the latent class models should be considered.

Amaya-Amaya et al. (2008) further advise that the appropriate model depends on the characteristics of the specific choice data on hand. The nested logit model is recommended when the alternatives are likely to be clustered into different groups that might share unobserved characteristics.

The mixed logit model is preferred if there is a suspicion that tastes might vary considerably across members of the population for some attributes. Whereas, the latent class is suggested if two or more groups of people with similar tastes are joined.

In all cases, many software packages such as Nlogit/LIMDEP and STATA can assist researchers in ensuring accurate estimations of these models. This study uses the simple logit model, thus, it is discussed next.

5.5.1 The Logit Model

Amaya-Amaya et al. (2008, pp.25) explain that "the logit model is derived under the assumption that the disturbances ε_{in} are Independent and Identically Distributed (IID) extreme value type I (Gumbel) with mode zero and variance $u^2\pi^2 / 6$ where u is a positive scale parameter".

IID means that each random variable has the same probability distribution as the others and all are mutually independent. The IID assumption leads to the Independence of Irrelevant Alternatives (IIA).

IIA means that if a respondent prefers A to B of the choice set [A, B], introducing a third alternative C into the choice set or [A, B, C] does not make B preferred to A. In the other words, the ratio of the choice probabilities of any two alternatives is unaffected by other alternatives which can be expressed as:

$$\frac{P_{in}}{P_{kn}} = \frac{e^{V_{in}} / \sum_j e^{V_{in}}}{e^{V_{kn}} / \sum_j e^{V_{kn}}} = \frac{e^{V_{in}}}{e^{V_{kn}}} = e^{V_{in} - V_{kn}} \tag{5.8}$$

Equation (5.8) implies that choice probabilities would all change in the same proportion with the introduction of a new alternative or the deletion of an existing one (Amaya-Amaya et al., 2008). Ben-Akiva and Lermen (1985, pp. 104-107) calculate the individual choice probability as:

$$P_{in} = \frac{\exp(\mu V_{in})}{\sum_{j \in C_n} \exp(\mu V_{jn})} \tag{5.9}$$

where the systematic utility or explainable function is linear-*in*-parameters which is $V_{in} = \beta' X_{in}$. The likelihood function for the logit model is:

$$L = \prod_{n=1}^{N} \prod_{i \in C_n} P_{ni}^{y_{in}} \tag{5.10}$$

where N is the sample size and y_{in} is a choice indicator equal to 1 if respondent n ($n = 1, 2, 3, \ldots, N$) selects any alternative i in the available choice set C_n and zero for otherwise. The logit model is estimated by finding the values of βs that maximise the following log-likelihood (LL) function:

$$LnL = \sum_{n=1}^{N} \sum_{i \in C} y_{in} (\ln(p_{in})) = \sum_{n=1}^{N} \sum_{i \in C_n} y_{in} \left(\beta' X_{in} - \ln \sum_{j \in C_n} \exp(\beta' X_{jn}) \right) \tag{5.11}$$

The logit model is often used due to its simplicity and ease of use. However, the logit model has been criticised by some researchers such as McFadden (1978). There are three main criticisms. First, McFadden (1978) points out that the IIA is useful when the number of possible alternatives is large because it allows consistent estimation of model parameters, however, the IIA assumption cannot be used in many circumstances.

For instance, IIA can be invalid in situations where some alternatives compete more closely with each other than they do with other alternatives. This is agreed by Fiebig et al. (2005, pp.5) who state "The primary defect of the logit model specification derives from the assumption that the disturbances are independent and identically distributed and hence it suffers from the property referred to as the Independence of Irrelevant Alternatives (IIA)."

Hausman and McFadden (1984) create a test which can be used to test whether the IIA is valid in DCE studies. IIA is valid if there is no statistical difference in the parameter estimates obtained from the logit model on the full set of alternatives (unrestricted model) and a logit model on a specified subset of alternatives (restricted model). Thus, the other models such as nested logit, the hetetoscedastic models, multinomial probit models, the mixed logit model and the latent class models have been developed in order to overcome the weakness of the logit model.

Second, although observed heterogeneity such as some socio-economic characteristics can be included in the logit model, the logit model cannot represent unobserved heterogeneity such as differences in tastes of respondents. (Amaya-Amaya et al., 2008). Third, the logit model is not recommended for analysing panel data where unobserved factors dependently affect respondents over time (Amaya-Amaya et al., 2008).

Ryan et al. (2008) suggest other models that may be used to overcome the weakness of the logit model. These models are the nested logit models, the hetetoscedastic models, multinomial probit models, the mixed logit model and the latent class models. These models also have their weaknesses which need to be considered as well. Amaya-Amaya et al. (2008) suggest that researchers should conduct their DCE studies by using the simple logit model models in order to ensure minimal error in the estimation process. This study decides to use the logit model to analyse the DCE data in order to minimise error in data analysis process at this stage.

5.6 The Weakness of DCE

There are serious weaknesses in using DCE especially in health areas (Kjar, 2005). Cookson (2003) and Wainwright (2003) argue that DCE methods may be invalid due to biases that cause the DCE to be unattractive to health care decision-makers. As an example, Wainwright (2003, pp.378) argues that DCE is not very useful when decision makers seriously focus on patients' health and well-being. He claims that "Rather than 'discovering' preferences that are already in existence, DCE uses what is essentially a highly manipulative technique to construct a narrative or discourse about consumer preferences". Moreover, Kjar (2005) points out that there are many serious biases that can occur in DCE method. These biases can be shown in the following sections.

5.6.1 Incentive to Misrepresent Responses

There are two types of incentives to misrepresent responses. The first is strategic bias which causes under/over estimation of WTP due to the pursuit of one's own interests. Second is justification bias which may occur when respondents expect researchers to possess information about how they really behave. (Kjar, 2005)

5.6.2 Scenario Misspecification

There are many biases for scenario misspecification. First, Salkeld et al. (2000) found status-quo bias in a study of cancer testing programmes. They found that patients had a statistically significant preference for the existing services when all other factors remained constant. Thus, status-quo bias occurs when respondents place high a value on goods that they have experienced. Second, availability bias may occur when the publicity of the project or event influences respondents' preferences so that preferences appear irrational from a theoretical point of view. For example, Jones Lee and Loomes (1994) found that

people's WTP to avoid a fatality on the London underground was 69% higher than their WTP to avoid a road fatality.

Third, Scott and Vick, (1999) found ordering effects (sequencing) in their study. Ordering effects occur when respondents are affected by ordering of questions and attributes. However, Farrar and Ryan (2000) argue that there is no significant effect of the ordering of the attributes on the estimated utility weights in their study.

Next, range bias relates to the importance of attribute levels that are used in the DCE. Ryan and Hughes (1997) suggest that attribute levels should be realistic, plausible and capable of being traded off. For instance, Skjoldborg and Gyrd-Hansen (2003) point out that WTP values are increased with a wider cost range. Last, there are other biases such as scope effect, embedding effect, framing effect and information bias that are reviewed in Hanlet et al. (1998) and Kjar, 2005. All of these biases affect strongly the result of the DCE.

Researchers need to avoid these biases as much as possible. For example, Inza et al. (2008) point out that researchers also need to make sure that respondents answer questions in DCE studies in a "rational" way. This is agreed by Severin et al. (2004) who believe that respondent rationality is important.

The majority of DCE studies have focused on identification of "irrational" responses called the dominance approach. The dominance approach is an option where there are no worse levels for any of the attributes and better for at least one of them. Thus, "rational" respondents should select the "dominance" options easily.

Lancsar and Louviere (2006) argue that although the dominance approach is useful, it can produce a biased result in many circumstances such as when respondents learn to choose the "dominance" option. They then apply the dominance option to answer the other options which can lead to an error in the results.

Validity and reliability are other very important aspects when using DCE methods to elicit preferences because they are not observable (Kjar, 2005). Kjar (2005, pp. 111) mentions that "Reliability refers to the degree of replicability of measurement overtime and over different applications (i.e. generalisability), whereas validity refers to the extent to which a study measures what it intends to measure." Jorgensen et al. 2004 further state that reliability means that a survey item has the capacity to measure something other than random noise.

5.7 Conclusion

There are two main approaches of eliciting Willingness to Pay (WTP). These methods are revealed preference and stated preference. Revealed preference is based on observation and Stated Preference focuses on survey and experiments. This study uses Stated Preference because this study uses Discrete Choice Experiment (DCE) for eliciting WTP for health insurance in Thailand. DCE is used because it can overcome weaknesses of Revealed preferences.

There are three other issues of DCE. First, the theoretical framework of DCE which is the random utility is presented. The concept of random utility is that people always maximise their indirect utility and the levels of maximised utility can be altered when process and incomes are changed. The indirect utility consists of two parts which are explainable component and unexplainable component. Researchers can estimate WTP from explainable component. Second, model estimation is discussed. The logit model is used in order to ensure minimal error in the estimation process. Last, this chapter discusses respondents can be checked by using the dominance approach.

Chapter 6: Research Design

6.1 Introduction

This chapter illustrates how to construct DCE which will be used to elicit WTP for the Gold Card scheme, compulsory public health insurance in Thailand. There are eight steps in setting up the DCE. These steps lead to a good design of DCE.

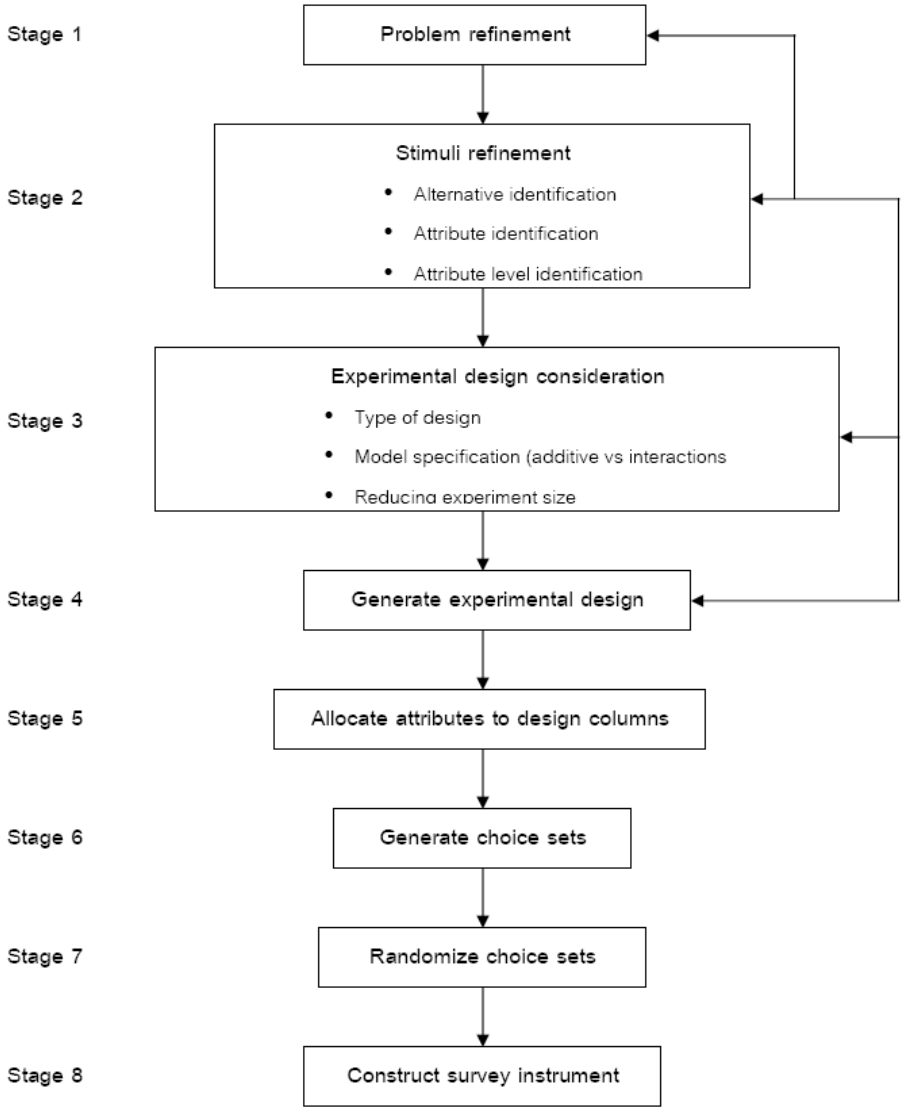
The pre-test study was conducted to find out the list of attributes that attract people to buy a health insurance plan. The pre-test found that there are seven attributes which are important, however, this study selects only the three most important attributes from the pre-test study to ensure that the data configurations are manageable. These three important attributes are *average waiting times for OPD, Choice of hospitals and Premium.* These three attributes are used to assign into the scenarios which are offered to respondents.

Three attributes with three levels for each attribute generate 27 possible scenarios. Thus, this experiment is able to manage all possible scenarios for which full factorial design can be used. The blocking method is also used to reduce the number of scenarios offered to respondents. Each respondent is offered only nine scenarios instead of all 27 scenarios because respondents are likely to be bored and fatigued by answering all 27 scenarios.

This study sets up orthogonal main effects only designs with two-way interaction effects. The reasons for considering the interaction effects are that 2 or more attributes such as *waiting times for OPD and Premium* may be correlated. This study uses 'unlabelled' or 'generic' alternatives which are experiments that do not name their alternatives such as Insurance A and Insurance B. The dominance approach is also included in this experiment. The interviewer will ask respondents to do the experiment again in case the respondent responds to the dominance card irrationally. The end of this chapter shows how WTP can be estimated.

6.2 Research Design

Hensher et al. (2006) have developed the experimental design processes. There are eight steps in setting up the Discrete Choice Experiments.



Source: Hensher et al. (2006)

This study uses the above process to construct the DCE. Stage 1 to 8 is discussed in detail below.

Stage 1: Problem Definition Refinement

Some economists such as Adamowicz et al. (1994), Ryan and Gerard (2003) and Hensher et al. (2006) highlight that a good problem definition refinement is based on researchers answering the following questions[13]:

How many alternatives[14] should be put in the DCE?

What are their attributes[15]?

Who are the respondents?

There are three answers for this stage. First, this study uses three alternatives because respondents are asked to select health insurance A or B or the Gold Card scheme. This is discussed in detail later in this chapter. It is not feasible to construct many public health insurance schemes so three alternatives should be appropriate. For the second question, the attributes can be found via the open questionnaires discussed in stage 2.2. Finally, respondents are those who are eligible for the Gold Card scheme.

Stage 2: Stimuli Refinement

Stage 2 contains three steps. The first step is called "refining the list of alternatives". The second step is to identify the list of attributes. The last step is to identify the attribute levels.

---

13 These questions have been modified according to this research's context.

14 Alternatives are options containing specified levels of attributes. (Hensher et al., 2006)

15 Attributes are characteristics of an alternative. (Hensher et al., 2006)

Stage 2.1 Refining the Lists of Alternatives

This study uses 'unlabelled' or 'generic' alternatives. The 'unlabelled' or 'generic' alternatives are experiments that do not name their alternatives. A reason for using 'unlabelled' or 'generic' alternatives is so the name of health insurance plans does not influence respondents' decision when they are asked to select one of health insurance plans from a scenario. This means that respondents will focus on the attributes rather than the name of health insurance or labelling of alternatives (Amaya-Amaya et al., 2008).

Hencher et al. (2006) also support that establishing willingness to pay (WTP) for specific attributes can be done by using an unlabelled experiment. The advantage of using unlabelled alternatives is that Independent and Identical (IID)[16] assumption is likely to be met under the unlabelled experiments. This study uses Insurance A and Insurance B for the unlabelled alternatives. For more details about labelled and unlabelled experiments can be found in Louviere et al. (2000) and Hensher et al. (2006, pp. 112)

Each scenario contains two alternatives which are *Insurance A and Insurance B*. The Gold Card scheme is also used as the "*status quo"* card which assists respondents in choosing between their current public health insurance and *Insurance A or Insurance B.*

Stage 2.2 Identification of the List of Attributes

Open questionnaires were used to find out the list of attributions which attract people to buy a health insurance plan. Seventy people[17] who currently have the Gold Card were given an open questionnaire.

---

16 Refer to details on the logit model in Chapter 5

17 These seventy Thais who have the Gold Card scheme were selected randomly at MungThong1 Village in Bangkok on Oct 2008. Questions were written in the Thai language.

Respondents are asked "If the government forces you to purchase health insurance, what are important factors that you consider when you buy a health insurance policy? Please list at least five factors". Some respondents who did not fully understand the questions were guided with some factors such as the annual premium. Results are shown in Table 6.1.

Table 6.1: Descriptive Data

Top 10 factors that are listed by respondents	No. of respondents (N=70)	Percentage (%)
Premium	70	100
Choices of contracted hospitals	67	96
Waiting time in Out-Patient-Department	65	93
Waiting to see specialists	42	60
Choice of drugs	38	54
Cancer and kidney diseases can be fully covered	34	48
Dental benefits coverage	30	43
hospitalities of medical staffs	17	24
Hospital's rooms	12	17
Car parking	7	0.1
Ect. such as gifts and discount	3	0.04

Table6.1 shows that the first seven attributes are very important from the respondents' point of view because these seven attributes are expressed by majority of respondents (high frequency) .Whereas, other three factors which are hospitalities, hospitals room and car are parking should not be considered because only some respondents expressed them (low frequency).Thus, these important seven attributes were;

1. *Premium* – the money that the insured needs to pay to their health insurer.

2. *Choice of hospitals*- the number of contracted hospitals which insured people is able to access.

3. *An average waiting time for OPD* – the average time that the insured may wait to see a doctor.

4. *An average waiting time for specialists*- the average time that the insured may wait to see a specialist.

5. *Choice of drugs*- the number of drugs which insured people are able to claim from their health insurance provider.

6. *The coverage for cancer and kidney patients*

7. *Dental care* – Dental benefits that are offered.

Some of the above attributes are very similar to attributes of other WTP for health insurance studies such as Zweifel, Telser and Vaterlaus (2006). It is assumed that these attributes play a significant role in choice of health insurance in Thailand.

Although there are seven attributes, only three attributes of *average waiting times for OPD, Choice of hospitals and Premium,* are selected here. There are three reasons for selecting and using these three attributes. First, if the design includes all seven attributes, the experiment will be very large and expensive which it is not possible to conduct at this stage. For example, if each attribute has three levels, the number of possible scenarios is up to $3^7 or (L^A)$ scenarios where L is the levels of attributes and A is number of attributes or 2,187 scenarios which means that fractional factorial designs need to be conducted and the budget need to be increased considerably.

Second, the previous Gold Card scheme surveys conducted by NHSO in 2008 similarly shows that waiting time in OPD and choice of contracted hospitals are the main issues in the Gold Card scheme in Thailand. Thus, this study decided to select these two attributes as they are important for insured people in the Gold Card scheme. The third, premium or price factor is very important for eliciting WTP. The current experiment focuses on these three attributes leaving future research to consider the other attributes.

Stage 2.3 Identification of the List of Attribute Levels

Each attribute has three levels. Equal levels of each attribute will aid researchers in calculating and generating the design of the DCE as the complexities of the experiment are increased when the number of attribute levels are increased (Hensher et al. 2006).

Sometimes the equal levels may impose a cost on the experiment because some attributes may naturally require more than three levels and more levels would enable researchers to detect more complex utility relationships (Hensher et al. 2006, pp. 108). All attribute levels have been designed based on the current information of the Gold Card scheme. This study assumes that levels of each attribute are reasonable and reliable.

The attributes are shown in Table 6.2 together with the levels assigned to them. These attributes and levels provide up to $3^3 or (L^A)$ scenarios where L is the levels of attributes and A is number of attributes or 27 possible scenarios. It is possible to conduct a full factorial design which generates all 27 scenarios. The next section shows how the scenarios are generated.

Table 6.2: Attributes and Levels

Attributes	Levels of Attributes
1. An average waiting time for OPD	15 min, 30 min, 45 min
2. Choice of hospitals	All public health care providers All private health care providers All health care providers
3. Premium (per three months)	100 Baht, 300 Baht, 500 Baht

Stage 3: Experimental Design Considerations

Hensher et al. (2006) state that a full factorial design can be defined as all possible treatment combinations or all scenarios are enumerated. According to the above section, it is possible to use all 27 scenarios to conduct the DCE with respondents.

The majority of DCE studies such as Hensher et al. (2006), Ryan et al. (2008), Sennhauser and Zweifel (2009) and Zweifel et al (2000, 2005 and 2006) have more attributes and attributes levels than this study. Thus, the fractional factorial design in which there is only a fraction of the total number of the scenarios is a better option than a full factorial design because fractional factorial designs can be used to reduce the size of the experimental design.

There are four statistical concepts which are very important for construction of full factorial design and fractional factorial designs (Hencher et al, 2006). The first concept is called orthogonality. Dey and Mukerjee (1999) note that although orthogonality is a term that has many definitions, it generally refers to two effects that are uncorrelated or so called orthogonal. Hensher et al. (2006, pp.115) also state that "Orthogonality is a mathematical constraint requiring that all attributes be statistically independent of one another".

The second concept is a main effect. Main effects (MEs) are the effect that each attribute has on the response variable (Hensher et al., 2006). The third concept is the interaction effect which is the impact of two or more variables upon a third response variable. In other words, Gerard et al. (2008, pp. 18) state that "Interaction effects refer to situations where the utility brought about by the levels of an attribute (also known as marginal utility) depends on the levels of one or more other attributes".

The last concept is "degrees of freedom". Hensher et al. (2006, pp.122) explain "The degrees of freedom for an experiment are the number of observations in a sample minus the number of independent (linear) constraints

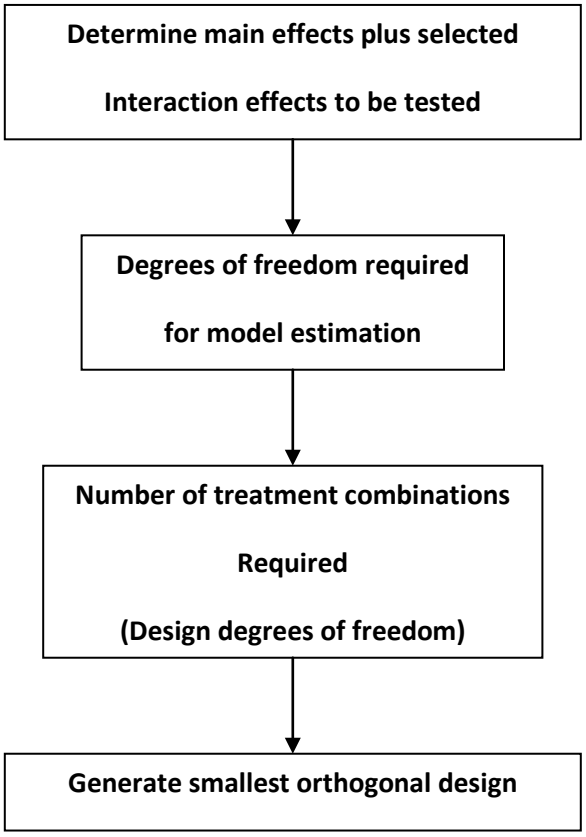
placed upon it during the modelling process. The independent (linear) constraints are the β-parameters we estimate"[18] . The degrees of freedom are important for the DCE because the more parameters that are estimated, the more degrees of freedom are required for the larger designs.

Figure 6.1 shows the stages in conducting the full factorial design and fractional factorial designs (FFDs). There are four steps in generating the design. The first step, in this study sets up orthogonal main effects only designs with two-way interaction effects considered. The reasons for considering the interaction effects are that two or more attributes may be correlated.

It is possible that there is correlation between premium and the waiting time for OPD or there are two-way interaction effects between these two attributes. Thus, this study is using orthogonal main effects plus two-way interaction effect design which is treated as non-linear. Non-linearity is assumed because non-linear effects allows the estimation of multiple parameters associated with dummy or effects coded qualitative or quantitative design attributes , whereas, linear effects assume the estimation of a single parameter associated with a quantitative attribute. (Rose and Bliemer, 2004)

[18] According to the Chapter 6, β-parameters in the indirect utility function we estimated which mean β-parameters in $V_{in} = \mathrm{ASC}_i + \beta_1 x_{i1} + \ldots + \beta_K x_{iK}$

Figure 6.1: Stages in Conducting the Full Factorial Design and the FFDs



Source: Hensher et al. (2006)

In the second step, the degrees of freedom need to be calculated. Table 6.3 provides a formula which gives the researcher the minimum treatment combination for main effects only in the case of fractional factorial designs (FFDs).

Table 6.3: Minimum Treatment Combination Requirements for Main Effects Only Fractional Factorial Designs

Experiment / Effects	Unlabeled	Labeled
Linear	A + 1	MA + 1
Non-linear (dummy or effects coded variables)	(L – 1) x A + 1	(L – 1) x MA + 1

Source: Hensher et al. (2006).

L is number of levels, M is the number of alternatives and A is the number of attributes. This study uses the full factorial design so that the minimum treatment combination or scenario does not need to be calculated. This study is able to generate all possible 27 scenarios. Thus, this step can be ignored.

In the third step, this study uses effects or orthogonal coding to generate the orthogonal design. Effect coding or orthogonal coding overcomes the problem when data are perfectly confounded in the base level of attribute with the overall or grand mean[19].

Effect coding or orthogonal coding means that all values for given attributes sum to zero. In the case of even numbers of code levels, each positive code level is matched by its negative value. On the other hand, in the case of odd numbers of code levels, the median level is assigned the value zero (Hensher et al., 2006). Table 6.4 illustrates how to use the orthogonal coding.

[19] See Hensher et al. (2006, pp. 119-120)

Table 6.4: Effects Coding Formats

	Variable 1	Variable 2	Variable 3	Variable 4
Level 1	1			
Level 2	-1			
Level 1	1	0		
Level 2	0	1		
Level 3	-1	-1		
Level 1	1	0	0	
Level 2	0	1	0	
Level 3	0	0	1	
Level 4	-1	-1	-1	
Level 1	1	0	0	0
Level 2	0	1	0	0
Level 3	0	0	1	0
Level 4	0	0	0	1
Level 5	-1	-1	-1	-1

Source: Hensher et al. (2006)

The last step is known as "blocking the design" technique. Blocking the design helps researchers reduce the amount of scenarios offered to respondents. For example, in the case of 27 scenarios (cards) in the experiment, it is inappropriate to give all 27 scenarios to each respondent because respondents are likely to feel overwhelmed by the scenarios.

Three blocks are created, with nine scenarios in each block. Each block is offered to a different respondent and three different respondents are required to complete the full design.

Stage 4: Generate Choice Sets

SPSS is used to generate the full factorial design. According to Table 6.2, there are three attributes for this experiment. This study offers two alternative health insurance plans to respondents which are Health Insurance A and Health Insurance B. Six attributes (three attributes for Health Insurance A and three attributes for Health Insurance B) need to be created in order to generate the experiment design.

SPSS is used to generate these six attributes which are A to F and G is a blocking variable with orthogonal coding. The above section states that orthogonal main effects plus two-way interaction effect design are also prepared. Thus, there are up to six stages to produce this design.

First, the orthogonal coding is also used to generate the design. Table 6.5 shows how orthogonal coding is constructed. Then, there are up to 21 two-way interactions for these six attributes. Figure 6.2 shows all possibilities of all 21 two-way interactions.

Figure 6.2: All Possibilities of Two-Way Interaction for 6 Attributes.

AB	BC	CD	DE	EF	FG	
AC	BD	CE	DF	EG		
AD	BE	CF	DG			
AE	BF	CG				
AF	BG					
AG						

Next, calculating two-way interaction design codes need to be conducted by using Microsoft Excel. Table 6.6 shows the result of the calculation. As can be seen from table 6.6, "AB" is column "A" multiplied by column "B", "AC" is column "A" multiplied by column "C" and so on for the remaining columns. Table 6.6 can be generated by using SPSS and Microsoft Excel. SPSS has generated 27 treatment combinations (scenarios) for the orthogonal design (see table 6.6).

Table 6.5: Orthogonal Coding

	An average waiting time for OPD
15 min	-1
30 min	0
45 min	1
	Choice of Hospitals
All public health care providers	-1
All private health care providers	0
All health care providers	1
	Monthly Premium (Baht)
100 Baht	-1
300 Baht	0
500 Baht	1

Table 6.6: Calculating Two-Way Interaction Design Codes

Treatment Combination	A	B	C	D	E	F	G	AB	AC	AD	AE	AF	AG	BC	BD	BE	BF	BG	CD	CE	CF	CG	DE	DF	DG	EF	EG	FG
1	1	0	-1	0	-1	1	1	0	-1	0	-1	1	1	0	0	0	0	0	0	1	-1	-1	0	0	0	-1	-1	1
2	0	-1	1	0	0	0	1	0	0	0	0	0	0	-1	0	0	0	-1	0	0	0	1	0	0	0	0	0	0
3	-1	0	0	-1	0	1	1	0	0	1	0	-1	-1	0	0	0	0	0	0	0	0	0	0	-1	-1	0	0	1
4	1	-1	-1	-1	1	0	1	-1	-1	-1	1	0	1	1	1	-1	0	-1	1	-1	0	-1	-1	0	-1	0	1	0
5	-1	0	-1	0	0	0	-1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
6	0	0	-1	0	1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	1	0	0	0	0	-1	0	0
7	1	1	1	-1	0	1	-1	1	1	-1	0	1	-1	1	-1	0	1	-1	-1	0	1	-1	0	-1	1	0	0	-1
8	-1	-1	-1	-1	-1	-1	-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9	1	-1	1	0	1	-1	-1	-1	1	0	1	-1	-1	-1	0	-1	1	1	0	1	-1	-1	0	0	0	-1	-1	1
10	1	1	-1	1	0	-1	1	1	-1	1	0	-1	1	-1	1	0	-1	1	-1	0	1	-1	0	-1	1	0	0	-1
11	1	0	1	1	-1	0	-1	0	1	1	-1	0	-1	0	0	0	0	0	1	-1	0	-1	-1	0	-1	0	1	0
12	-1	1	-1	1	1	1	-1	-1	1	-1	-1	-1	1	-1	1	1	1	-1	-1	-1	-1	1	1	1	-1	1	-1	-1
13	0	1	1	-1	-1	-1	1	0	0	0	0	0	0	1	-1	-1	-1	1	-1	-1	-1	1	1	1	-1	1	-1	-1
14	-1	0	1	1	0	-1	0	0	-1	-1	0	1	0	0	0	0	0	0	1	0	-1	0	0	-1	0	0	0	0
15	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
16	1	-1	0	1	1	1	0	-1	0	1	1	1	0	0	-1	-1	-1	0	0	0	0	0	1	1	0	1	0	0
17	0	1	0	0	-1	1	-1	0	0	0	0	0	0	0	0	-1	1	-1	0	0	0	0	0	0	0	-1	1	-1
18	0	0	0	-1	1	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	1	0	-1	0
19	0	-1	0	1	0	-1	-1	0	0	0	0	0	0	0	-1	0	1	1	0	0	0	0	0	-1	-1	0	0	1
20	-1	1	0	0	1	-1	1	-1	0	0	-1	1	-1	0	0	1	-1	1	0	0	0	0	0	0	0	-1	1	-1
21	-1	1	1	-1	1	0	0	-1	-1	1	-1	0	0	1	-1	1	0	0	-1	1	0	0	-1	0	0	0	0	0
22	0	1	-1	1	-1	0	0	0	0	0	0	0	0	-1	1	-1	0	0	-1	1	0	0	-1	0	0	0	0	0
23	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	-1	-1	-1	0	1	0	0	0	0	0	0	0	1	1	0	-1	0	1	0	-1	0	0	-1	0	0	0	0
25	-1	-1	1	0	-1	1	0	1	-1	0	1	-1	0	-1	0	1	-1	0	0	-1	1	0	0	0	0	-1	0	0
26	-1	-1	0	1	-1	0	1	1	0	-1	1	0	-1	0	-1	1	0	-1	0	0	0	0	-1	0	1	0	-1	0
27	1	0	0	-1	-1	-1	0	0	0	-1	-1	-1	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0

In the next step, it is necessary to find a design correlation. The design correlation is used to ensure that all main effects are un-confounded with two-way or higher interaction. Main effect is the direct independent effect of each factor upon a response variable. For experimental designs, the main effect is the difference in the means of each level of an attribute and the overall or grand mean. (Hensher, 2006, pp.701)

Otherwise, parameters will be incorrectly estimated. The design correlation can be achieved by using “Data Analysis” in Microsoft Excel. Table 6.7 shows the result of the design correlation. At this stage, it is necessary to decide which combination should be used. According to Table 6.7, AD, AF, CE, CF, DE, DF, DG, EF, EG are not confounded with all main effects. However, AD interaction column is confounded with some rows such as CE, CF and EG. When assigning the attributes of the Health Insurance A to the A and D columns, attributes of the Health Insurance B must not be assigned into the interaction columns CE, CF and EG as mentioned above because this would result in confounding of the estimated interaction. The attributes for Health Insurance B should be assigned to AF, DE, DF, DG, or EF, however, the researcher cannot assign two attributes to the A and D column which mean that only EF can be used. Then, correlated attributes will be assigned into, AD and EF, This is shown in the next stage.

Table 6.7: Design Correlation

	A	B	C	D	E	F	G	AB	AC	AD	AE	AF	AG	BC	BD	BE	BF	BG	CD	CE	CF	CG	DE	DF	DG	EF	EG	FG
A	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.6	0	0	0	0	0	-0.6	0	0	0	0	0	0
B	0	1	0	0	0	0	0	0	0	0	-0.6	0	0	0	0	0	0	0	-0.6	0	0	0	0	0	0	0	0	-0.6
C	0	0	1	0	0	0	0	0	0	0	0	0	-0.6	0	-0.6	0	0	0	0	0	0	0	0	0	0	0	0	0
D	0	0	0	1	0	0	0	0	0	0	0	0	0	-0.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	1	0	0	-0.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	-0.6	0	0	0	0	0	0	0	0	0	0
G	0	0	0	0	0	0	1	0	-0.6	0	0	0	0	0	0	0	-0.6	0	0	0	0	0	0	0	0	0	0	0
AB	0	0	0	0	-0.6	0	0	1	0	0	0.3	0	0	0	0	0.3	0	0	0	0	0.5	0	0	-0.3	0.5	0	0	0
AC	0	0	0	0	0	0	-0.6	0	1	0	0	0	-0.3	0	0	0	0.5	0	0	0	0	0.3	0.3	0.3	0	0.3	0	0
AD	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	-0.3	0.5	0	0.3	0.3	0	0	0	0	0	0.3	0.3
AE	0	-0.6	0	0	0	0	0	0.3	0	0	1	0	0	0	0	-0.3	0	0	0.3	0	0.3	0	0	0	0.3	0	0	0.3
AF	0	0	0	0	0	0	0	0	0	0	0	1	0	0.5	-0.3	0	0	0	0.3	0.3	0	0	0	0	0.3	0	0.3	0
AG	0	0	-0.6	0	0	0	0	0	-0.3	0	0	0	1	0	0.5	0	0	0	0	0	0	0.3	0.3	0.3	0	0.3	0	0
BC	0	0	0	-0.6	0	0	0	0	0	0	0	0.5	0	1	-0.3	0	0	0	0.3	0	0	0	0	0	0	0.3	0.3	0
BD	0	0	-0.6	0	0	0	0	0	0	0	0	-0.3	0.5	-0.3	1	0	0	0	0.3	0	0	0	0	0	0	0	0.3	0
BE	-0.6	0	0	0	0	0	0	0.3	0	0	-0.3	0	0	0	0	1	0	0	0	0	0.3	0.3	0	0	0.3	0	0	0
BF	0	0	0	0	0	0	-0.6	0	0.5	-0.3	0	0	0	0	0	0	1	-0.3	0	0.3	0	0	0	0	0	0	0	0.3
BG	0	0	0	0	0	-0.6	0	0	0	0.5	0	0	0	0	0	0	-0.3	1	0	0.3	0	0	0.3	0	0	0	0	0.3
CD	0	-0.6	0	0	0	0	0	0	0	0	0.3	0.3	0	0.3	0.3	0	0	0	1	0	0	0	0	0	0	0	0.5	0.5
CE	0	0	0	0	0	0	0	0	0	0.3	0	0.3	0	0	0	0	0.3	0.3	0	1	0	0	0	0	0.5	0	0	0.5
CF	0	0	0	0	0	0	0	0.5	0	0.3	0.3	0	0	0	0	0.3	0	0	0	0	1	0	0	0	0.5	0	0.5	0
CG	-0.6	0	0	0	0	0	0	0	0.3	0	0	0	0.3	0	0	0.3	0	0	0	0	0	1	0.5	0.5	0	0.5	0	0
DE	0	0	0	0	0	0	0	0	0.3	0	0	0	0.3	0	0	0	0	0.3	0	0	0	0.5	1	0.5	0	0.5	0	0
DF	0	0	0	0	0	0	0	-0.3	0.3	0	0	0	0.3	0	0	0	0	0	0	0	0	0.5	0.5	1	0	0.5	0	0
DG	0	0	0	0	0	0	0	0.5	0	0	0.3	0.3	0	0	0	0.3	0	0	0	0.5	0.5	0	0	0	1	0	0	0
EF	0	0	0	0	0	0	0	0	0.3	0	0	0	0.3	0.3	0	0	0	0	0	0	0	0.5	0.5	0.5	0	1	0	0
EG	0	0	0	0	0	0	0	0	0	0.3	0	0.3	0	0.3	0.3	0	0	0	0.5	0	0.5	0	0	0	0	0	1	0
FG	0	-0.6	0	0	0	0	0	0	0	0.3	0.3	0	0	0	0	0.3	0	0.3	0.5	0.5	0	0	0	0	0	0	0	1

Stage 5: Allocate Attributes to Design Columns

The program SPSS has generated 27 scenarios (cards). Table 6.8 shows attributes are assigned to design columns with all 27 scenarios using orthogonal codes. The above section notes that it is expected that premium and the average waiting time for OPD could be correlated. Hence, this study assigns *"premium"* to A (for Insurance A) and E (for Insurance B) columns and *"waiting for OPD"* is assigned to D (for Insurance A) and F(for Insurance B) columns which *"choice of hospitals"* are assigned to B(for Insurance A) and C (for Insurance B) columns.

Table 6.8: Attributes Assigned to Design Columns

A	D	B	E	F	C	G	
Insurance A			Insurance B				
Premium	Waiting OPD	Choice	Premium	Waiting OPD	Choice	Block	Card No.
1	0	0	-1	1	-1	1	1
0	0	-1	0	0	1	1	2
-1	-1	0	0	1	0	1	3
1	-1	-1	1	0	-1	1	4
-1	0	0	0	0	-1	-1	5
0	0	0	1	-1	-1	0	6
1	-1	1	0	1	1	-1	7
-1	-1	-1	-1	-1	-1	-1	8
1	0	-1	1	-1	1	-1	9
1	1	1	0	-1	-1	1	10
1	1	0	-1	0	1	-1	11
-1	1	1	1	1	-1	-1	12
0	-1	1	-1	-1	1	1	13
-1	1	0	0	-1	1	0	14
0	1	0	1	1	1	1	15
1	1	-1	1	1	0	0	16
0	0	1	-1	1	0	-1	17
0	-1	0	1	0	0	-1	18
0	1	-1	0	-1	0	-1	19
-1	0	1	1	-1	0	1	20
-1	-1	1	1	0	1	0	21
0	1	1	-1	0	-1	0	22
1	0	1	0	0	0	0	23
0	-1	-1	0	1	-1	0	24
-1	0	-1	-1	1	1	0	25
-1	1	-1	-1	0	0	1	26
1	-1	0	-1	-1	0	0	27

Table 6.9 shows the blocking method which is used to reduce the number of scenarios offered to respondents. This study distributes the survey in four districts, thus, three blocks are created and, therefore, nine scenarios are offered to each respondent (There are 27 scenarios in this study and this study uses three blocks, thus, 27/3 or nine scenarios for each block).

Table 6.9: Using Blocking Variables to Reduce the Number of Scenarios Offered to Respondents

Insurance A			Insurance B				
Premium	Waiting OPD	Choice	Premium	Waiting OPD	Choice	Block	Card No.
-1	0	0	0	0	-1	-1	5
1	-1	1	0	1	1	-1	7
-1	-1	-1	-1	-1	-1	-1	8
1	0	-1	1	-1	1	-1	9
1	1	0	-1	0	1	-1	11
-1	1	1	1	1	-1	-1	12
0	0	1	-1	1	0	-1	17
0	-1	0	1	0	0	-1	18
0	1	-1	0	-1	0	-1	19
0	0	0	1	-1	-1	0	6
-1	1	0	0	-1	1	0	14
1	1	-1	1	1	0	0	16
-1	-1	1	1	0	1	0	21
0	1	1	-1	0	-1	0	22
1	0	1	0	0	0	0	23
0	-1	-1	0	1	-1	0	24
-1	0	-1	-1	1	1	0	25
1	-1	0	-1	-1	0	0	27
1	0	0	-1	1	-1	1	1
0	0	-1	0	0	1	1	2
-1	-1	0	0	1	0	1	3
1	-1	-1	1	0	-1	1	4
1	1	1	0	-1	-1	1	10
0	-1	1	-1	-1	1	1	13
0	1	0	1	1	1	1	15
-1	0	1	1	-1	0	1	20
-1	1	-1	-1	0	0	1	26

Next, correlation tests are conducted. Hensher et al. (2006) suggest seven appropriate correlation test approaches such as the Pearson product moment, G index, J index and Spearman rank correlation. Table 6.10 shows all seven correlation test approaches. It is necessary to define which kind of random variable scale they are using before they select the most suitable approaches.

Table 6.10: Seven Appropriate Correlation Tests

Scale Pair	Correlation Test Name
Ratio scale, Ratio scale or Ratio scale, Interval scale	Pearson product moment correlation coefficient
Dichotomous scale, Dichotomous scale	G-index
Nominal scale, Nominal scale or Nominal scale and Dichotomous scale	J-index
Ordinal scale, Ordinal scale	Spearman rank correlation
Dichotomous scale, Ratio scale	Point biserial correlation
Nominal scale, Interval scale	CP coefficient
Interval scale, Interval scale	H-index

Source: Adapted from Hensher et al. (2006)

According to Table 6.10, the Spearman rank correlation should be used. The reason is that the attributes and the attributes level in this study use an ordinal scale which allows respondents to make the rank-ordering of these attributes in a meaningful way (Cavana et al., 2001). The spearman correlation test can be done by using SPSS. The result of the Spearman correlation test is described in Table 6.11. Table 6.11 shows that there is no correlation between attributes at all so it is orthogonal.

Table 6.11: Results from Spearman Correlation Test by Using SPSS

	Premium(A)	Waiting OPD(A)	Choice(A)	Premium(B)	Waiting OPD(B)	Choice(B)
Premium(A)	1					
Waiting OPD(A)	0	1				
Choice(A)	0	0	1			
Premium(B)	0	0	0	1		
Waiting OPD(B)	0	0	0	0	1	
Choice(B)	0	0	0	0	0	1

Note: (A): Insurance A and (B): Insurance B

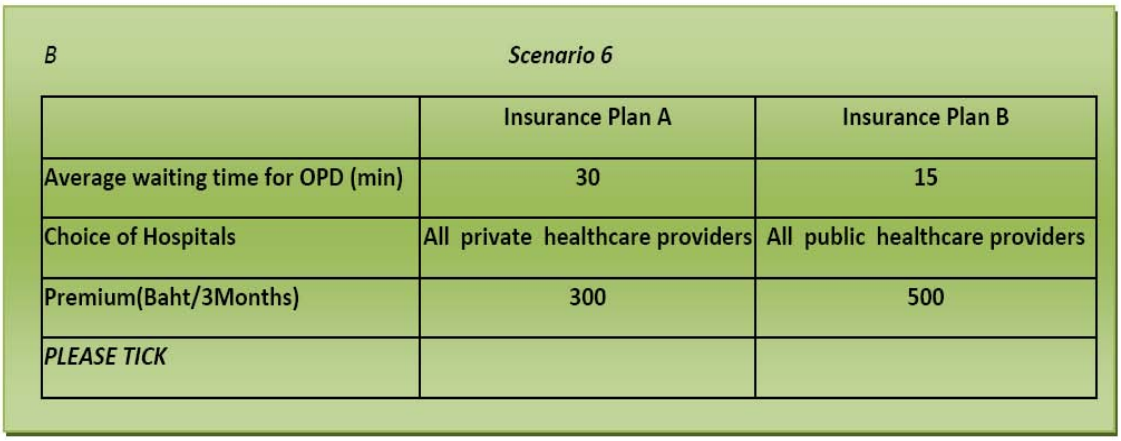
Stage 6: Generate Choice Sets or Scenarios

Choice sets can be generated by converting the orthogonal codes in Table 6.8 to the names of the attribute levels. Table 6.12 shows the result after converting from orthogonal code to the attribute levels. Table 6.12 also shows that there are 27 scenarios or cards for Health Insurance A and B. Figure 6.3 shows an example of scenario 6 (Card no.6).

Table 6.12: All 27 Scenarios (Cards) for Health Insurance Plan A and B

Insurance A			Insurance B				
Premium	Waiting OPD	Choice	Premium	Waiting OPD	Choice	Card No.	Block
100	30	All pri HPs	300	30	All pub HPs	5	A
500	15	All HPs	300	45	All HPs	7	A
100	15	All pub HPs	100	15	All pub HPs	8	A
500	30	All pub HPs	500	15	All HPs	9	A
500	45	All pri HPs	100	30	All HPs	11	A
100	45	All HPs	500	45	All pub HPs	12	A
300	30	All HPs	100	45	All pri HPs	17	A
300	15	All pri HPs	500	30	All pri HPs	18	A
300	45	All pub HPs	300	15	All pri HPs	19	A
300	30	All pri HPs	500	15	All pub HPs	6	B
100	45	All pri HPs	300	15	All HPs	14	B
500	45	All pub HPs	500	45	All pri HPs	16	B
100	15	All HPs	500	30	All HPs	21	B
300	45	All HPs	100	30	All pub HPs	22	B
500	30	All HPs	300	30	All pri HPs	23	B
300	15	All pub HPs	300	45	All pub HPs	24	B
100	30	All pub HPs	100	45	All HPs	25	B
500	15	All pri HPs	100	15	All pri HPs	27	B
500	30	All pri HPs	100	45	All pub HPs	1	C
300	30	All pub HPs	300	30	All HPs	2	C
100	15	All pri HPs	300	45	All pri HPs	3	C
500	15	All pub HPs	500	30	All pub HPs	4	C
500	45	All HPs	300	15	All pub HPs	10	C
300	15	All HPs	100	15	All HPs	13	C
300	45	All pri HPs	500	45	All HPs	15	C
100	30	All HPs	500	15	All pri HPs	20	C
100	45	All pub HPs	100	30	All pri HPs	26	C

Figure 6.3: An Example of Scenario 6



B *Scenario 6*

	Insurance Plan A	Insurance Plan B
Average waiting time for OPD (min)	30	15
Choice of Hospitals	All private healthcare providers	All public healthcare providers
Premium(Baht/3Months)	300	500
PLEASE TICK		

This experiment has generated 27 scenarios with three blocks. All of these scenarios are offered to respondents by using the blocking technique.

Stage 7: Randomising Scenario Sets

There are no exact guidelines as to how the researcher should assign these scenarios to respondents. According to Table 6.12, there are three blocks- A, B and C which means that each respondent will be offered nine scenarios and three respondents will be selected to complete the full experiment design of 27 scenarios.

The problems are that a study using this approach ignores possible bias from the order in which the scenarios set appear. Many studies overcome the above problems by using randomisation of scenario sets in which case two respondents offered with the same block will observe the same scenario sets, however, each respondent will be offered the block in different orders (Hensher et al., 2006).

Hensher et al. (2006) mention that there is no optimal number of how many randomised versions should be created and how many respondents will be used for the design. In this study, it has been decided to randomise the scenarios sets in order to overcome some biases which may occur during the experiment.

Stage 8: Construct Survey Instrument

Stage 8.1 Experiment Design

This study involves 1,200 households who are eligible for the Gold Card scheme in the northern part of Thailand. Each respondent will receive a package from an interviewer. The package consists of two parts which are the questionnaire and the choice set cards. First, each respondent will receive all relevant information about the Gold Card scheme before answering the questionnaire. The questionnaire contains a number of socioeconomic questions such as age, sex and household's income. This questionnaire also focuses on health status, hospitalisation in the past year and household health expenditures in the past month and in the past six months.

Then, the DCE will be conducted in which each respondent will be offered nine green cards which consist of two alternatives – Insurance A or Insurance B- plus one blue card which is their status quo. Respondents will be asked which card they would like to choose. If the green card is selected, they must choose either Insurance A or Insurance B. Otherwise, they have to choose the blue card which means that they prefer to stick with their status quo of the Gold Card scheme.

A dominance approach is used in this study. This approach occurs naturally because this study uses the full factorial design. The dominance approach is an option that has no worse levels for any of the attributes and better levels for at least one of them. Thus, "rational" respondents should select the "dominance" options easily.

This study includes the dominance card see Figure 6.4 in each block. The interviewer will ask a respondent to do the experiment again in case the respondent responds to the dominance card irrationally. For example, if a respondent selects Insurance Plan B in Figure 6.4, the interviewer will ask the respondent to go over the whole experiment again because this respondent is responding irrationally to the experiment.

Figure 6.4: An Example of Dominance Card

B *Scenario 21*

	Insurance Plan A	Insurance Plan B
Average waiting time for OPD (min)	15	30
Choice of Hospitals	All healthcare providers	All healthcare providers
Premium(Baht/3 Months)	100	500
PLEASE TICK		

6.3 Econometric Specification

This study aims to elicit Willingness-To-Pay (WTP) for the Gold Card scheme in Thailand. This study assumes only three important attributes which are waiting time for OPD, choice of hospitals and premium for the Gold Card scheme. Thus, utility for the Gold Card scheme can be written as

$$U_{ij} = \beta_0 + \beta_1 chohos_{ij} + \beta_2 \omega aitOPD_{ij} + \beta_3 premium_{ij} + \varepsilon_{ij} \qquad (6.1)$$

where $chohos$, $\omega aitOPD$, and $premium$ are the three attributes of choice of hospitals, average waiting time for OPD, and premium respectively or it can be written as:

$$V = \beta_1 Allpub + \beta_2 Allpri + \beta_3 AllHPs + \beta_4 WaitOPD + \beta_5 Premium_{ij} \quad (6.2)$$

where $Allpub$, $Allpri$, $AllHPs$, $WaitOPD$ and $Premium$ are attributes of all public healthcare providers , all private healthcare providers, all healthcare providers which insured people can access, average waiting time in OPD and premium (per three months) respectively and V is utility which is assumed linear and additive.

Although the DCE of this study was designed preparing for two-way interaction, equation (6.2) ignores the estimation of two-way interaction between attributes due to its complexity and it is not suitable for all practitioners. Future research may need to estimate main effects plus two-way interaction.

6.3.1 Willingness-to-Pay

Willingness to Pay (WTP) can be calculated by estimating the Marginal Rate of Substitution (MRS) between two attributes i and j and is equal to the ratio of the derivatives of the indirect utility function with respect to the two attributes. This can be written as

$$MRS = -\frac{\partial v / \partial a_i}{\partial v / \partial a_j} = -\frac{\beta_i}{\beta_j}$$

where a_i is the vector of attributes of i and v is the indirect utility which can be seen in the Chapter 5. Thus, if j is defined as a financial attribute then the WTP can be estimated because this allows the interpretation of the negative of the marginal rate of substitution as a marginal WTP for attribute i. (Hanemann, 1983, Becker and Zweifel, 2007 and Sennhauser and Zweifel, 2009).

6.4 Conclusion

There are six issues in the design. First, the design used unlabelled alternatives which are appropriate for the willingness to pay studies. Second, the open questionnaires study identified seven attributes which were very important when a person wishes to buy public health insurance in Thailand. However, only three attributes of *average waiting times for OPD, Choice of hospitals* and *Premium* are selected in this study.

Third, the full factorial designs are used in this experimental design. Next, orthogonal main effects plus two-way interaction effect design are also used to generate scenarios. The SPSS programme is used and tested to generate all 27 scenarios and the Spearman rank correlation test is used to test the correlation by using the Microsoft Excel programme.

Each scenario consists of two alternatives-Insurance A and Insurance B. Each respondent in each block is offered randomly up to nine scenarios with the status quo card and is asked to choose the green card or blue card. If respondents select the green card, they must further choose either Health insurance plan A or B.

Moreover, this study includes the dominance card in each block so the interviewer asks respondents to repeat the experiment where there is evidence that a respondent response to the dominance card is irrational. Finally, WTP can be calculated by estimating the marginal rate of substitution between two attributes.

Chapter 7: Questionnaire Results

7.1 Introduction

There are two parts in the Discrete Choice Experiment (DCE). The first part is a questionnaire which is used to collect data such as socio-economic, health status and health expenditures data. The second part is the quantitative data in which econometrics is used to interpret the DCE data. This chapter focuses on questionnaire results and the next chapter discusses the DCE data and DCE results. There are four sections. First, questionnaire design is discussed. Second, sampling design including sample size and survey location is mentioned. Next, data collection is illustrated. Last, socio-economic and descriptive data are reported and analysed.

7.2 Questionnaire Design

The questionnaire in this study consists of two parts. The first part collected socio-economic data such as age, gender and income. The second part collected general health information and health expenditures. There are eight questions in the second part which are;

1. How would you rate your health status?
2. Have you been in hospital in the last 12 months? How many times?
3. How many times have you used the Gold card scheme in the last 12 months?
4. Do you have any complementary health insurance?
5. How much did you spend on your health last month? Can you claim a refund of your health expenditure?
6. Have you or anyone in your family not been able to have recommended medical care due to financial hardship?
7. Have you or anyone in your family experienced financial hardship as a result of health expenditures such as difficulties paying bills?

8. Catastrophic financing occurs when you pay up to more than 30% of your household's income/ month on health bills. Have your health bills ever been more than 30% of your household income?

Closed and open-ended questions were used in this study. Closed questions assist respondents to choose quickly among several alternatives, whereas, open-ended questions allow respondents to answer in any way they want (Cavana et al. 2000). The questions were organised logically and neatly in appropriate sections so respondents could answer questions[20] without difficulty. Respondents' information will be held under confidentiality protected by research ethical principles of Curtin University.

7.3 Sampling Design

The population in this study is all Thais who are covered by the Gold Card scheme. The Gold Card scheme covers approximately 50-55 million people (75.77% of Thai population). It is known that the larger the sample size of the study, the greater the external validity and generalisability (Polgar & Thomas 2000; Cavana et al. 2000; Williams 1999). However, this study must select a limited sample size due to budget and time constraints. Thus, the sample size was calculated via a sample size calculator[21].

The sample size calculator shows that with 99% confidence and a population of 53 million, the sample size is 1,037. Also sample size in this study was advised by experts who think that sample size for this study should be at least 1,000. This study decided to use 1,200 head of households who are covered by the Gold Card scheme as a sample.

[20] All questions were translated into the Thai language.

[21] Sample size calculations can be done via http://www.custominsight.com/articles/random-sample-calculator.asp

7.3.1 Selection Criteria

Social workers, community leaders and village leaders in many areas in Thailand were contacted. The researcher contacted these people in areas in the northern part, north – eastern part and central part of Thailand (southern part was ignored due to insurgency). The contacts were made via telephone. The methodologies and objectives of this study were introduced to these people, and the following questions were asked to them;

- Do you know a district/community/village where the majority of households are covered by the Gold Card scheme? If the answer was 'yes' , the following questions were asked
- Can you help me reach 1,200 households in three months (from 1st August to 31 October 2009)?

Two provinces in the northern part of Thailand (see Figure 7.1a) were selected for two reasons. Firstly, social workers, community leaders or village leaders who are in the northern part knew of districts/communities/villages where the majority of households are covered by the Gold Card scheme. Secondly, they were able to help the researcher to reach these households from 1st August to 31 October 2009.

Within the two provinces, five districts were selected. These five districts were selected for two reasons. First, the majority of households in these districts are covered by the Gold Card scheme. The second reason is that the social workers/ village leaders could make an appointment with these households during 1st August to 31 October 2009.

A cluster-sampling approach was used for two reasons. First, it is extremely costly and difficult to list all the individuals who are covered by the Gold Card scheme. Second, the population is concentrated in the five districts (clusters), thus, interviewers could conduct many interviews in a single day in a single district by using cluster-sampling method.

Although a cluster-sampling approach generally gives less precision than simple random sampling method, research with a fixed budget, such as the current study, could use a bigger sample for the study (Stat Trek, 2011). Hence, the population was divided into five groups (districts). Members of selected districts were randomly selected in the sample. The random selection ensures generalisability of the results which is important for the policy recommendations of the study (Cavana et al. 2000). The random selection means that every head of household who is covered by the Gold Card scheme has an equal chance of being chosen as a subject. Qualified interviewers who have experiences in household surveys and interviews were hired and trained.

Village leaders and community leaders in selected districts set up an appointment with the households using random methods for selection. Every fifth name in the district/community's phonebook was chosen for an appointment. During the phone call, the households were asked if they were covered by the Gold Card scheme and would be available and willing to be interviewed in the period from 1st August to 31 October 2009. Eighty-five percent of households said that they are covered by the Gold Card scheme and about 70% of head of households who are covered by the scheme said that they were available and willing to be interviewed.

In the end, the sample of this study can be separated into four groups of A, B, C and D, based on the districts of the households (see Figure 7.1b and 7.1c). Three-hundred head of households for each group (A, B C and D) who are eligible for the Gold Card scheme were approached via appointment. Thus, the sample size of this study is exactly 1,200 and, thus, 1,200 respondents were able to complete the survey.

Groups A, B and D surveyed were in the same province but different districts. However, the researcher wanted to have one sample which is not located close to groups of A and B, therefore, group D was selected.

According to Figure 7.1b, these three groups are surveyed in *Chiang Rai* province which is located in the northern part of Thailand. Respondents in group A live in *Plong* district, respondents in group B live in *Chiang-khain, Si Don Chai* and *Ta* districts and respondents in Group D live in *Mueang-Chum* district.

On the other hand, group C is situated in another province. The sample (group C) in this province was selected because the village leaders could make an appointment with households during 1st August to 31 October 2009 and the majority of households in this district are covered by the Gold Card scheme. This province is *Kum-Phaeng-Phet* province and respondents in group C live in *Khon-phai* district (see Figure 7.1c).

Figure 7.1a: Map of Chiang Rai and Kamphaeng Phet Provinces

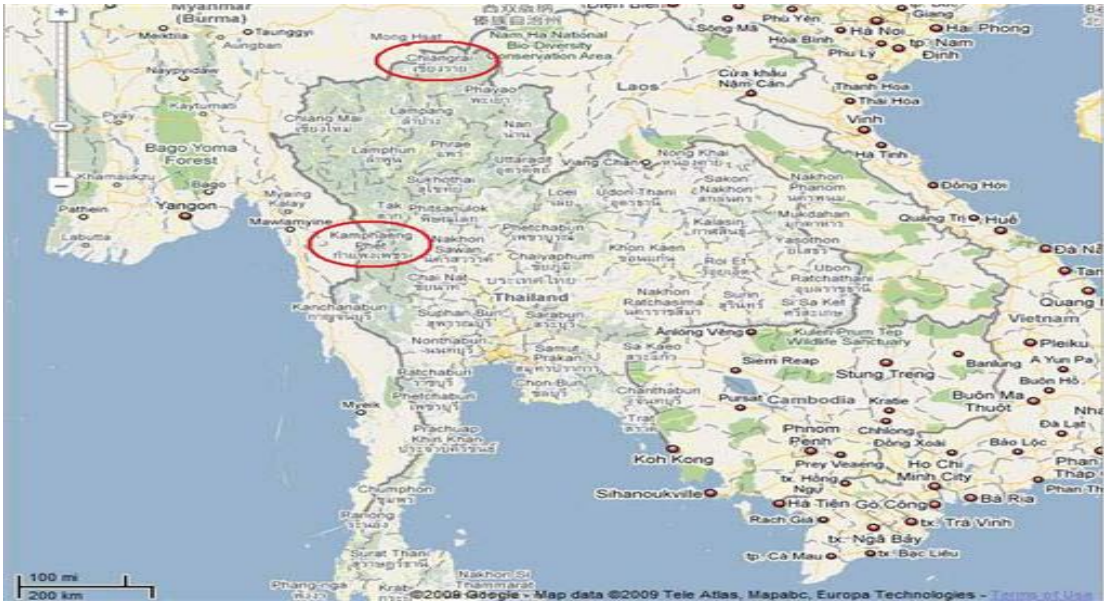


Figure 7.1b: The Location of Survey for Groups A, B and D in Chiang Rai Province

Figure 7.1c: The Location of Survey for Groups C in Kamphaeng Phet Province

Source: Google Map

7.4 Data Collection

Support for this study was provided from personal funds, and Curtin University. Funds were used to pay for necessary resources such as hiring qualified interviewers and transport costs. Questionnaires were translated from English to Thai and back to English to check that the meaning remains the same, and were pre-tested in a similar population group. All of the questions and conversations in this study were done in the Thai language during the survey.

Data were gathered by the personal or face-to-face interview method. The main advantage of this method is that interviewers can collect all completed data in a short time and any doubts the respondents may have regarding any questions can be solved immediately. Face-to-face interviews provide rich data. Respondents also can understand complex issues easier by using face-to-face interviews (Cavana et al., 2000). Pre-testing of the questionnaires was conducted for one hundred households. Results of pre-testing are in Appendix 2. Pre-testing can increase the measurement reliability and content validity (Burns, 2000a). There are, however, disadvantages of this interviews method. There are discussed in the limitation section of the next chapter.

Interviewers made an appointment with households in each district via telephone and door knocking. Village leaders also helped interviewers make an appointment with their residents. Once appointments were arranged, interviewers could reach the head of households (respondents). Interviewers were trained to provide a proper introduction. Respondents were told about the objective of this study and confidentiality issues. Respondents also were provided all relevant health information of the Gold Card scheme such as the current health care financing.

Respondents were free to ask interviewers questions before the experiment was started. Respondents were guided by interviewers step-by-step to complete the questionnaire and respondents were able to ask interviewers any questions at any time during the experiment. Data such as socio-economic, health information and health expenditure data were collected in 10 to 15 minutes and then quantitative data for the Discrete Choice Experiment (DCE) which is discussed in the next chapter was collected. Results are discussed in the following section.

7.5 Results and Descriptive Analysis

The data in this survey on socio-economic, general health information and health expenditures are presented and analysed in this section.

Table 7.1: Socio-economic Characteristics by Group

		Group A	Group B	Group C	Group D
Gender	Female	489	506	554	458
	Male	481	552	532	440
Age (mean)		38.1	35.0	34.7	39.7
Income (mean in Baht)		8,234	13,039.1	7,817.5	7,531

According to Table 7.1, the survey shows that males who are the head of household have an average age between 34 and 39 years old. The proportion of males and females is about 50/50 in this survey. Respondents have an average household income between Baht 7,500 and 13,100 per month ($A 250 to 436). On average, respondents in group C and D have lower income than respondents in the other two groups, whereas, respondents in group B have the highest income. This is reasonable because the majority of people in groups A, C and D are farmers, however, the majority of people in group B are small business owners.

Table 7.2: Mean of All Descriptive Data in Each Group

Group	A	B	C	D	Note
Health Status	3.87 Fair	4.04 Good	3.51 Fair	1.93 Poor	1 to 5 1=very poor 5=very good
Hospitalised in the last 12 months?	3%	7%	8%	13%	% of "yes"
How many times have you been hospitalised in the last 12 months?	0.058	0.108	0.10	0.36	
How many times did you use the Gold card in the last 12 months?	0.056	0.08	0.08	0.3	
Any complementary health insurance?	3%	75%	41%	32%	% of "yes"
Last month health expenditures?	477.47	1038.73	406.19	422.13	
Preceding 5 months health expenditures?	949.43	930.1	852.83	1322.1	
Any experiences of financial hardship for health care?	1%	10%	86%	7%	% of "yes"
Any experiences of problems with paying health bills?	1%	9%	1%	3%	% of "yes"
Any experiences of financial catastrophic?	1%	7%	3%	6%	% of "yes"

7.5.1 Descriptive Data Analysis

Based on the results in Table 7.2, there are five interesting points that demand attention. First, on average, respondents in group D have clearly poorer self-assessed health status, and leading to an expectation that this group may has the highest demand for health care. Respondents in group B have good health status. Group A and C have on average fair health status. As expected, respondents in group D have been hospitalised at the highest average rate at 0.36 time/person/year compared with 0.108, 0.1 and 0.058 time/person/year for respondents in group B, C and A respectively.

Second, the results in Table 7.2 show that the respondents in every group were able to use the Gold Card almost every time when they were sick. This means that the Gold Card is very important for these people. Third, the majority of respondents in group B who have on average higher income than other groups are able to purchase complementary health insurance, while only some of respondents in group C and D have complementary health insurance. The majority of respondents in group A do not have any complementary health insurance schemes. This finding is reasonable because respondents in group B have clearly higher household income than other three groups on average. As a result, respondents in group B should have a better chance to afford complementary health insurance.

Next, health expenditure for the last month (September 2009) is similar for groups A, C and D at about Baht 420 to 470 ($A 14 to 15.6) on average, however, group B, the highest income group, spends on average for their health up to Baht 1,038 ($A 34.6). The higher spending by group B would support the observation that health is a luxury good in which income elasticity of demand is positive and greater than one. Thus, people spend more on health care as their income rises (Costa-Font et al., 2009).

It is possible that the highest spending for health in group B was caused by the higher utilisation as a result of influenza H1N1. Many respondents in group B indicated that they spent their money on influenza vaccine when the H1N1 was spread around the same time that the survey was conducted.

This can be supported by Bangkokbiznews (2009) who states that the numbers of people who required an influenza vaccine doubled in most private hospitals during July 2009 to October 2009. Table 7.2 further shows that group D (not group B), who may have the highest need for health care due to their poor health status, have actually spent highest for their health in the past 5 months (May 2009 to October 2009), but not for the one month prior to the survey period due to vaccination mentioned above.

Group D spent on average Baht 1,322.10 ($A 44.01), whereas, the other groups have a similar rate of spending for their health in the last 6 months at Baht 910.78 ($A 30.35) on average.

Last, most of respondents in group A, B and D have not had any experiences of financial catastrophe, paying health bills and financial hardship for health care. Whereas, the majority of respondents in group C indicate in their questionnaires that they have experienced financial hardship for health care such as deciding not to go to hospital due to worrying about bills. A few of the people in group C indicated experiences of financial catastrophe. The majority of respondents may not have any experiences of financial catastrophe because, based on the comments in questionnaires, it can be concluded that they refused to take medications if they could not pay for them and they only take medications that were covered by health insurance schemes.

7.6 Conclusion

This chapter discusses questionnaire design, sample design, sample size and data collection. The results from the questionnaire shows that most of time respondents are able to use the Gold Card which means that the Gold Card is very important for these people. The majority of respondents who have on average higher income than other respondents are able to purchase complementary health insurance, whereas, only some of respondents with lower income on average have complementary health insurance.Respondents who have poor health status are more likely to visit hospital and spend their money on their health care than those who are healthy. However, if an epidemic such as H1N1 occurred, healthy and higher income people may spend more on their health care than the unhealthy and low income people. High income people have greater capacity to pay out-of-pocket. Low income respondents are more likely to experience financial hardship more than those who have higher income.

Chapter 8: Discrete Choice Experiments Results

8.1 Introduction

This chapter discusses the quantitative data or Discrete Choice Experiment (DCE) data and DCE results. There are six sections. Firstly, DCE and DCE data collection are explained. Secondly, DCE results are presented and analysed. Thirdly, the willingness-to-pay (WTP) for the Gold Card scheme, when choice of health care providers, waiting time in Out-Patient-Department and premium are varied, is discussed. Next, the additional source of finance for the Gold Card scheme is mentioned based on the WTP results. Then, the limitations of this study and other issues that need to be covered are noted. Lastly, the findings of this study are summarised

8.2 Discrete Choice Experiment (DCE)

The experiment was started on 1st August 2009 and it was completed in 31 October 2009. The pre-testing for sixty households was conducted on 1 July 2009 for a week by interviewers. This pre-testing was conducted in selected districts mentioned in the previous chapter. The pre-testing found that most of respondents did not agree with monthly premium because they felt it is not appropriate for them. This pre-testing later found that most respondents indicated that premium payment three monthly would be more acceptable for them than monthly. Thus, the premium payment was adjusted from monthly to three monthly. Other DCE results from pre-testing were satisfactory.

8.2.1 DCE Data Collection Methods

All samples and sample size were discussed in the previous chapter. To summarise, DCE were conducted for 1,200 households in four districts in the northern part of Thailand. The DCE was conducted immediately after respondents completed the questionnaire.

Respondents were asked to compare and choose between the green card (Insurance Plan A or Insurance Plan B) or the blue card (their status quo). There were nine green cards (nine scenarios) that need to be chosen by each respondent. The example of the green and the blue card can be seen in the Figure 8.1. The DCE took approximately 10-15 minutes for each household.

All households completed all nine choice set cards, attached together with the questionnaire. A household who failed the dominance test, mentioned in chapter 6, was asked to do the experiment over again. However, in the end, only a few households failed the dominance test.

Hence, 1,200 household responses to the nine choice set yields 10,800 completed choices and 32,400 observations as there are 3 alternatives in each choice. These data were analysed using the logit model. This is discussed later.

Figure 8.1: Example of the 'Green Card' and the 'Blue Card'

B *Scenario 6*

	Insurance Plan A	Insurance Plan B
Average waiting time for OPD (min)	30	15
Choice of Hospitals	All private healthcare providers	All public healthcare providers
Premium(Baht/3Months)	300	500
PLEASE TICK		

"Status Quo" Scenario

	The Gold Card Scheme
Average waiting time for OPD (min)	75
Choice of Hospitals	Only one hospital mentioned on the card
Premium(Baht/Month)	Free
PLEASE TICK	

8.2.2 Data Preparation

Table 8.1: General Choice Data Entry Format

id	Cno	Card_no	Alt	Cset	Alt1	Alt2	Alt3	C_id	Allpub	Allpri	AllHPs	Only1	WaitOPD	Premium	Choice
1	1	5	1	3	1	0	0	1	0	1	0	0	30	100	0
1	1	5	2	3	0	1	0	1	1	0	0	0	30	300	1
1	1	5	3	3	0	0	1	1	0	0	0	1	75	0	0
1	2	7	1	3	1	0	0	2	0	0	1	0	15	500	0
1	2	7	2	3	0	1	0	2	0	0	1	0	60	300	1
1	2	7	3	3	0	0	1	2	0	0	0	1	75	0	0
1	3	8	1	3	1	0	0	3	1	0	0	0	15	100	1
1	3	8	2	3	0	1	0	3	1	0	0	0	15	100	0
1	3	8	3	3	0	0	1	3	0	0	0	1	75	0	0
1	4	9	1	3	1	0	0	4	1	0	0	0	30	500	0
1	4	9	2	3	0	1	0	4	0	0	1	0	15	500	1
1	4	9	3	3	0	0	1	4	0	0	0	1	75	0	0
1	5	11	1	3	1	0	0	5	0	1	0	0	60	500	0
1	5	11	2	3	0	1	0	5	0	0	1	0	30	100	1
1	5	11	3	3	0	0	1	5	0	0	0	1	75	0	0
1	6	12	1	3	1	0	0	6	0	0	1	0	60	100	1
1	6	12	2	3	0	1	0	6	1	0	0	0	60	500	0
1	6	12	3	3	0	0	1	6	0	0	0	1	75	0	0
1	7	17	1	3	1	0	0	7	0	0	1	0	30	300	1
1	7	17	2	3	0	1	0	7	0	1	0	0	60	100	0
1	7	17	3	3	0	0	1	7	0	0	0	1	75	0	0
1	8	18	1	3	1	0	0	8	0	1	0	0	15	300	1
1	8	18	2	3	0	1	0	8	0	1	0	0	30	500	0
1	8	18	3	3	0	0	1	8	0	0	0	1	75	0	0
1	9	19	1	3	1	0	0	9	1	0	0	0	60	300	1
1	9	19	2	3	0	1	0	9	0	1	0	0	15	300	0
1	9	19	3	3	0	0	1	9	0	0	0	1	75	0	0
2	1	5	1	3	1	0	0	10	0	1	0	0	30	100	0
2	1	5	2	3	0	1	0	10	1	0	0	0	30	300	1
2	1	5	3	3	0	0	1	10	0	0	0	1	75	0	0
2	2	7	1	3	1	0	0	11	0	0	1	0	15	500	1
2	2	7	2	3	0	1	0	11	0	0	1	0	60	300	0
2	2	7	3	3	0	0	1	11	0	0	0	1	75	0	0
2	3	8	1	3	1	0	0	12	1	0	0	0	15	100	1
2	3	8	2	3	0	1	0	12	1	0	0	0	15	100	0
2	3	8	3	3	0	0	1	12	0	0	0	1	75	0	0
2	4	9	1	3	1	0	0	13	1	0	0	0	30	500	0
2	4	9	2	3	0	1	0	13	0	0	1	0	15	500	1
2	4	9	3	3	0	0	1	13	0	0	0	1	75	0	0
2	5	11	1	3	1	0	0	14	0	1	0	0	60	500	0
2	5	11	2	3	0	1	0	14	0	0	1	0	30	100	1
2	5	11	3	3	0	0	1	14	0	0	0	1	75	0	0
2	6	12	1	3	1	0	0	15	0	0	1	0	60	100	1
2	6	12	2	3	0	1	0	15	1	0	0	0	60	500	0

Questionnaire responses were prepared for data analysis using STATA version9 (2007) software. Table 8.1 shows how all variables are organised. According to Table 8.1 "id" is an identification variable unique to each respondent following by the "Cno" which is the choice set number in the DCE questionnaire as there are nine choices in this study, therefore, "Cno" will range from 1 to 9. Card_no is the number of the card that is offered to a respondent. "Alt" is alternative 1 to 3 (Insurance Plan A-"Alt1"-, Insurance Paln B-"Alt2"- and status quo- "Alt3-". Thus, there are three alternatives in a choice set so "Cset" is 3. "Alt1" takes the value of 1 for all observations arising from alternative 1 and 0 otherwise, and so on for "Alt2" and "Alt3". The variable "C_id" is required for using STATA software where this "C_id" takes a unique value for each choice set, and it identifies the observations that each unique choice is represented when data is grouped together. "C_id" will range from 1 to 9 for respondent 1 and, for respondent 2, this will range from 10 to 18 and so on.

"WaitOPD"-Average waiting time in OPD- and "Premium" are quantitative variables which take values in the data set that correspond to the level presented in the cards. The variables "Allpub" – respondents are able to access to all public health care providers-, "Allpri- respondents are able to access to all private health care providers- , "AllHPs"- respondents are able to access to all public health care providers- respondents are able to access to all health care providers- and "Only1"- respondent selects the status quo which means they can access one contracted health care provider are qualitative variables.

These qualitative variables are entered in the form of dummy coded variables. Dummy variables take the value of 1 if the level is presented in the alternative and 0 otherwise. For example, the first alternative in choice set 1 is "Allpri" with 30 minutes waiting in OPD and 100 Baht ($A3.4)/3months premium. It should be noted that in each choice set alternative 3 was the "status quo" and this is the same for all choice sets.

Respondents are asked to answer more than one question resulting in multiple observations for each respondent. The dependent variable is "Choice" which is the respondent's choice of Health Insurance A or B [Green Card] or Status Quo [Blue Card]. Choice is re presented as a dichotomous variable taking the value of 1 for the chosen alternative and 0 for other alternatives. For example, Table 8.1 shows that respondent 1 selects Insurance Plan B in choice set 1 and 2. Whereas, Insurance Plan A is selected in choice set 3 by respondent 1.

According to Chapter 6, the econometric specification for DCE in this study is

$$V = \beta_1 Allpub + \beta_2 Allpri + \beta_3 AllHPs + \beta_4 WaitOPD + \beta_5 Premium_{ij} \quad (8.1)$$

where $Allpub$, $Allpri$, $AllHPs$, $WaitOPD$ and $Premium$ are attributes of all public health care providers , all private health care providers, all health care providers which insured people can access, average waiting time in OPD and premium (per three months) respectively and V is utility which is assumed linear and additive.

It is important to understand the unit of measurement before interpreting these coefficients. β_1, β_2 and β_3 show the change in utility in moving from accessing only one contracted health care provider (their status quo) to accessing all public health care providers, all private health care provider and all health care providers respectively. β_4 shows the utility of a one minute reduction in waiting time for OPD and β_5 shows the utility of a one Baht reduction in cost[22].

[22] Please note that respondents were asked to pay premium/3months in this experiment. Thus, their willingness to pay for health insurance needs to be divided by 3 in order to get monthly premium.

The data were analysed using STATA[23] and the logit model. In STATA, this study used '*clogit*' command. This command specifies the conditional logit model which allows estimation of McFadden's choice model.

The conditional logit is interchangeable with the term of logit. Also, this study includes alternative-specific variables[24] such as premium, hence, 'clogit' is more appropriate than the 'mlogit' command which is a standard command for the logit model studies.[25]8

8.3 Results for DCE

Table 8.2 presents the results from the logit model in each group. The goodness of fit of the model can be explained by McFadden's Pseudo R^2 which is 0.685, 0.5576, 0.6366 and 0.5848 for group A, B, C and D respectively. These McFadden's R^2 indicates that the goodness of fit of the model is well accepted. The chi-squared statistic of 4063.46, 3308.05, 3776.52 and 3469.44 for group A, B, C and D respectively indicates that the estimated model has improved explanatory power over a model where only constant terms were included. The results from STATA also show that all attributes are significant at the 95 % confidence level.

23 STATA version 9 (pre 2008 version) are used.

24 Alternative-specific variables are variables such as price which may vary across scenarios. On the other hand, variables such as gender which do not vary across alternative scenarios are called case-specific. (Cameron and Trivedi, 2009, pp.479)

25 'mlogit' is normally used for simple case where all regressors are case specific

Table 8.2: Results from the Logit Model: Using STATA

Group A

No. Of Observation =8100

LR chi2(5) = 4063.46
Prob > chi2 = 0.0000
Log likelihood = -934.40772 Pseudo R2 = 0.6850

Choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Allpub	10.12296	1.082122	9.35	0.000	8.002037	12.24388
Allpri	9.717116	1.02144	9.51	0.000	7.71513	11.7191
AllHPs	11.70587	1.052276	11.12	0.000	9.643451	13.7683
WaitOPD	-.0388255	.0058331	-6.66	0.000	-.0502581	-.0273929
Premium	-.0155267	.0013305	-11.67	0.000	-.0181344	-.012919

Group B

No. Of Observation =8100

LR chi2(5) = 3308.05
Prob > chi2 = 0.0000
Log likelihood = -1312.111 Pseudo R2 = 0.5576

Choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Allpub	3.042462	.2576349	11.81	0.000	2.537507	3.547418
Allpri	4.150848	.2191887	18.94	0.000	3.721246	4.58045
AllHPs	3.977125	.268565	14.81	0.000	3.450747	4.503502
WaitOPD	-.0546779	.0023371	-23.40	0.000	-.0592585	-.0500973
Premium	-.0056362	.0003329	-16.93	0.000	-.0062886	-.0049838

Group C

No. Of Observation =8100

Log likelihood = **-1077.8776**

LR chi2(**5**)	= **3776.52**
Prob > chi2	= **0.0000**
Pseudo R2	= **0.6366**

Choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Allpub	**4.790177**	**.2347498**	**20.41**	**0.000**	**4.330075**	**5.250278**
Allpri	**5.460467**	**.2223651**	**24.56**	**0.000**	**5.02464**	**5.896295**
AllHPs	**7.546558**	**.2932143**	**25.74**	**0.000**	**6.971869**	**8.121247**
WaitOPD	**-.0302617**	**.0026992**	**-11.21**	**0.000**	**-.0355521**	**-.0249714**
Premium	**-.0165544**	**.0005436**	**-30.45**	**0.000**	**-.0176198**	**-.015489**

Group D

No. Of Observation =8100

Log likelihood = **-1231.4164**

LR chi2(**5**)	= **3469.44**
Prob > chi2	= **0.0000**
Pseudo R2	= **0.5848**

Choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Allpub	**7.705208**	**.430086**	**17.92**	**0.000**	**6.862255**	**8.548161**
Allpri	**7.360796**	**.4175138**	**17.63**	**0.000**	**6.542484**	**8.179108**
AllHPs	**9.066303**	**.454984**	**19.93**	**0.000**	**8.17455**	**9.958055**
WaitOPD	**-.0213786**	**.0018512**	**-11.55**	**0.000**	**-.0250069**	**-.0177503**
Premium	**-.0099852**	**.000463**	**-21.57**	**0.000**	**-.0108927**	**-.0090778**

8.3.1 Attributes Analysis

According to the coefficients from Table 8.2, these attributes which are all public, all private and all health care providers, waiting time for OPD and premium have an impact on the probability of selecting an alternative. The negative and significant coefficients for “Premium” and “Wait time for OPD” mean that people prefer these attributes to have a lower level.

In other words, respondents are more likely to select a health insurance policy with both lower cost and lower waiting time. The positive and significant coefficients of "All public health care providers" "All private health care providers" and "All health care providers" indicate that respondents would like to have access to more than one contracted health care provider (their status quo). These results also support the theoretical background of the model that, everything else equal, people would prefer to have more than one choice of health care provider.

The larger coefficient on a given attribute compared with other attributes, everything else equal, means that respondents prefer to have the larger attribute. For example, if the coefficient on "All health care providers" is larger than the coefficient on "All public health care providers", respondents prefer to have access to all health care providers than access to only public health care providers.

8.3.2 Marginal Rate of Substitution (MRS)

Ryan et al. (2008) point out that MRS can be calculated by the negative of the ratio of any two coefficients. If researchers would like to know the willingness to pay (WTP), β_5 is used as the denominator such as $-\beta_1 / \beta_5$, and indicates how much respondents are willing to pay for a health insurance which offer all public health care providers to insured people. Results of WTP in each group are summarised in Table 8.3a to Table 8.3d. Then, WTP is discussed in the next section.

Table 8.3a: Willingness to Pay of Group A

Group A	MRS in term of cost and choices of health care providers	How much respondents are willing to pay for additional health care providers
$-\beta_1/\beta_5$	$-\frac{10.12296}{-0.0155267} = 651.97$	Baht 651.97/3months or Baht 217.32/month to access all public health care providers.
$-\beta_2/\beta_5$	$-\frac{9.717116}{-0.0155267} = 625.83$	Baht 625.83/3months or Baht 208.61/month to access all private health care providers.
$-\beta_3/\beta_5$	$-\frac{11.70587}{-0.0155267} = 753.92$	Baht 753.92/3months or Baht 251.3/month to access all health care providers.
$-\beta_4/\beta_5$	$-\frac{-0.0388255}{-0.0155267} = -2.50$	Baht 2.5 to reduce their waiting time in OPD by 1 minute.

Table 8.3b: Willingness to Pay of Group B

Group B	MRS in term of cost and choices of health care providers	How much respondents are willing to pay for additional health care providers
$-\beta_1/\beta_5$	$-\frac{3.042462}{-0.0056362} = 539.80$	Baht 539.80/3months or Baht 180/month to access all public health care providers.
$-\beta_2/\beta_5$	$-\frac{4.150848}{-0.0056362} = 736.46$	Baht 736.46/3months or Baht 245.48/month to access all private health care providers.
$-\beta_3/\beta_5$	$-\frac{3.977125}{-0.0056362} = 705.64$	Baht 705.64/3months or Baht 235.21/month to access all health care providers.
$-\beta_4/\beta_5$	$-\frac{-0.0546779}{-0.0056362} = -9.7$	Baht 9.7 to reduce their waiting time in OPD by 1 minute.

Table 8.3c: Willingness to Pay of Group C

Group C	MRS in term of cost and choices of health care providers	How much respondents are willing to pay for additional health care providers
$-\beta_1/\beta_5$	$-\frac{4.790177}{-0.0165544} = 289.36$	Baht 289.36/3months or Baht 96.45/month to access all public health care providers.
$-\beta_2/\beta_5$	$-\frac{5.460467}{-0.0165544} = 329.85$	Baht 329.85/3months or Baht 109.95/month to access all private health care providers.
$-\beta_3/\beta_5$	$-\frac{7.546558}{-0.0165544} = 455.86$	Baht 455.86/3months or Baht 151.95/month to access all health care providers.
$-\beta_4/\beta_5$	$-\frac{-0.0302617}{-0.0165544} = -1.82$	Baht 1.82 to reduce their waiting time in OPD by 1 minute.

Table 8.3d: Willingness to Pay of Group D

Group D	MRS in term of cost and choices of health care providers	How much respondents are willing to pay for additional health care providers
$-\beta_1/\beta_5$	$-\frac{7.705208}{-0.0099852} = 771.66$	Baht 771.66/3months or Baht 257.22/month to access all public health care providers.
$-\beta_2/\beta_5$	$-\frac{7.360796}{-0.0099852} = 737.17$	Baht 737.17/3months or Baht 245.72/month to access all private health care providers.
$-\beta_3/\beta_5$	$-\frac{9.066303}{-0.0099852} = 907.97$	Baht 907.97/3months or Baht 302.65/month to access all health care providers.
$-\beta_4/\beta_5$	$-\frac{-0.0213786}{-0.0099852} = -2.14$	Baht 2.14 to reduce their waiting time in OPD by 1 minute.

8.4 Willingness to Pay (WTP)

There are four issues from Table 8.2a to Table 8.2d that should be discussed about WTP for the Gold Card scheme in this section. First, this study analyses the broad picture of how much respondents are willing to pay to get additional contracted health care providers.

Second, the WTP for accessing all public health care providers is discussed. Next, the WTP for accessing all private health care providers and all health care providers are analysed respectively. Last, the WTP for 1 minute's reduction in waiting in OPD is discussed.

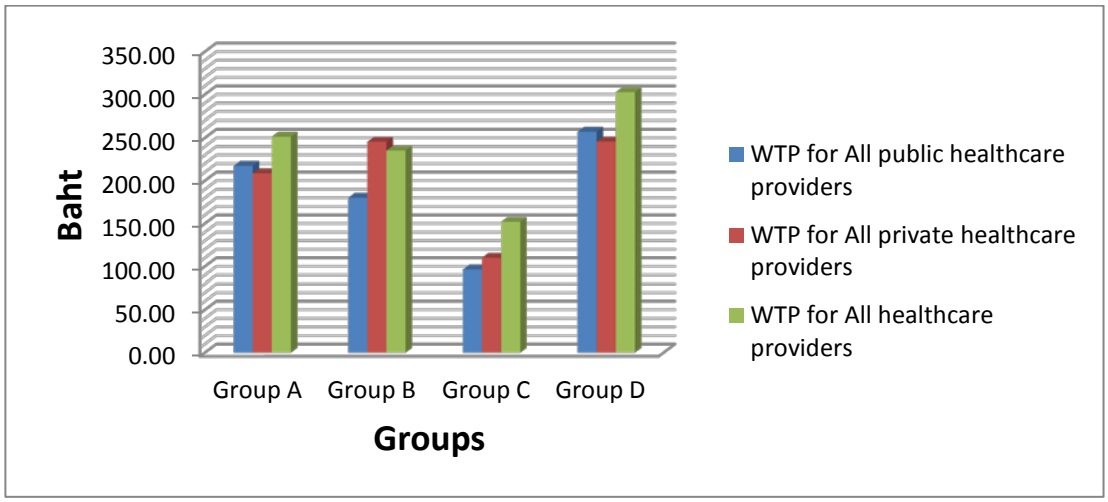
Some descriptive data analysis in chapter 7 needs to be reviewed before WTP is discussed. Chapter 7 concludes that on average, respondents in group C and D have lower income than respondents in the other two groups, whereas, respondents in group B have the highest income. Moreover, on average, respondents in group D have clearly poorer self-assessed health status, and this study, thus, assumes that this group has the highest demand for health care. Respondents in group B have good health status. Group A and C have on average fair health status.

8.4.1 WTP for Additional Contracted Health Care Providers in Each Group

Figure 8.2 shows that respondents in group D have the highest WTP for obtaining additional choices of health care providers. This is not surprising because respondents in group D have poorer health status, hence, they have more "need" for health care. Respondents in group C who have low income have the lowest willingness to pay for additional health care providers. It is likely that, everything being equal, people who have lower income are likely to have lower WTP. Moreover, health status also affects WTP. Figure 8.2 shows that group B who have the highest income and good health does not actually have the highest WTP on average.

Figure 8.2 clearly shows that respondents in group D who have clearly lower income than group B but poor health have the highest WTP on average. This means that people with poor health are likely to have higher WTP for health insurance than those who are healthy.

Figure 8.2: WTP for Getting Additional Health Care Providers in Each Group



According to Figure 8.2, for all respondents in group A C and D, they would prefer to access all health care providers because they are willing to pay more for all health care providers than other two attributes which are all public health care providers and all private health care providers. According to Figure 8.2, preferences between all public and all private health care providers of group A, C and D, except group B, are actually not so different because their WTP for all public and private health care providers are very similar in each group.

The confidence intervals in Table 8.2 indicate that the coefficient on "AllHps" is significantly higher/ (different) than/ (from) both the coefficient of "AllPub" and the coefficient of "AllPri" in only group C, as the confidence interval of "AllHPs" is not overlapped with both "AllPub" and "AllPri" in group C. On the other hand, Table 8.2 demonstrates that the coefficient of "AllHps" is not significantly different/higher to both the coefficient of "AllPub" and the coefficient of "AllPri" in group A and D, as the confidence intervals of "AllHPs" do overlap with both "AllPub" and "AllPri" in group A and D.

If respondents have to choose between private and public healthcare providers, respondents in group A and D are willing to pay more for public than private health care providers. This means that they prefer to access public healthcare providers than private healthcare providers. This may be because respondents can go to public health care providers more easily than private health care providers in their areas. This finding is similar to Supakankunti (2001) who found that her respondents can more easily access public hospitals than private clinics/hospitals and health centre. However, if we have a look at the confidence intervals in group A and D, it can be seen from Table 8.2 that the confidence intervals overlap between "AllPub" and "Allpri" in both group A and D. This means that the coefficient of "Allpub" is not significantly higher/ (different) than/ (from) the coefficient of "AllPri" in group A and D.

In contrast, respondents in group B and C prefer to access private healthcare providers than public healthcare providers as their WTP for private health care providers is higher than WTP for public health care providers. Respondents in group B in particular would clearly prefer to access only all private health care providers because their WTP for all private health care providers is obviously higher than all public health care providers. Whereas, WTP for all private health care providers is only slightly higher than all public health care providers for respondents in group C.

There are two reasons that group B and C prefer to access private health care providers. The first is, in Thailand, private health care providers are more expensive than public health care providers, thus, it is possible that respondents in group B who have the highest income in this study may be able to afford to access private health care providers. However, this income effect should not be considered for respondents in group C who are on low income.

The second reason is that the majority of respondents in group B and C told interviewers that they have experienced a problem with the quality of care given by public health care providers. This can be supported by many comments

in the questionnaires in which they express that nurses and services in private health care providers are better than nurses and services provided by public health care providers. Thus, although respondents in group C are poor, most of them comment that if it is possible, they would prefer to access private health care providers.

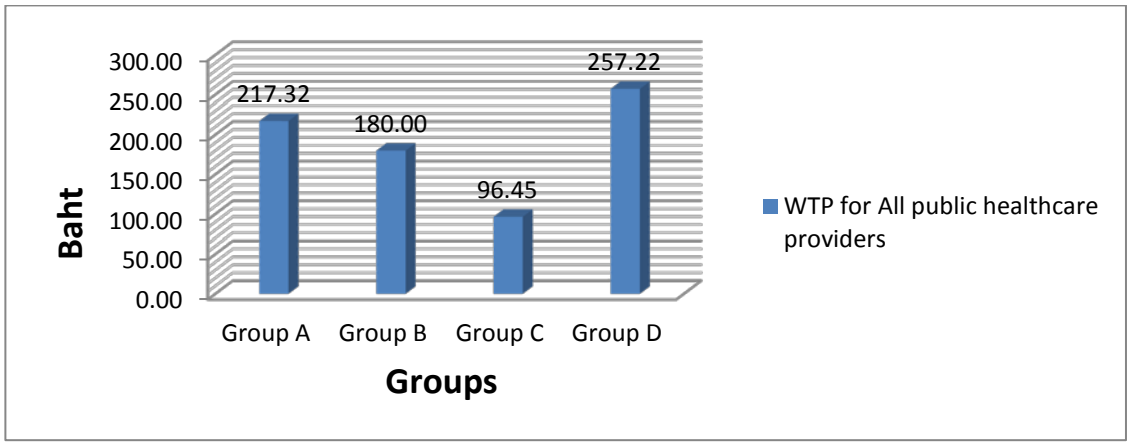
This study found that respondents in group B are even willing to pay more to access private health care providers than to access all health care providers. According to the results in Table 8.2, the confidence intervals between "Allpri" and "AllHPs" in group B overlap. Thus, the coefficient of "AllPri" is not actually statistically different from the coefficient of "AllHPs". However, Table 8.2 shows that the coefficient of "AllPri" is significantly higher than the coefficient of "AllPub" in group B because the confidence interval between these two does not overlap.

Table 8.2 further demonstrates that the confidence intervals between "AllPri" and "AllPub" in group C overlap which means that the coefficient of "AllPri" and the coefficient "AllPub" are not statistically different from each other in group C.

8.4.2 WTP for Accessing All Public Health Care Providers

According to Figure 8.3, respondents in group D have the highest WTP for all public health care providers followed by group A, B and C who have the lowest WTP for all public health care providers. According to Figure 8.3, the average WTP for accessing all public health care providers is Baht 187.75/ month ($A 6.25). However, if all respondents in group D who have clearly poor health status are excluded, the average WTP for accessing all public health care providers is reduced to Baht 164.59/ month ($A 5.5).

Figure 8.3: WTP for All Public Health Care Providers

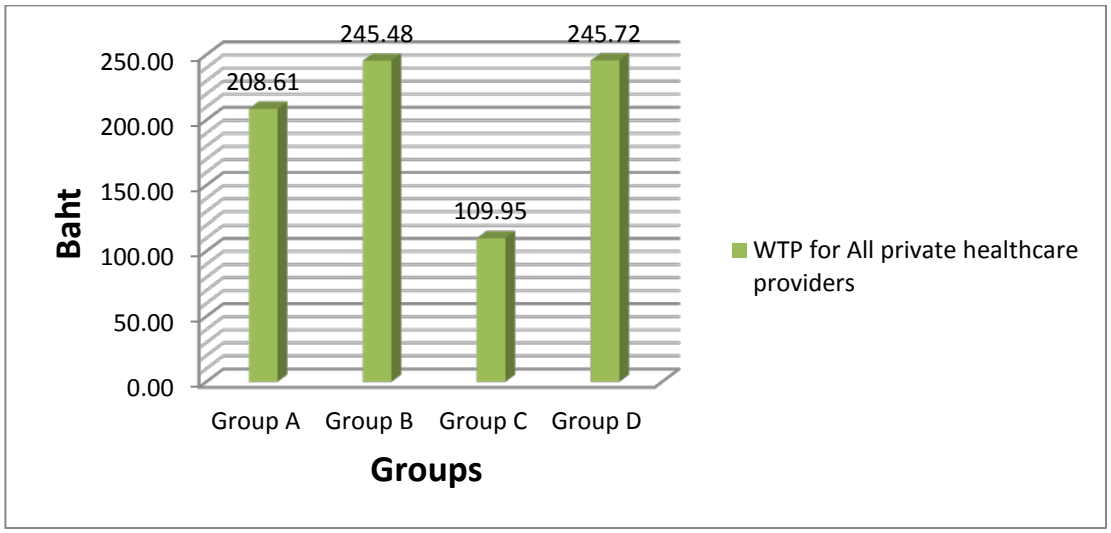


8.4.3 WTP for Accessing All Private Health Care Providers

Figure 8.4 indicates that the respondents in both group B and group D have the highest WTP for all private health care providers following by groups A and C who have the lowest WTP for all private health care providers in that order. It can be seen from Figure 8.4 that the average WTP for accessing all private health care providers is Baht 202.44/ month ($A 6.74). Group B has the highest WTP for private health care providers for two reasons.

First, they are able to afford to go to private health care providers due to their higher income, as mentioned above. Second, they have experienced a problem with quality of care in public health care providers so they are willing to pay more for private health care providers to get a better quality of services. Group D has the highest WTP for private health care providers due to their health status. If respondents in group D who have poor health status are excluded, the average WTP for accessing all private health care providers is decreased to Baht 188.01/ month ($A 6.26).

Figure 8.4: WTP for All Private Health Care Providers

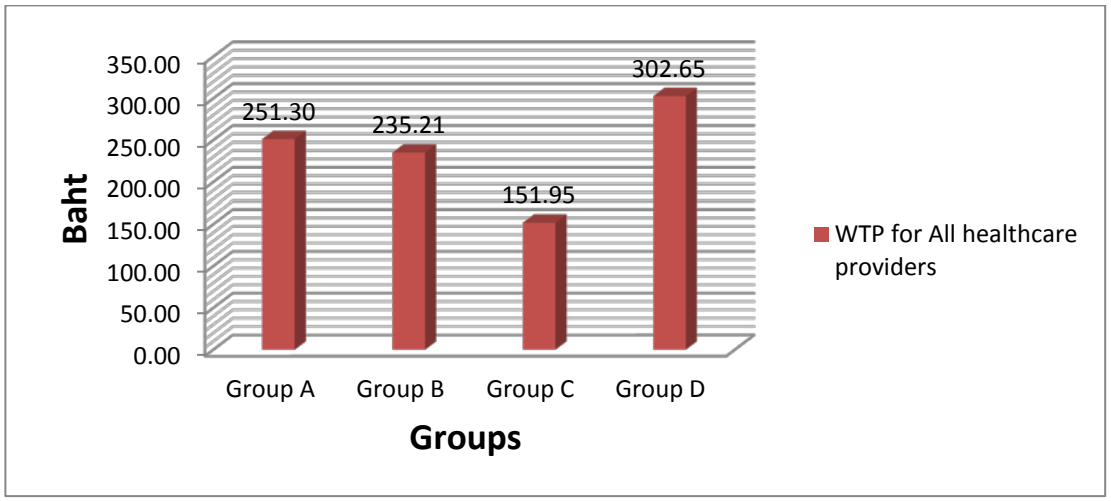


8.4.4 WTP for Accessing All Health Care Providers

Figure 8.5 similarly shows that respondents in group D have the highest WTP for all health care providers followed by groups A, B and C who have the lowest willingness to pay for all health care providers. It can be seen from Figure 8.5 that the average willingness to pay for accessing all health care providers is Baht 235.28/ month ($A 7.83).

However, if respondents in group D who have poor health status are excluded, the average WTP for accessing all health care providers is dropped to Baht 212.82/ month($A 7.06).

Figure 8.5: WTP for All Health Care Providers

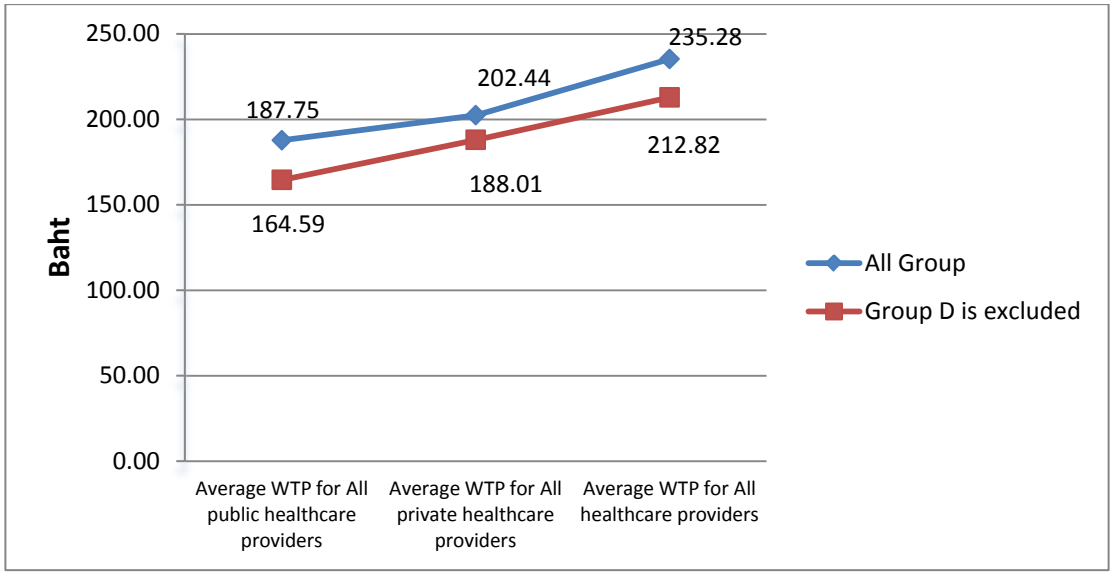


In short, Figure 8.6 concludes that on average, the majority of respondents in this study would prefer to access all health care providers because they have the highest WTP for all health care providers on average. However, if they have to choose between public or private health care providers, they prefer private health care provider because, on average, they are willing to pay more for accessing all private than public health care providers.

Moreover, if all respondents in group D who have poor health are excluded, the average rate of willingness to pay drops about 12%, 7% and 10% for accessing all public health care providers, all private health care providers and all health care providers respectively. This means that if all respondents have the same income, it is likely that respondents who have poor health and higher need for health care are willing to pay more for health insurance than those who are healthy on average.

The equity issues of whether people with higher needs should be asked to pay more and people with higher income should pay for people with poor health have not been taken into consideration here but their importance is recognised.

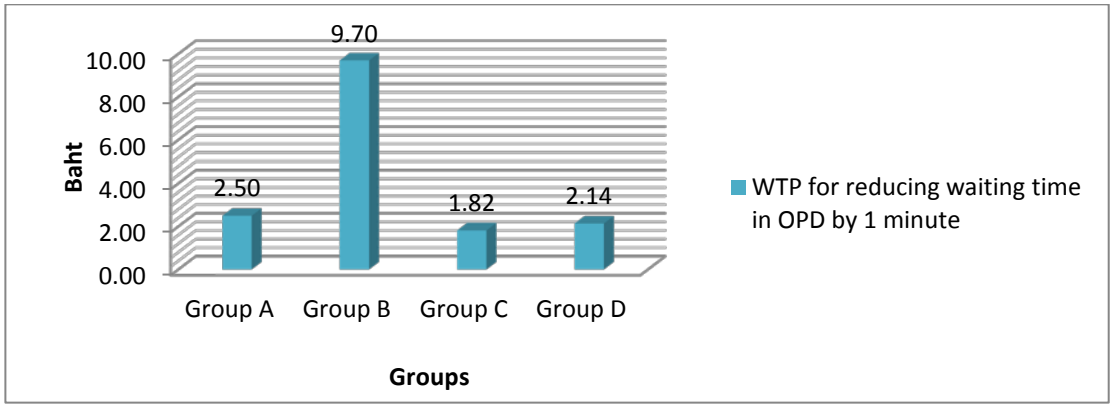
Figure 8.6: Average WTP for Additional Health Care Providers



8.4.5 WTP for Reducing Waiting Time in OPD by 1 Minute

Figure 8.7 illustrates how much respondents are willing to pay to reduce their waiting time in OPD by 1 minute. The results are according to our expectations. First, respondents in group B who have the highest income are willing to pay more than other groups to reduce their waiting time by 1 minute at Baht 9.7 ($A 0.33) . This means that their opportunity cost is higher than other groups who have lower income.

Figure 8.7: Willingness to Pay for Reducing Waiting Time in OPD by 1 Minute



On the contrary, respondents in groups A, C and D who have lower income than group B have lower willingness to pay for reducing their waiting time by 1 minute in OPD at Baht 2.5 ($A 0.08), 1.82 ($A 0.06) and 2.14 ($A 0.07) respectively . This may be interpreted as a result of their lower opportunity costs. Respondents in group A are willing to pay only slightly more than respondents in groups C and D. The results shown in Figure 8.7 are supported by data from questionnaires which show that the majority of respondents in groups A, C and D said that they do not care much about long waiting time in OPD as they prepared to wait in OPD for the whole day and are accustomed to this.

On average, insured people would be willing to pay up to Baht 4.04 ($A 0.13) for reducing their waiting time in OPD by 1 minute. However, if the highest income group (group B) is excluded, the average WTP for reducing waiting time in OPD decreases about 46.7% to Baht 2.15 ($A 0.07). Next, another source of finance of the Gold Card scheme is presented.

8.5 Another Source of Finance for the Gold Card Scheme

Chapter 3, pp.20, shows that at least Baht 31-46 billion ($A 1- 1.5 billion) is needed to finance the Gold Card scheme in the future. Thus, this study recommends the Thai government may ask insured people to pay the premium in order to get additional funds. However, the premium will be paid by insured people, if and only if, the Gold Card scheme offers more attractive choices to them.

For example, in this study, if choice of health care providers is extended and a reduction in waiting time in OPD is guaranteed, it is possible that respondents will pay a premium for extended choice of health care providers. According to the above section, if group D who has different health status from other groups is excluded[26], it is possible that, on average, insured people may be willing to pay up to Baht 164.69/month ($A 5.5) for accessing all public health care providers, Baht 188.01/month ($A6.26) for accessing all private health care providers and Baht 212.82/month ($A 7.09) for accessing all health care providers.

If this study is assumed to be reliable and accurate, the Gold Card scheme can run strongly in the long term via the extra funds. For example, if insured people are able to access all health care providers, the scheme can collect up to approximate roughly Baht 8,512 million /month ($A 283.73 million)[27]. This fund could be used for the benefit of the Gold Card scheme and insured people.

---

[26] Group D is excluded because the majority of people have indicated that they have fair to good health status, thus, WTP should be estimated from people who have fair to good health status.

[27] Thailand has about 70,000,000 people. About 50,000,000 people are eligible for the Gold Card scheme and about 10,000,000 people may be exempted for premium because these people are very old or very poor. Then, approximately 40,000,000 insured can be asked to pay monthly premium. If the Gold Card scheme offer all healthcare providers to insured, it is possible that the Gold Card scheme can collect approximately 40,000,000 * 212.82 = Baht 8,512 million/month. ** ** Please note that the numbers of people using in the above calculation are not the exactly number, thus, the result of calculation is not accurate as this is just an example.

At the same time, the Gold Card scheme may be able to improve the efficiency of its management. As an example, the government could endeavour to manage the funds carefully to ensure that the most value is obtained from these additional funds. This may lead to improvements in quality and quantity of health care services.

8.6 Limitations of This Study

There are three main limitations of this study. The first, a weakness of DCE is that respondents sometimes experience difficulties when answering the questions. Indeed, such difficulties were reported by the interviewers used for this study. For example, a few respondents could not remember their health care expenditures at all. A few respondents also were extremely hesitant when they were asked to select either Insurance Plan A or Insurance Plan B in the green card. In addition, disadvantages of face-to-face interviews are that it takes respondent time, it is costly, respondents may be worried about confidentiality of information and interviewer bias may have occurred from the interviewers.

The second aspect is a weakness of the experiment design used in this study. As mentioned in chapter 6, the equal levels of attribute in DCE design, which are used in this study (this study uses three levels for each attribute), may impose a cost on the experiment because some attributes may naturally require more than three levels (Hensher et al. 2006, pp. 108).

The more levels of attributes imply a larger design of this experiment and associated expense and complication. Moreover, the weakness of the logit model mentioned in chapter 5 also needs to be considered.

The last aspect of limitations is related to the errors of household surveys. There are two types of errors. First, the error can be caused by observing a sample instead of the whole population.

This type of errors can be mitigated by increasing the sample size and the method used to select the sample. This is known as 'sampling error'. (UN, 2005)

Second, non-sampling error is the most important source of error in estimates. This type of error is independent of sample size. Non-sampling errors may arise from many different sources, such as interviewers may make mistakes in the collection of data due to personal variations. Respondents may also forget activities such as hospital visits or the associated costs and they may respond irrationally. For example, although interviewers assured respondents that all information and data will be kept in a safe place and their information will be erased as soon as this study is completed, some respondents may not want to provide some of their information accurately, such as their income. (UN, 2005)

Furthermore, the dominance approach is used to ensure that respondents answer rationally, however, if respondents really do not believe that the Gold Card scheme can be closed in the future due to the current financing situation, they may respond to this experiment irrationally. This study acknowledges that error in estimation could be occurred by these limitations. This study suggests future research should focus on these limitations carefully.

8.7 Another Issue That Need to be Considered

The majority of insured people in the Gold Card scheme are on low to middle incomes. This raises an issue of concern regarding equity. For example, should these people have to pay a premium to access a basic health insurance package? As long as additional funds such as from tax reform in Thailand seem not to be readily accessible, insured people may need to pay a premium for extended choices.

The alternative is that many Thais may not have the Gold Card scheme in the future due to lack of sustainable funding. It may be time that Thais need to be

aware that more funds are needed to ensure sustainability of the Gold Card scheme.

8.8 Conclusion

This study shows that if choices and benefits of the Gold Card scheme are modified, it is possible that insured people would be willing to pay more in premiums. It is possible to obtain extra sources of funds from currently insured people to contribute to the insurance pool. Once, the government is able to provide more funds for the Gold Card scheme, the Gold Card scheme may be able run more effectively to provide both the quantity and quality of services desired by the Thai population. However, the government needs to manage the funds carefully to ensure that these funds are used in the most efficient ways.

The DCE shows that the majority of respondents would prefer to access all health care providers because they are willing to pay at the highest rate of Baht 235.28/month ($A 7.84) on average. Also, on average, they are willing to pay more for accessing all private health care providers (Baht 202.44/month or $A 6.74) than accessing all public health care providers (Baht 187.75/month or $A 6.25) which means that if they have to choose either contracted private or public health care providers, they would prefer to choose private health care than public health care providers.

If respondents in group D, who have poorer health are excluded, the rate of WTP is dropped about 12%, 7% and 10% for accessing all public health care providers, all private health care providers and all health care providers respectively. Thus, it can be said that respondents who have high need of health care, due to their poor health status, are willing to pay more for health insurance than the average in this sample.

In addition, insured people may be willing to pay up to Baht 4.04 ($A 0.14) for reducing their waiting time in OPD by 1 minute. However, if the highest income group (group B) is excluded, the average WTP for reducing waiting time in OPD decreases about 46.7% to Baht 2.15 ($A 0.07)

If the above results are assumed to be reliable and accurate, the Gold Card scheme can function strongly in the long term via the extra funds. For example, if insured people are able to access all health care providers, the Gold Card scheme can collect up to approximately Baht 8,512 million /month ($A 283.73 million).

However, limitations of this study which are mentioned in the last section need to be considered for the future research. There are three aspects which may cause error estimation for this study. These limitations come from the weakness of the DCE itself, the weakness of the design of this study and the errors in household survey.

Chapter 9: Conclusions and Policy Implications

9.1 Conclusions

There are three research objectives of this thesis. First, this study aims to elicit the Willingness to Pay (WTP) for the Gold Card scheme in Thailand by using Discrete Choice Experiment (DCE) method. There are eight steps in setting up DCE discussed in chapter 6. Second, this study aims to find an alternative additional fund for the Gold Card scheme. Third, data such as socioeconomic data, health status and health expenditures are collected and analysed in order to understand the characteristics of insured people.

This section provides the conclusions arising from findings of chapter 7 and 8. There are three main findings. The first is from the questionnaire which shows that most of the time respondents use the Gold Card, when they are sick. This means that the Gold Card is very important for these people.

The majority of respondents who have on average higher income than other respondents are able to purchase complementary health insurance, whereas, only some of respondents who have lower income on average have complementary health insurance. This is evidence that the purchase of health is a luxury good as people spend more on it as their income rises (Costa-Font et al., 2009).

This study further found that respondents who have poor health status are more likely to visit hospital and they also spend more money on their health care than those who are healthy (Grossman, 2000). However, healthy people may spend more on health care than the unhealthy when there is a strong possibility of incurring an unhealthy state in the future. For example, many healthy respondents were spending their money on influenza vaccine when the H1N1 was rampant around the same time that survey was conducted.

Furthermore, low income respondents are more likely to experience financial hardship than those who have higher income. The majority of respondents have not had any experiences of financial catastrophe because, according to comments in questionnaires, it can be concluded that they refused to take medications which they could not pay for it and they only received medications that were covered by health insurance schemes.

The second finding is that if the Gold Card scheme allows respondents to access all public health care providers, rather than only one contracted health care provider mentioned on the card at present, the average WTP is Baht 187.75/ month ($A 6.25). However, if all respondents who have poor health status are excluded, the average WTP for accessing all public health care providers is reduced about 12 % to Baht 164.59/ month ($A 5.5).

Also, if respondents are able to access all private health care providers when they are sick, the average WTP is Baht 202.44/ month ($A 6.74). However, if respondents who have poor health status are excluded, the average WTP is decreased about 7% to Baht 188.01/ month ($A 6.26).

If the Gold Card scheme allows respondents to access all health care providers, the average willingness to pay is Baht 235.28/ month ($A 7.83). However, if respondents who have poor health status are excluded, the average WTP drops about 10% to Baht 212.82/ month ($A 7.06).

According to their WTP, the majority of respondents would prefer to access all health care providers, but if they have to choose between private and public health care providers, they would prefer private health care to public health care providers.

The third finding is that respondents who either have higher income or poor health would be willing to pay more for additional choices of health care providers than those healthy respondents and the lower income respondents.

Likewise, respondents who have higher income would be willing to pay for a reduction in their waiting times in Out-Patient-Department (OPD) more than those who have lower income. This finding is as expected because respondents who have higher income would also have higher opportunity costs. On average, insured people would be willing to pay up to Baht 4.04 ($A 0.13) for reducing their waiting time in OPD by 1 minute. However, if the highest income group (group B) is excluded, the average WTP for reducing waiting time in OPD decreases about 46.7% to Baht 2.15 ($A 0.07).

From the above findings, it is obvious that if the Gold Card scheme can extend its choices of health care providers and the waiting time in OPD can be reduced, the scheme is able to obtain more funds from payment of premiums. For example, if insured people are able to access all health care providers, the Gold Card scheme can collect roughly up to Baht 8,512 million /month ($A 283.73 million)[28]. This fund could be used for the benefit of the Gold Card scheme and insured people.

In sum, the questionnaire results show that the scheme is very important for respondents. Most of higher income respondents are able to purchase complementary health insurance, whereas, only a few respondent on low incomes have complementary health insurance.

[28] Thailand has about 70,000,000 people. About 50,000,000 people are eligible for the Gold Card scheme and about 10,000,000 people may be exempted for premium because these people are very old or very poor. Then, approximately 40,000,000 insured may be asked to pay monthly premium. If the Gold Card scheme offer all healthcare providers to insured, it is possible that the Gold Card scheme can collect approximately 40,000,000 * 212.82 = Baht 8,512 million/month. ** Please note that the numbers of people using in the above calculation are not the exactly number, thus, the result of calculation is not accurate as this is just an example.

Other findings are that if the Gold Card scheme is able to extend choices of health care providers and the waiting time in Out-Patient-Department can be reduced, insured people would be willing to pay premium for the Gold Card scheme. The majority of respondents would prefer to be able to access all health care providers because they are willing to pay at the highest rate of Baht 235.28/month ($A 7.84) on average.

Also, on average, they are willing to pay more for accessing all private health care providers (Baht 202.44/month or $A 6.74) than accessing all public health care providers (Baht 187.75/month or $A 6.25) which means that if they have to choose either contracted private or public health care providers, they would prefer private to public health care providers.

If respondents, who have poor health are excluded, the rate of WTP drops about 12%, 7% and 10% for accessing all public health care providers, all private health care providers and all health care providers respectively. Thus, it can be said that respondents who have high need of health care, due to their poor health status, are willing to pay more for health insurance than average.

In additional, insured people may be willing to pay up to Baht 4.04 ($A 0.14) for reducing their waiting time in OPD by 1 minute. Whereas, if the highest income group (group B) is excluded, the average WTP for reducing waiting time in OPD decreases about 46.7% to Baht 2.15 ($A 0.07).

However, limitations of this study which are mentioned in chapter 8 need to be considered for the future research. There are three aspects which may cause error estimation for this study. These limitations come from the weakness of the DCE itself, the weakness of the design of this study and the errors in household survey.

9.2 Policy Implications

The Gold Card scheme is very important for Thai citizens and the government as it provides coverage for those on low and middle incomes. However, additional funds need to be sought urgently, otherwise, the universal health insurance policy may not be achieved and uninsured rate in Thailand will increase again because many Thais will no longer have health insurance. For instance, Chanduaywit et al. (2006) estimate that the Gold Card scheme needs additional funds of about million Baht 16,000 to 41,000 ($A 534 to 1,367 million) in 2001-2004.

Thai politicians always put the Gold Card scheme to the electorate as a free program and many Thais may not understand that there are always some costs incurred every time they use the Gold Card.

In addition, although the government has dramatically increased funds from million Baht 27,621 ($A 920.7 million) in 2002 to million Baht 89,385 ($A 2979.5 million) in 2009, researchers such as Chanduaywit et al. (2006) point out that more funds still need to be allocated to the Gold Card scheme due to increasing utilisation. For example, the number of visits has increased from 111.9 in 2003 to 140.7 million times in 2009 for out-patient services and from 4.3 in 2003 to 5.21 million times in 2009 for in-patients services (NHSO, 2010).

If Thais are aware that more funds are needed to allocate to the Gold Card scheme, premium payment according to insured people's WTP may be possible. Otherwise, if insured people are able to access health care at no cost, sooner or later, moral hazard issues may be another problem for the health insurance system in Thailand. However, controlling moral hazard with a co-payment requires diligent monitoring as under this situation low income people may be denied needed health care.

This study recommends that as long as other additional funds such as via tax reform cannot be obtained, the Gold Card scheme may require the insured to pay premiums in order to obtain extra funds. Insured people would be willing to pay for premium, if and only if, the Gold Card scheme can extend their choices of health care providers and reduce their waiting time in OPD.

The Gold Card scheme can obtain more funds and the scheme can be operated substantially in the long term. However, extending choices of health care providers and reducing the waiting time in OPD would increase expenditure for the scheme. The Thai government would need to assess the feasibility of this policy change taking into account available financial and human resources.

On the other hand, premium payments may not be the best option for the Gold Card scheme because there are two issues that need to be considered by policy makers. The first issue is should insured people in the Gold Card scheme pay the premium? This question is crucial because a majority of insured people in the Gold Card scheme have low and middle incomes and may not be able to afford the premium.

The government could identify very low income insured people in the Gold Card scheme and these people could be exempted from paying the premium. Both low and middle income insured people may need to pay for the premium, but the rate could be set differently. The exemption of some people from payment of the premium in combination with different rates of premium payment creates a level of administrative complexity which in itself imposes costs.

The second issue is the question of how the Thai government could efficiently collect the premiums. If the government asks every insured person to pay premiums themselves, the overhead costs and administrative cost of financing health insurance will be high (Danzon, 1992).

In short, although it is possible that premium payment can be used to raise additional funds for the Gold Card scheme. This study recommends that as long as other additional funds such as those from tax reform cannot be sourced, the Gold Card scheme may require the insured to pay the premium in order to obtain extra funds. Insured people would be willing to pay for the premium, if and only if, the Gold Card scheme can extend their choices of health care providers and reduce their waiting time in OPD. However, this study notes that premium payment may not be the best option because the majority of insured people in the Gold Card scheme are on low and middle incomes. Charging a premium may not be considered politically feasible.

Appendix1

1: Questionnaire

Questionnaire Date of Visit _ _ / _ _ / _ _

Sheet No. __

Willingness-to-pay for health insurance in Thailand -The discrete choice experiment.

You are about to receive some information before this experiment can be conducted. The information is necessary in order that you understand the context of the experiment. Communication of the information may take up to 20 minutes of your time. The information in summary is;

1) The objective of this study.

2) The benefits of this study for health insurance system in Thailand.

3) The overview of the Gold Card scheme.

4) The current benefit package provided by the Gold Card scheme.

5) The current health care financing in the Gold Card scheme.

Once you have received the above information, please fill free to ask any questions. Also, I need to collect your socio-economic data such as age, gender, family size, household health expenditures and education in the household. However, we can assure you that all information is confidential for the following reasons. First, your identities such as name and address are not required. Second, all of you information will be used and kept in the safe place. Third, your information is will be deleted as soon as this study is completed. I would like to say “thank you” for your participation in this survey. Now, I shall start with the first question.

1. Identification of Household and Household Members.

Number of Member	Sex	Age
1	F/M	
2	F/M	
3	F/M	
4	F/M	

2. Health, Demand for Health Care and Health Insurance Status.

Number of Member	How would you rate your health status?				
1	Very good	Good	Average	Poor	Very poor
2	Very good	Good	Average	Poor	Very poor
3	Very good	Good	Average	Poor	Very poor
4	Very good	Good	Average	Poor	Very poor

Number of Member	Have you been hospitalized in the last 12 months?	If 'Y' how many times have you been to the hospital?	If 'Y' how many times have you used the Gold card scheme?
1	Y/N		
2	Y/N		
3	Y/N		
4	Y/N		

Are you satisfied with your current benefit package?

Yes/No.

Do you have any complementary health insurance e.g. private health insurance?
Y/N

---

3. Household Health Expenditures.

Last Month: _____Baht. Can you claim? Y/N

Five months proceeding last month: _____Baht. Can you claim? Y/N

1. Have you or anyone in your family not been able to have recommended medical care due to financial hardship?
Y/N

and/or

2. Have you or anyone in your family experienced financial hardship as a result of health expenditures such as difficulties paying bills?
Y/N

3. Financing catastrophic occurs when you pay up more than 30 % of your household's income/ month on health bills. Have your health bills ever been more than 30% of your household income. Y/N

If 'Yes', how did you cope with it?

_____

_____

On average, what is your estimation of your health expenditure as a percentage of your household income per month? _____ Baht

If you have any comment on Health insurance system in Thailand, please feel free to write it down.

_____

_____

_____

_____

_____

_____

_____

In the next section, I would like to conduct the decision experiment. The previous gold card scheme surveys have shown that waiting time for OPD and choice of hospitals seem to be the main issue in the current health insurance system. This experiment is new in Thailand but it will be very useful for the reform of health insurance system in Thailand in the future. You are about to get the "blue card" entitled the current waiting time for OPD and choice of hospitals in the Gold care scheme with nine "green cards" which are the decision scenarios.

At this stage, please ask the interviewer for any information which you may need to understand before the experiment can be started. Now, we can start the decision experiment. Please take a card in the sequence indicated by the interviewer. Please always compare the "blue card" with the "green card" and choose which one between "blue card" and "green card" you would prefer. You can seek any additional information from the interviewer at anytime.

4. What is your choice when comparing the "blue card" to the "green card" no.1?

☐ White ☐ Green ☐ No answer

5. What is your choice when comparing the “blue card” to the “green card” no.2 to 9?

☐ White ☐ Green ☐ No answer

6. Did you find it difficult to make the above choices?

☐ Yes ☐ Moderate ☐ No ☐ I don’t know

Thank you so much for your time and participation. I wish to assure you that the information you have provided will not be able to identify you or your household and your information will be kept confidentiality.

2: Choice sets

2.1 Block A

A ***Scenario 5***

	Insurance Plan A	Insurance Plan B
Average waiting time for OPD (min)	30	30
Choice of Hospitals	All private healthcare providers	All public healthcare providers
Premium(Baht/Month)	100	300
PLEASE TICK		

A ***Scenario 7***

	Insurance Plan A	Insurance Plan B
Average waiting time for OPD (min)	15	60
Choice of Hospitals	All healthcare providers	All healthcare providers
Premium(Baht/Month)	500	300
PLEASE TICK		

A ***Scenario 8***

Average waiting time for OPD (min)	15	15
Choice of Hospitals	All pubic healthcare providers	All public healthcare providers
Premium(Baht/Month)	100	100
PLEASE TICK		

A ***Scenario 9***

	Insurance Plan A	Insurance Plan B
Average waiting time for OPD (min)	**30**	**15**
Choice of Hospitals	**All pubic healthcare providers**	**All healthcare providers**
Premium(Baht/Month)	**500**	**500**
PLEASE TICK		

A ***Scenario 11***

	Insurance Plan A	Insurance Plan B
Average waiting time for OPD (min)	**60**	**30**
Choice of Hospitals	**All private healthcare providers**	**All healthcare providers**
Premium(Baht/Month)	**500**	**100**
PLEASE TICK		

A ***Scenario12***

	Insurance Plan A	Insurance Plan B
Average waiting time for OPD (min)	**60**	**60**
Choice of Hospitals	**All healthcare providers**	**All public healthcare providers**
Premium(Baht/Month)	**100**	**500**
PLEASE TICK		

A ***Scenario17***

	Insurance Plan A	Insurance Plan B
Average waiting time for OPD (min)	30	60
Choice of Hospitals	All healthcare providers	All private healthcare providers
Premium(Baht/Month)	300	100
PLEASE TICK		

A ***Scenario18***

	Insurance Plan A	Insurance Plan B
Average waiting time for OPD (min)	15	30
Choice of Hospitals	All private healthcare providers	All private healthcare providers
Premium(Baht/Month)	300	500
PLEASE TICK		

A ***Scenario19***

	Insurance Plan A	Insurance Plan B
Average waiting time for OPD (min)	60	15
Choice of Hospitals	All public healthcare providers	All private healthcare providers
Premium(Baht/Month)	300	300
PLEASE TICK		

2.2 Block B

B ***Scenario 6***

	Insurance Plan A	Insurance Plan B
Average waiting time for OPD (min)	30	15
Choice of Hospitals	All private healthcare providers	All public healthcare providers
Premium(Baht/3Months)	300	500
PLEASE TICK		

B ***Scenario 14***

	Insurance Plan A	Insurance Plan B
Average waiting time for OPD (min)	60	15
Choice of Hospitals	All private healthcare providers	All healthcare providers
Premium(Baht/Month)	100	300
PLEASE TICK		

B ***Scenario 16***

	Insurance Plan A	Insurance Plan B
Average waiting time for OPD (min)	60	60
Choice of Hospitals	All public healthcare providers	All private healthcare providers
Premium(Baht/Month)	500	500
PLEASE TICK		

B ***Scenario 21***

	Insurance Plan A	Insurance Plan B
Average waiting time for OPD (min)	15	30
Choice of Hospitals	All healthcare providers	All healthcare providers
Premium(Baht/3 Months)	100	500
PLEASE TICK		

B ***Scenario 22***

	Insurance Plan A	Insurance Plan B
Average waiting time for OPD (min)	60	30
Choice of Hospitals	All healthcare providers	All public healthcare providers
Premium(Baht/Month)	300	100
PLEASE TICK		

B ***Scenario23***

Average waiting time for OPD (min)	Insurance Plan A	Insurance Plan B
Choice of Hospitals	30	30
Premium(Baht/Month)	All healthcare providers	All private healthcare providers
PLEASE TICK	500	300
Average waiting time for OPD (min)		

B

Scenario24

	Insurance Plan A	Insurance Plan B
Average waiting time for OPD (min)	15	60
Choice of Hospitals	All public healthcare providers	All public healthcare providers
Premium(Baht/Month)	300	300
PLEASE TICK		

B

Scenario25

Average waiting time for OPD (min)	Insurance Plan A	Insurance Plan B
Choice of Hospitals	30	60
Premium(Baht/Month)	All public healthcare providers	All healthcare providers
PLEASE TICK	100	100
Average waiting time for OPD (min)		

B

Scenario27

Average waiting time for OPD (min)	Insurance Plan A	Insurance Plan B
Choice of Hospitals	15	15
Premium(Baht/Month)	All private healthcare providers	All private healthcare providers
PLEASE TICK	500	100
Average waiting time for OPD (min)		

2.3 Block C

C ***Scenario 5***

	Insurance Plan A	Insurance Plan B
Average waiting time for OPD (min)	**30**	**60**
Choice of Hospitals	**All private healthcare providers**	**All public healthcare providers**
Premium(Baht/Month)	**500**	**100**
PLEASE TICK		

C ***Scenario 7***

	Insurance Plan A	Insurance Plan B
Average waiting time for OPD (min)	**30**	**30**
Choice of Hospitals	**All public healthcare providers**	**All healthcare providers**
Premium(Baht/Month)	**300**	**300**
PLEASE TICK		

C ***Scenario 8***

	Insurance Plan A	Insurance Plan B
Average waiting time for OPD (min)	**15**	**60**
Choice of Hospitals	**All private healthcare providers**	**All private healthcare providers**
Premium(Baht/Month)	**100**	**300**
PLEASE TICK		

C ***Scenario 9***

	Insurance Plan A	Insurance Plan B
Average waiting time for OPD (min)	**15**	**30**
Choice of Hospitals	**All public healthcare providers**	**All public healthcare providers**
Premium(Baht/Month)	**500**	**500**
PLEASE TICK		

C ***Scenario 11***

	Insurance Plan A	Insurance Plan B
Average waiting time for OPD (min)	**60**	**15**
Choice of Hospitals	**All healthcare providers**	**All public healthcare providers**
Premium(Baht/Month)	**500**	**300**
PLEASE TICK		

C ***Scenario12***

	Insurance Plan A	Insurance Plan B
Average waiting time for OPD (min)	**15**	**15**
Choice of Hospitals	**All healthcare providers**	**All healthcare providers**
Premium(Baht/Month)	**300**	**100**
PLEASE TICK		

C ***Scenario17***

	Insurance Plan A	Insurance Plan B
Average waiting time for OPD (min)	60	60
Choice of Hospitals	All private healthcare providers	All healthcare providers
Premium(Baht/Month)	300	500
PLEASE TICK		

C ***Scenario18***

	Insurance Plan A	Insurance Plan B
Average waiting time for OPD (min)	30	15
Choice of Hospitals	All healthcare providers	All private healthcare providers
Premium(Baht/Month)	100	500
PLEASE TICK		

C ***Scenario19***

	Insurance Plan A	Insurance Plan B
Average waiting time for OPD (min)	60	30
Choice of Hospitals	All public healthcare providers	All private healthcare providers
Premium(Baht/Month)	100	100
PLEASE TICK		

Appendix 2 Results of Pre-Testing

Table1: Socio-Economic Characteristics

		Repondents (100 households)
Gender	Female	48%
	Male	52%
Age (mean)		37.9
Income (mean in Baht)		3,972

Table2:Mean of All Descriptive Data in Each Group

Group	A	Note
Health Status	3.87 Fair	1 to 5 1=very poor 5=very good
Hospitalised in the last 12 months?	0.06%	% of "yes"
How many times have you been hospitalised in the last 12 months?	0.075	
How many times did you use the Gold card in the last 12 months?	0.085	
Any complementary health insurance?	0.06%	% of "yes"
Last month health expenditures?	150.5	
Preceding 5 months health expenditures?	386.82	
Any experiences of financial hardship for health care?	0%	% of "yes"
Any experiences of problems with paying health bills?	0%	% of "yes"
Any experiences of financial catastrophic?	0%	% of "yes"

Table3: Results from Logit Model Using STATA9

No. Of Observation=2700

		LR chi2(5)	= 1184.71
		Prob > chi2	= 0.0000
Log likelihood = -396.39478		Pseudo R2	= 0.5991

Choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Allpub	7.565698	.7046923	10.74	0.000	6.184527	8.94687
Allpri	6.663155	.6601628	10.09	0.000	5.369259	7.95705
AllHPs	9.228443	.7512861	12.28	0.000	7.755949	10.70094
WaitOPD	-.0300845	.0034406	-8.74	0.000	-.0368278	-.0233411
Premium	-.01056	.0009076	-11.64	0.000	-.0123389	-.0087811

The DCE pre-testing was conducted in 100 households in the areas group A (see chapter 7). Table1 shows that males who are the head of household have an average age between 37.9 years old. The proportion of males and females is 52% and 48% respectively. Respondents have an average household income Baht 3,972 ($A 132.4). Table 2 further shows that these respondents have fair to pretty good health status. Only a few respondents have been hospitalised in the last 12 months. The Gold Card has been used rarely.

Most of these respondents do not have any complementary health insurance. Health expenditures for the last month (September 2009) and the past five months are Baht 150.5 ($A 5) and Baht 386.82 ($A 13) respectively. None of the respondents have had experiences of financial hardship, problems with paying bills and financial catastrophic. This is largely because they rarely go to a hospital.

Table 3 shows that these respondents prefer to access all health care providers. If they have to choose between public and private health care providers, they prefer to access to all public health care providers than all private health care providers.

Most of respondents note that public health care providers are preferred because private health care providers are more expensive than public health care providers and there are more public than private health care providers in the area. The WTP calculation is not calculated here as this is only pre-testing and the sample is too small. However, according to coefficients (Table 3 Appendix 2), these respondents are willing to pay the most for accessing all health care providers, and more than they are willing to pay access provate health care providers.

References

ABAC Poll 2003, Survey of the Gold Card, ABAC University, Bangkok Thailand.

Adamowicz, W., Louviere, J. and Williams, M. 1994, 'Combining revealed and stated preference methods for valuing environmental amenities', *Journal of Environmental Economics and Management*, Vol.26, pp.271-292.

Ajay, M., Singh, J., Afridi, F., Lamba, V., Selvaraju, V. and Gumber, A. 2002, 'Who Benefits from Public Sector Health Spending? Results of a Benefit Incidence Analysis for India.', *National Council of Applied Economic Research*, New Delhi & World Bank, Washington DC.

Akal, A. and Harvey, R. 2001, *The role of health insurance and community financing in funding immunization in developing countries* [online], Available: http://www.gavialliance.org/resources/financing/Role_of_Insurance.pdf [2005, Dec 2].

Allegri, M., Sanon, M., Bridges, J. and Sauerborn, R. 2006, 'Understanding consumers' preferences and decision to enroll in community-based health insurance in rural West Africa', *Health Policy*, Mar, 76(1), pp.58-71.

Amaya-Amaya, M., Gerard, K. and Ryan, M. 2008, *Discrete Choice Experiments In a Nutshell*, In: Using Discrete Choice Experiment to Value Health and Health Care, edited by Bateman, I.J., Springer, Dordrecht, Netherlands.

Aronson, J. 1994, 'A pragmatic view of thematic analysis'. *The Qualitative Report*, Spring, Vol.2 (1).

Arrow, K.J. 1963, 'Uncertainty and Welfare Economics of Medical Care', *American Economic Review*, Vol.53, pp.73-941.

Balkrishnan, R., Byerly, W.G., Camacho, F.T., Shrestha, A. and Anderson. R.T. 2001, 'Effect of prescription benefit changes on medical care utilization in a Medicare HMO population', *American Journal of Managed Care* 7 (November), pp.1093-1100.

Bangkokbiznews 2009, [online], Available: http://www.bangkokbiznews.com/ [2009, Nov 7].

Becker, K. and Zweifel, P. 2007, *Age and Choice in Health Insurance: Evidence from Switzerland*, Working Paper no. 0410, University of Zurich, Switzerland.

Behavioural Research Group 2008, *Quantitative Research*, [online], Available: http://www.brg.ca/quantitative.htm [2008, Jan7].

Ben-Akiva, M. and Lerman, S. 1985, *Discrete Choice Analysis: Theory and Application to Travel Demand*, MIT Press, Cambridge, MA, U.S.A.

Bhushan, I. 1999, 'Financing Immunization Programs in the Asia and pacific Region: Issues and Option', *Asian Development Bank*, Conference paper, November 1999, Australia, Brisbane.

Binam, J., Nkama. A. and Nkendah, R. 2004, *Estimating the willingness to pay for community health prepayment schemes in rural area: A case study of the use of contingent valuation surveys in centre Cameroon*, [online], Available: http://www.csae.ox.ac.uk/conferences/2004-GPRaHDiA/papers/4h-Binam-CSAE2004.pdf [2006, July 24].

Binam, J., Nkama. A. and Nkendah, R. 2004, *Estimating the willingness to pay for community health prepayment schemes in rural area: A case study of the use of contingent valuation surveys in centre Cameroon*, [online], Available: http://www.csae.ox.ac.uk/conferences/2004-GPRaHDiA/papers/4h-Binam-CSAE2004.pdf [2006, July 25].

Bishop, R.C. 1982, 'Option Value: An Exposition and Extension', *Land Economics*, vol. 58(1), pp.1-15.

Blais, L., Boucher, J.M., Couture, J., Rahme, E. and LeLorier, J. 2001, 'Impact of a costsharing drug insurance plan on drug utilization among older people', *Journal of the American Geriatric Society* 49 (April), pp.410-14.

Breidert, C. 2005, *Estimation of willingness-to-pay - theory, measurement, and application*, Dissertation, Wirtschaftsuniversität Wien.

Breyer, F. 1991, *Distribution effects of coinsurance options in social health insurance systems*, In: Lopez-Casasnovas G(ed) Incentives in health systems, Springer, New York.

Birch, S. And Donalson, C. 2003, 'Valuing the benefits and costs of health care programmes: where's the extra in extra-welfarism?' Soc Sci Med., 36(5), Mar, pp.1121-1133.

Bryan, S. and Roberts, T. 2008, *Preferences for Health Care Programmes: Result form a general population discrete choice survey*, edited by Bateman, I.J., Springer, Dordrecht, Netherlands.

Burgess, L. and Street, D.J. 2003, 'Optimal designs for 2k choice experiment', *Communication in Statistics-Theory and Methods*, Vol.32, pp.2185-2206.

Burns, C.M. 2000a, 'Navigation strategies with ecological displays', *International Journal of Human-Computer Studies*, 52, pp. 111-129.

Busch, S. H., Tracy A. F., Noelia D., Mireia J.B., Stephanie S. ,'Value to Smokers of Improved Cessation Products: Evidence From a Willingness-to-Pay Survey', *Nicotine & Tobacco Research*, Vol.6(4), pp. 631-639.

Busse, R. 2002, *Health care systems in eight countries: trends and challenges, The London School of Economics & Political Science*, London.

Butler, J. and Moffit, R. 1982, 'A computationally efficient quadrature procedure for the one-factor multinomial probit model', *Econometrica*, Vol. 50, pp.761-764.

Butler, R.J. and Worall, D. 1990, 'Economic Determinants of Workers' Compensation Trends', *Journal of Risk and Insurance*, Vol. 61, issue 3, pp. 383-401.

Butler, R.J., Hartwing, RP. and Gardner, H. 1996, 'HMOs, moral hazard and cost shifting in workers' compensation', *Journal of Health Economics*, Vol. 16, pp. 191-206.

Byrns, R. 2006, *Ability to Pay Principle of Taxation* [Online], Available: http://www.unc.edu/depts/econ/byrns_web/Economicae/Figures/A2Pay.htm [2006, Jan 4].

Cameron, T.A. 1988, 'A New Paradigm for Valuing Non-Market Goods Using Referendum Data: Maximum Likelihood Estimation by Censored Logistic Regression', *Journal of Environmental Economics and Management*, Vol. 15(3), pp. 355-379.

Carrin, R. and James, C. 2004, *Reaching universal coverage via social health insurance: key design features in the transition period*, WHO, Geneva.

Cavana, R., Delahaye, B. and Sekaran, U. 2001, *Applied Business Research: Qualitative and Quantitative Methods*, Markono Print Media Pte Ltd, Singapore.

Cawley, J. 2006, *Contingent Valuation Analysis of Willingness to Pay to Reduce Childhood Obesity*, NBER, Cambridge, U.K.

Chanduaywit, V. 2006, *Additional sources of financing for the UC*, HISRO, Nonthaburi, Thailand.

Criel, B. and Van Dormael, M. 1999, 'Mutual health organization in Africa and social health insurance systems: Will European history repeat itself?' *Tropical Medicine and International Health*, 4(3), pp. 155-159.

Criel, B., Waelkens, M-P., and Soors, W. 2009, Community Health Insurance in developing countries, in Health systems policy, finance, and organization edited by Carrin, G., WHO.

Christie, B. 2004, 'Tuition Fees, Student Finance and Access an Economist's Perspective', *University of Regina*, December, 2004, pp.3.

Christian A. V., Robert G. Ethier, Gregory L. Poe, Michael P. Welsh 2003, 'Payment certainty in discrete choice contingent valuation responses: results from a field validity test', *Southern Economic Journal*, Vol.69 (4), pp.886-902.

Christophe, J. and Marette, S. 2000, 'Accounting for Consumers' Preferences in International Trade Rules' , *Incorporating Science, Economics, and Sociology in Developing Sanitary and Phytosanitary Standards in International Trade: Proceedings of a Conference (2000)*, p.188.

Chunharas, S. 2002, *Health Insurance Systems in Thailand*, HSRI, Nonthaburi, Thailand.

Conn, C. and Walford, V. 1998, *An Introduction to Health Insurance for Low Income Countries*, Health Systems Resource Center. U.K.

Cookson, R. 2003, "Willingness to pay methods in health care: a sceptical view", *Health Economics*, vol. 12, no. 11, pp. 891-894.

Costales, R. 1995, *The Economic Dimension of EIA in the Transition From A Centrally Planned Economy to A Truly Participative Market Based Economic System*, Conference Program, ASCE 1995.

Costa-Font, J., Gemmill, M. and Rubert, G. 2009, Re-visiting the health care luxury good hypothesis: Aggregation, precision, and publication biases?, Working Paper no.09/02, HEDG, York.

Creeses, A. and Bennett, S. 1997, 'Rural Risk-Sharing Strategies', *Innovations in Health Care Financing*, Paper no. 365, World Bank, Washington D.C.

CSMBS, 2007, Report of CSMBS, [online], Available: www.cgd.go.th *[2007, May 5].*

Culyer, A.J. 1991, *Providing Health Care*, Oxford University Press, Oxford, England.

Culyer, A.J. and Wagstaff, A. 1993, 'Equity and Equality in Health and Health Care', *Journal of Health Economics*, Vol. 12, pp. 431-457.

Culyer, A.J. and Newhouse, J.P. 2000, Handbook of Health Economics, Vol.1A, Elsevier Science, B.V., Amsterdam, The Netherland.

Danzon, P.M. 1992. 'Hidden overhead costs: Is Canada's system really less expensive?' *Health Affairs*, Spring, pp. 21-43.

Desvousges, W.H., Johnson, F.R., Dunford, R.W., Hudson, S.P., and Wilson, K.N. 1993, 'Measuring natural resource damages with contingent valuation: tests of validity and reliability', *Contingent Valuation – A Critical Assessment, North-Holland, Amsterdam*, pp. 91-164.

Dey, A. and Mukerjee, R. 1999, *Fractional Factorial Designs*, Wiley, New York, U.S.A.

Diener, A., O' Brien, B. and Gafni, A. 1998, 'Health care contingent valuation studies: a review and classification of the literature.' *Health Economics*, Vol. 7 (4), pp.313-326.

Dixon, A. and Robinson, R. 2002*, Health care systems in eight countries: trends and challenges, The London School of Economics & Political Science*, London.

Donald, W., Norman, D. and Ronald , L. 1996, *Benchmarks of Fairness For Health care Reform*, Oxford University Press, New York, U.S.A.

Donaldson, C. and Gerard, K. 1993, *Economic of Health Care Financing*, Ch. 10, Mcmillan Press, London U.K.

Donaldson, C., Gerard, K., Mitton, C., Jan, s. and Wiseman, v. 2004, E*conomics of Health Care Financing: The Visible Hand*, 2nd edition, Ch.5, Macmillan, London.

Donaldson, C., Helen M., and Shackley, P. 2006, 'Contingent Valuation in Health Care', *In The Elgar Companion to Health Economics*, Andrew M. Jones(editor), Edward Elgar, Northampton, England.

Donaldson, D. 1999, *Report on Health Financing Reform in Thailand*, HSRI, Nonthaburi, Thailand.

Dong, H., Kouyate, B. Cairns, J. and Sauerborn, R. 2005, 'Inequality in Willingness-to-pay for community-based health insurance', *Health Policy*, Vol. 72, Issue 2, May 2005, pp. 149-156.

Dong H, Kouyate B, Cairns J, Mugisha F, Sauerborn R 2006, 'Willingness-to-pay for community-based insurance in Burkina Faso', *Health Econ*, Issue12, pp.849-862.

Drolet, A.L., Simonsom, I. and Tversky, A. 2000, 'Indifference curves that travel with the choice set', *Marketing letters*, Vol.11, pp.199-209.

Dror,D., Radermacher, R. and Koren, R. 2007, 'Willingness to pay for health insurance among rural and poor persons: Field evidence from seven micro health insurance units in India', *Health Policy*, Vol.82,pp.12-27.

Eaton, B.C, and Eaton, D. F. 2002, *Micro Economics*, 5 edition, Ch. 16, Prentice Hall, U.S.A.

Eldis, 2006, *Social Health Insurance* [online], Available: http://www.eldis.org/healthsystems/shi/index.htm [2006, June 10].

Ernst and Young, 2003, 'Health Care Systems and Health Market Reform in the G20 Countries', *World Economic Forum*, January 3, 2006.

Evans, R. 1984, *The Economics of Canadian*, Butterworth & Co. (Canada) Ltd., Canada.

Farrar, S., Ryan, M., Ross, D., and Ludbrook, A. 2000, 'Using discrete choice modelling in priority setting: an application to clinical service developments', *Social Science & Medicine*, Vol. 50, pp. 63-75.

Fiebig, D., Louviere, J. and Waldman,D. 2005, *Contemporary issues in modeling discrete choice experiment data in health economics*, Working paper, University of New South Wales, New South Wales, Australia.

Finkelstein, E. A., Brown, D.S., Avidor, Y. and Takeuchi, A.H. 2005, 'The Role of Price, Sociodemographic Factors, and Health in the Demand for Bariatric Surgery', *American Journal of Managed Care*, Vol. 11(10), pp. 630-637.

Folland, S., Goodman, A. and Stano, M. 2001, *The Economics of Health and Health Care*, Prentice-Hall, Inc, New Jersey, U.S.A.

Foster, V. and Mourato, S. 2002, 'Testing for consistency in contingent ranking experiment', *Journal of Environmental Economics and Management*, Vol.44, pp.302-328.

Freeman, A.M. 1984b, 'The Quasi-Option Value of Irreversible Development', *Land Economics*, vol. 60(1), pp.1-13.

Freeman, A.M. 1985, 'Supply Uncertainty, Option Price, and Option Value', *Land Economics*, vol. 61(2), pp.176-181.

Freeman, A.M. 1989, 'Ex Ante and Ex Post Values for Changes in risks', *Risk Analysis*, Vol.9 (3), pp. 309-317.

Freeman, A.M. 2003*, The measurement of Environmental and Resource Values: Theory and Methods*, 2nd edition, Resources for the Future, Washington, DC.

Gafni, A. 1991, 'Willingness-to-pay as a measure of benefits', *Relevant questions in the context of public decision making about health care programs*, Vol.29, pp.1246-1252.

Gerard, K., Ryan, M. and Amaya-Amaya, M. 2008, *Discrete Choice Experiments In a Nutshell*, In: Using Discrete Choice Experiments to Value Health and Health Care, edited by Bateman, I.J., Springer, Dordrecht, Netherlands.

Gertler, P.J. 1998, 'On the Road to Social Health Insurance: the Asian Experience', *World Development*, Vol.26, No.4, pp.717-732.

Getzen, T. 2004, *Health Economics: Fundamentals and Flows of Fund*, 2nd edition, Hamilton Printing, U.S.A.

Gladwell, M. 2005, *The Moral-Hazard Myth: The bad idea behind our failed health-care system* [online], Available: http://www.newyorker.com/archive/2005/08/29/050829fa_fact. [2006, May 10].

Gordis, L. 1988, *Epidemiology and Health Risk Assessment*, Oxford University Press, U.K.

Gosden, T., Forland, F., Kristiansen, I.S., Sutton, M., Leese, B., Giuffrida, A., Sergison, M. and Pedersen, L. 2000, *Capitation, salary, fee-for-service and mixed systems of payment: effects on the behaviour of primary care physicians (review)*, Issue 3, John Wiley&Sons, Ltd,

Gottret, P. and Schieber, G. 2006, *Health Financing Revisited: A Practioner's Guide*, The World Bank, Washington D.C., U.S.A.

Graham, D.A. 1981, 'Cost-Benefit Analysis under uncertainty', *American Economic Review*, Vol. 71(4), pp.715-725.

Grossman, M. 2000, The human capital model. In Culyer, A.J. and Newhouse, J.P. (eds), Hand book of Health Economics, vol. 1a. Amsterdam: North-Holland.

Hajivassiliou,V., McFadden,D. and Ruud,P. 1996, 'Simulation of multivariate normal rectangle probabilities and their derivatives: theoretical and computational results', *Journal of Econometrics*, Vol.72, pp,85-134.

Hanemann, W.M. 1982, *Applied welfare Analysis with qualitative response models*, working paper no. 241, Department of Agriculture and Resource Economics, University of California, Berkeley, U.S.A.

Hanemann, M.W. 1983, 'Marginal welfare measures for discrete choice models', *Economics Letter*, vol.13, pp. 129-136.

Hanemann, W.M. 1984, 'Welfare Evaluations in Contingent Valuation Experiments with Discrete Responds', *American Journal of Agricultural Economics*, Vol. 71(4), pp. 1057-1061.

Hanley, N., Wright, R. E., & Adamowicz, V. 1998, "Using choice experiments to value the environment – Design issues, current experience and future prospects", *Environmental & Resource Economics*, vol. 11, no. 3-4, pp. 413-428.

Hausman, J. and McFadden, D., 1984, 'Specification tests for the multinomial logit model', *Econometrica*, Vol.52, pp. 1219-1240.

Haneman, W.M. and Kaninen, B. 1999, *The Statistical Analysis of Discrete-Response CV data*. In valuing Environmental Preferences: Theory and Practice of the Contingent Valuation Method in the US, EU, and Developing Countries, edited by Bateman, I.J. and Wills, K.G., Oxford Press, U.K.

Healy, J. 2002, *Health care systems in eight countries: trends and challenges,* The London School of Economics & Political Science, London.

Helms, J., Newhouse, J., Phelps, C., **'**Copayments and Demand for Medical Care: The California Medicaid Experience**',** *The Bell Journal of Economics*, Vol. 9, No. 1 (Spring, 1978), pp. 192-208.

Hencher, D.A., Rose, J.M. and Greene, W.H. 2006, *Applied Choice Analysis: A Primer*, Cambridge University Press, Cambridge, U.K.

Hensher, D.A. and Green , W. 2003a, 'The mixed logit model: the state of practice', *Transportation*, Vol. 30(2), pp.133-176.

Hicks, J.R. 1939, 'The foundations of welfare economics', *Economic Journal*, vol.49, pp.694-721.

HISRO 2006, *Report of UC*, [online], Available: www.hisro.or.th *[2006, Jan 12].*

HISRO 2007, *Report of UC*, [online], Available: www.hisro.or.th *[2007, Feb 9].*

HSRI 2000, *Preliminary results of the evaluation of the 1999 National Essential Drug List*, HSRI, Nonthaburi, Thailand.

HSRI 2002, *Health Insurance System in Thailand*, HSRI, Nonthaburi, Thailand.

HSRI 2005, *Evaluation of Universal Health Insurance in Thailand 2005*, HSRI, Nonthaburi, Thailand.

HSRI 2006, *Evaluation of Universal Health Insurance in Thailand 2006*, HSRI, Nonthaburi, Thailand.

HSRI 2007, *Evaluation of Universal Health Insurance in Thailand 2007*, HSRI, Nonthaburi, Thailand.

Huber, J. and Zwerina, K. 1996, 'The importance of utility balance in efficient choice designs', *Journal of Marketing research*, Vol.33, pp.307-317.

Huges, G. 1987, *The Incidence of Fuel Taxes: A Comparative Study of Three Countries,* Oxford Press, New York, U.S.A.

ILO 2004, *Publication and Research*, [online], Available: www.ilo.org [2004, Nov 27].

Inza, M., Ryan, M. and Amaya-Amaya,M. 2008, *Irrational' Stated Preferences*, In: Using Discrete Choice Experiment to Value Health and Health Care, edited by Bateman, I.J., Springer, Dordrecht, Netherlands.

Itivaleekul , S. 2002, *Social Security Scheme: Experiences of capitation payment system*, HSRI, Nonthaburi, Thailand.

Jehle, A. and Reny, P. 2001, *Advanced Microeconomic Theory*, 2nd ed., Addison Wesley Longman, New York, U.S.A.

Jindawattana, A. and Pipatrojanakamol, S. 2004, *Does 30 Baht for all disease is Universal Coverage?*, Sangserm, Bangkok.

Johnson, R. E., Goodman, M. J., Hornbrook M. C., and Eldredge , M. B. 1997, 'The impact of increasing patient prescription drug cost sharing on therapeutic classes of drugs received and on the health status of elderly HMO members', *Health Services Research* 32 (April), pp. 103-22.

Jones Lee, M. & Loomes, G. 1994, "Towards A Willingness-To-Pay Based Value of Underground Safety", *Journal of Transport Economics and Policy*, vol. 28, no. 1, pp. 83-98.

Jorgensen, B. S., Syme, G. J., Smith, L. M., & Bishop, B. J. 2001, "Random error in willingness to pay measurement: A multiple indicators, latent variable approach to the reliability of contingent values", *Journal of Economic Psychology*, vol. 25, no. 1, pp. 41-59.

Jutting, J. 2004, 'Do community-based Health Insurance Schemes Improve Poor People's Access to health care? Evidence From Rural Senegal', World Development, Vol.32, No.2, pp. 273-288.

Kielhorn, A. And Schulenburg, J.M. 2000, *The health economics handbook*, 2nd ed., Adis International Limited, England

Lancaster, K. 1966, 'A new approach to consumer theory', *Journal of Political Economy*, Vol.74, pp.132-157.

Lancaster, K. 1971, *Consumer demand: A New Approach,* Columbia University Press, New York, U.S.A.

Lancsar, E. and Louviere,J.J. 2006, 'Deleting 'irrational' responses from discrete choice experiment: a case of investigating or imposing preferences?', *Health economics*, Vol.15(8), pp. 797-811.

Larissa, R., Ubach, C., Donaldson, C. and Ryan, M. 2004, 'Valuing the Benefits of Weight Loss Programs: An Application of the Discrete Choice Experiment', *Obesity Research*, Vol. 12(8), pp. 1342-1351.

Limwattananon, S., Tangcharoensathien,V. and Prakongsai, P. 2005, *Equity in financing health care: impact of universal access to health care in Thailand*, International Health Policy Program, MOPH, Nonthaburi, Thailand.

Louviere, J.J. 2000, *Why Stated Preference Discrete Choice Modeling is NOT Conjoint Analysis (and what SPDCM IS)*, Arbeitspapier, Memetrics, Sydney.

Louviere, J.J. 2001, *Choice experiment: an overview of concepts and issues*, In: The Choice Modeling Approach to Environmental Valuation, edited by Bennett, J. and Blamey, R, Edward Elgar, Northampton, England.

Liu, Y., Rao, K. And Hu, S. 2002, *People Republic of China: Toward Establishing a Rural Health Protection System*, Asian Development Bank, Manila, Philippines.

Magid, D. J., Koepsell, T.D., Every, N. R., Martin, J. S., Siscovick, D. S., Wagner, E. H. and Weaver, W. D. 1997, 'Absence of association between insurance co-payments and delays in seeking emergency care among patients with myocardial infarction', *New England Journal of Medicine* 336 (June), pp. 1722-29.
Manski, C. 1977, 'The Structure of random utility models', *Theory and Decision*, Vol.8, pp. 39-254.

Martin, S. Rice, N. and Smith, P. 1998, 'Risk and the general practitioner budget holder', *Social Science & Medicine*, Vol. 47, pp. 1547-1554.

McConnell, C. and Brue, S. 2006, *Economics*, 17 Edition, Ch. 2, McGraw-Hill/Irwin, New York, U.S.A.

McFadden, D. 1973, *Conditional Logit Analysis of Discrete Choice Behavior, In Frontiers of Econometrics*, edited by Zarembka, P. Academic Press, New York, U.S.A.

McFadden, D. 1974, *Conditional logit analysis of qualitative choice behaviour, Frontiers in Econometrics*, edited by Zarembka, P., Academic Press, New York, U.S.A.

McFadden, D. 1978, *Modeling the choice of residential location*, In: Spatial Interaction Theory and Planning Models, edited by Karlqvist, A., Lundqvist L., Snickars, F. and Weibull, J., Amsterdam, North Holland.

McFadden,D. 1986, 'The Choice Theory Approach to Market Research', *Marketing Science*, Vol. 5(4), pp. 275-297.

McGuire, T. 2001, *Handbook of Health Economics*, Vol. 1A, Elsevier B.V., Amsterdam, Holland.

Mitchell, R.C. and Carson, R. 1989, *Using Surveys to Value Public Goods: the Contingent Valuation Method*, RFF Press, Washington D.C., pp. 240.

Mongkolsmai, D., Satsanguan, P., Khoman, S. 1998, *Health insurance for the urban poor: the case of slum dwellers in Bangkok,* Thummasat University Press, Bangkok, Thailand.

Mooney, G. 1994, *Key Issues in Health Economics*, Harvester Wheatsheaf, New York and London

Mooney, G. and Russell, E. 2003*, Advances in Health Economics*, Wiley, London, England.

Mooney, G. 2003, *Economics, Medicine and Health Care*, 3rd ed., Prentice Hall, London, U.K.

Morey, E. & Rossmann, K.G. 2003, 'Using Stated-Preference Questions to Investigate Variations in Willingness to Pay for Preserving Marble Monuments: Classic Heterogeneity, Random Parameters, and Mixture Models', *Journal of Cultural Economics*, Springer, vol. 27(3), pages 215-229.

Morris, S., Devlin, N. and Parkin. D. 2007, *Economic Analysis in health care*, John Wiley&Son, Ltd, Glasgow, U.K.

Na Ranong, V. 2006, 'Additional fund for UC', *Universal Coverage Digest*, Vol.1, Jan 2006, pp. 94-97.

Narbro, K., and Lars S., 2000, 'Willingness to Pay for Obesity Treatment', International Journal of Technology Assessment in Health Care, Vol. 16(1), pp.50-59.

Newhouse, J. 1995, *Free For All*, Harvard University Press, Cambridge.

Newhouse, J. 1996, *Free For All? Lessons from the RAND Health Insurance Experiment*, Harvard University Press, U.S.A.

NHSO 2002, *The report of health insurance for Thai between 1997-2001*, NHSO, Nonthaburi, Thailand.

NHSO 2008, *The report of the Gold Card scheme 2007*, NHSO, Nonthaburi, Thailand.

NHSO 2009, *The report of the Gold Card scheme 2008*, NHSO, Nonthaburi, Thailand.

NICHSR 2007, *Module 3: Identification and Retrieval of Published Health Economic Evaluation Studies* [online]. Available: http://www.nlm.nih.gov/nichsr/edu/healthecon/03_he_01.html [2007, July 20].

Nitayarumphong, S., Pannarunothai, S. and Srithamrongsawat, S. 2000, *Toward development of universal coverage of health insurance*, The Office of Health Care Reform Project, Nonthaburi, Thailand.

NSO 2005, *National Statistical*, [online], Available: http://web.nso.go.th/index.htm [2005, Oct 23].

NSO 2007, *National Statistical*, [online], Available: http://web.nso.go.th/index.htm [2007, Apl 17].

NSO 2009, *National Statistical*, [online], Available: http://web.nso.go.th/index.htm [2009, May 12].

O'Malley, S. and Sindelar., J. 2004,'Value to Smokers of Improved Cessation Products: Evidence From a Willingness-to-Pay Survey', *Nicotine & Tobacco Research*, Vol.6(4), pp. 631-639.

Olsen, J.A., Kidholm, K., Donaldson, C., and Shackley, P. 2004, 'Willingness to pay for public health care: a comparison of two approaches', *Health Policy*, Vo.17, Issue 2, pp. 217-228.

Osterkamp, R. 2003, 'Public health insurance: Pareto-efficient allocative improvements through differentiated copayment rates', *Eur J Health Economics*, vol. 2, pp.79-84.

Ostrom, E. 1998, *The Comparative Study Of Public Economies*, Memphis, TN, U.S.A.

Pannarunothai, S. and Renburge, C. 1998, *Equity in access to health care: using concentration index*, MOPH, Nonthaburi, Thailand.

Pantanarakuan, P. and Pannitamai, V. 2007, 'The reform of the MoPH: An Alternative', *Universal Coverage Digest*, Vol.1, Jan-Apl 2007, pp. 6-14.

Patamasiriwat ,D. 2005, 'The decentralisation in Thailand: Achievement and Problems', *Thammasat Econ* , Thammasat University Press, Bangkok, Thailand.

Pauly, M.1968, 'The Economics of Moral Hazard. Comment'. *The American Economic Review*, Vol. 58 (1968), pp. 531- 537.

Pauly, M., Danzon, P., Feldstein, P., and Hoff, J. 1991, 'A plan for 'Responsible National Health Insurance'', *Health Affair*, Spring 1991, pp. 5-21.

Pauly, M. 2003, 'Should We Be Worried About High Real Medical Spending Growth in The United States?', *Health Affairs*, Web Exclusive, pp. w3-15-W3-17.

Pesky, J. 1992, 'Retrospective:Pareto's law', *Journal of Economics Perspectives*, vol.6, pp. 181-192.

Phelps, C.E. 2003, *Health Economics*, 3rd edition, Pearson Education, Inc., U.S.A.

Pilote, L., Beck, C., Richard, H. and Eisenberg, M.J. 2002, 'The effects of cost-sharing on essential drug prescriptions, utilization of medical care and outcomes after acute myocardial infarction in elderly patients', *Canadian Medical Association Journal* 167 (August), pp.246-52.

Pitayarangsarit, S., Tangcharoensathien, V. and Aniwan, S. 2000, The *Evaluation of the health care expenditure in the reform of the CSMBS*, HSRI, Nonthaburi, Thailand.

Pitayarangsarit, S. 2005, *From Policy to Implementation: Historical event during 2001-2004 of universal coverage in Thailand*, Ch.4, Ministry of Public Health, Nonthaburi, Thailand.

Pitayarangsarit, S., Jonggudomsuk,P., Sakulpanich, T., Singhapan, S. and Homhual,
P. 2005, *From Policy to Implementation: Historical event during 2001-2004 of universal coverage in Thailand*, Ch.2, International Health Policy Program, Nonthaburi, Thailand.

Polgar, S. and Thomas, S.A. 2000, *Introduction to research in the health sciences*, 4th ed., Churchill Livingstone, Edinburgh, U.K.

Powell, M. And Anesaki, M. 1990, *Health care in Japan*, London, Routledge.

Puig-Junoy,J., Saez,M., Martinez-Garcia, E. 1998, 'Why do patients prefer hospital emergency visits? A nested multinomial logit analysis for patient-initiated contacts', *Health Care Management Science*, Vol. 1(1), pp. 39-52.

Rawiwong, W. 2000, *The Characteristics of Problem on Health Service Utilization under different Health Insurance Schemes*, HSRI, Nonthaburi, Thailand.

Rice, T. 2003, *The Economics of Health Reconsidered,* 2nd ed., Health Administration Press, Chicago, U.S.A.

Rice, T. and Matsuoka, K. 2004, 'the impact of cost-sharing on appropriate utilization and health status: a review of the literature on seniors.' *Medical Care Research and Review*, 61(4) December 2004, pp. 415-452.

Riedesel, P. 2001, *Choice Analysis*, [online], Available: http://www.action-research.com/compare.htm [2002, Dec 20].

Roemer, M.I., Hopkins, C.E. et al. 1975, 'Copayments for ambulatory care: penny-wise and pound-foolish', *Medical Care*, Vol. 22(3), pp.457-466.

Rose, J. and Bliemer, M. 2004,*The design of stated choice experiment: the state of the practice and future challenges Institute Transport and Logistics Studies*,[online], Available: http://www.bts.gov/publications/journal_of_transportation_and_statistics/volume_08_number_02/html/paper_02/index.html [2007, July 15].

Rose, J. and Bliemer, M. 2004, *The design of stated choice experiments: the state of the practice and future challenges Institute Transport and Logistics Studies*, Working Paper
04-09.

Rosen, S. 2007, *Seth's Farewell Commencement Address*, [online], Available: http://www.bcemba07.org/archives/16 [2007, March 2].

Ryan, M. and Farrar, S. 1994, *A Pilot study using conjoint analysis to establish the views of users in the provision of orthodontic services in Grampian*, Health Economics Research Unit Discussion Paper No. 07/94, University of Aberdeen, Aberdeen, England.

Ryan, M. and Farrar, S. 2000, 'Using conjoint analysis to elicit preferences for health care', *BMJ*, Vol.320, June 2000.

Ryan, M., Bate, A., Eastmond, C.J. and Ludbrook, A. 2001, 'Use of discrete choice experiments to elicit preferences', *Quality in Health Care 2001*, Vol. 10, pp. i55-i60.

Ryan, M. and Gerard, K. 2003, 'Using discrete choice experiment to value health care programmes: current practice and future research reflections', *Applied Health Economics and Health Policy*, Vol.2(1), pp. 55-64.

Ryan, M. 2004, 'Discrete choice experiments in health care', *BMJ*, Vol. 328, pp.382.

Ryan, M., Diack, J.M., Watson,V. and Smith, N. 2005, *Rapid prenatal diagnostic testing for Down syndrome only or longer wait for full karyotype: the views of pregnant women*, Prenatal Diagnosis, Vol.25, pp. 1206-1211.

Ryan, M., Gerard, K. and Amaya-Amaya, M. 2008, *Discrete Choice Experiments In a Nutshell*, In: Using Discrete Choice Experiments to Value Health and Health Care, edited by Bateman, I.J., Springer, Dordrecht, Netherlands.

Ryan, M. & Hughes, J. 1997, "Using conjoint analysis to assess women's preferences for miscarriage management", *Health Economics*, vol. 6, no. 3, pp. 261-273.

Salkeld, G., Ryan, M., & Short, L. 2000, "The veil of experience. Do consumers prefer what they know best?", *Health Economics*, vol. 9, no. 3, pp. 267-270.

Scott, A. & Vick, S. 1999, "Patients, doctors and contracts: An application of principal-agent theory to the doctor-patient relationship", *Scottish Journal of Political Economy*, vol. 46, no. 2, pp. 111-134.

Sekhri, K. and Savedoff, W. 2005, 'Private health insurance: implications for developing countries', *Bulletin of the World Health Organization*, vol. 83, Issue 2, pp. 127-134.

Sen, A. 1970, *Collective Choice and Social Welfare*, Amsterdam, North Holland.

Sen, A. 1992, *Inequality revisited*. Cambridge MA: Harvard University Press, U.S.A.

Sen, A. 2001, Economic Progress and Health. In D. Leon & G. Walt (Eds.), *Poverty, Inequality and Health: An International Perspective*. Oxford University Press, Oxford,
pp. 333-345.

Sennhauser, M. and Zweifel. P. 2009, *A Pharmaceutical Innovation: Is it Wirth the Money? Whose Money?*, University of Zurich Press, Zurich, Switzerland.

Severin V.C., Burgess L., Louviere T., Street D.J., 2004. Comparing statistical efficiency and respondent efficiency in *choice experiments*, *Research Report*, Department of Mathematical Sciences, University of Technology, Sydney,. Australia

SHADAC 2001, *Why Surveying 'Willingness to Pay' is Difficult?* [Online], Available: http://www.sph.umn.edu/img/assets/18528/SurveyWillingnessToPay.pdf [2006, Feb 25].

Shiell, A. and Gold, L. 2002, 'Contingent valuation in health care and the persistence of embedding effects without the warm glow', *Journal of Economic Psychology*, vol. 23, pp. 251-262.

Siamwalla, A. 2002, *Reform of Health Insurance Systems in Thailand*, HSRI, Nonthaburi, Thailand.

Skjoldborg, U. S. & Gyrd-Hansen, D. 2003, "Conjoint analysis. The cost variable: an Achilles'heel?", *Health Economics*, vol. 12, no. 6, pp. 479-491

Smith, B.A. 1992, 'Health insurance in developing countries: Lessons from experience', *Health Policy and Planning*, Vol. 7(3), pp. 215-226.

Smith, C. and Witter, S. 2004, *Risk Pooling in Health Care Financing: The implications for Health System Performance,* World Bank, Washington D.C., U.S.A.

Smith, R. 1997, *Contingent Valuation: Indiscretion in the Adoption of Discrete Choice Question Formats?*, Working paper 74, CHPE.

Smith, V.K. 1983, 'Option Value: A Conceptual Overview', *Southern Economic Journal*, vol. 49(3), pp.654-668.

Spechler, M.C. 2000, *Economics and Security: Comments and a Suggested Framework*[Online],Available
:http://www.nato.int/docu/colloq/1999/pdf/264-268.pdf
[2006,Jan 14].

Srianant, N. 2002, *The System of the CSMBS*, HSRI, Nonthaburi, Thailand.

Sriratanaban , J. 2001, *Health Insurance System in Thailand*, NHSO, Nonthaburi, Thailand.

Sriratanaban , J. 2006, 'Quality for All Thais' , *Universal Coverage Digest*, Vol.1, Jan 2006, pp. 55-67.

Srithamrongsawat, S. 2002, *Health Insurance System in Thailand*, NHSO, Nonthaburi, Thailand.

Srithamrongsawat, S. and Torwatanakikul, S. 2005, 'Implementation of Universal Coverage in Thailand', *Journal of Health care System*, Vol.1 (1), pp.47-62.

Srithamrongsawat, S. 2007, 'Cancellation of 30 Baht Co-Payment', *Universal Coverage Digest*, Vol.2, Jan 2007, pp.121-131.

SSO 2007*, Social Security Office,* [online], *Available:* http://www.sso.go.th *[2007, May 8].*

SSO 2008*, Social Security Office,* [online], *Available:* http://www.sso.go.th *[2008, Sep 21].*

Stalhammar, N.O. 1996, 'An empirical note on willingness to pay and starting point bias', *Medical decision Making*, Vol. 16, pp. 247.

Street, D.J.,Burgess, L., Viney, R. and Louviere, J. 2008, *Discrete Choice Experiments In a Nutshell*, In: Using Discrete Choice Experiment to Value Health and Health Care, edited by Bateman, I.J., Springer, Dordrecht, Netherlands.

Stat Trek 2011, *Statistics tutorial* [Online], Available: http://stattrek.com/lesson6/cls.aspx [2011, Aug 30].

Stuart, B., and C. Zacker. 1999, 'Who bears the burden of Medicaid drug co-payment policies?', *Health Affairs* 18 (March/April), pp. 201-12.

Suan Dusit Poll 2004*, Survey of the Gold Card, Suan Dusit University, Bangkok, Thailand.*

Suraratdecha C., Saithanu, S. and Tangcharoensathein, V. 2004, 'Is universal coverage a solution for disparities in health care?: Finding from three low-income provinces of Thailand', *Health Policy* , Vol. 73, Issue 3, pp. 272-284.

Supakankunti, S. 2001, 'Future Prospects of Voluntary Health Insurance in Thailand', Health Policy and Planning, Vol. 15(1), pp. 85-94.

Tamblyn, R. 2001, 'The impact of pharmacotherapy policy: A case study', *Canadian Journal of Clinical Pharmacology* 8 (Fall Supplement), pp. 39A-44A.

Tangcharoensathien, V., Pitayarangsarit, S. and Aniwan, S. 1999, *The report of the CSMBS: The expenditures*, HSRI, Nonthaburi, Thailand.

Tangcharoensathien, V., Pitayarangsarit, S. and Aniwan, S. 2000, *The report of the CSMBS: The expenditures*, HSRI, Nonthaburi, Thailand.

Tangcharoensathien, V., Srithamrongsawat, S., Pitayarangsarit, S. 2002, *Health Insurance System in Thailand*, NHSO, Nonthaburi, Thailand.

Tangcharoensathien, V., Kasemsup, V., Supaporn,T., Teerawattananon, Y. 2005, *Universal Access to Renal Replacement Therapy in Thailand: A Policy Analysis*, Research report, International Health Program, MOPH, Nonthaburi, Thailand.

TDRI 2001, *The Monitoring and Evaluation of Universal Health Coverage in Thailand*, First Phase 2001/2002, TDRI, Bangkok, Thailand.

Telser, H. and Zweifel, P., *Validity of Discrete-Choice Experiments Evidence for Health Reduction*, Working paper No. 0313, Zurich University Press, Zurich, Switzerland.

Thammaroj, N.2007, *Overview of the CSMBS*, HSRI, Nonthaburi, Thailand.

Thammatach, A. and Jongudomsuk, P. 2004, *Organization and management*, Ch.3, NHSO, Nonthaburi, Thailand.

Thurstone, L.L. 1927, 'A law of comparative judgment', *Psychological Review*, Vol. 34, pp.273-286.

Train, K. 2003, *Discrete Choice Methods with Simulation*, Cambridge University Press, Cambridge, U.S.A.

Tobin, J. 1970, 'On limiting the domain of inequality', *Journal of Law and Economics*, Vol. 13(2), pp. 263-277.

Van Doorslaer, E. and Masseria, C. 2004, 'Income-related Inequality in the Use of Medical Care in 21 OECD countries', *Improving Health System Performance in OECD countries*, pp.109-137.

Viscusi, W.K. 2004, 'The Value of life: estimates with risks by occupation and industry', *Economic Inquiry*, Vol.42, pp.29-48.

Voeth, P.W., and Hahn,C., 1998, 'Limit Conjoint Analyse', *Marketing Zeitschrift fur Forschung and Praxis (ZFP)*, Issue 2.

Waelkens, M-P., Soors, W. and Criel, B. 2005, *Extension of Social Security (ESS) Paper no.22: The Role of Social Health Protection in Reducing Poverty: The Case of Africa*, International Labour Office Strategies and Tools against Social Exclusion and Poverty (STEP), Geneva, Switzerland.

Wainwright, D. M. 2003, "More 'con' than 'joint': problems with the application of conjoint analysis to participatory healthcare decision making", *Critical Public Health*, vol. 13, no. 4, pp. 373-380

Wang, H., Zhang, L., Yip, W. and Hsiao, W. 2006, 'Adverse selection in a voluntary Rural Mutual Health Care health insurance scheme China', *Social Science&Medicine*, Vol.63, pp.1236-1245.

Wagstaff, A. and Doorslaer, E. 2000, *Handbook of Health Economics*, Vol. 1A, Ch. 34, Elsevier Science B.V., Netherlands.

Welsh, M. and Poe,G. 1998, 'Elicitation Effects in Contingent Valuation: Comparisons to a Multiple Bounded Discrete Choice Approach', *Journal of Environmental Economics and Management*, Vol.36, issue 2, pp. 170-185.

WHO 2000, *The world Health Report 2000. Health systems: improving performance*, WHO Report, Geneva.

WHO 2002, Medical Savings Accounts: *Lessons Learned from Limited International Experience*, Discussion Paper, Issue 3, Geneva.
WHO 2003, *Social Health Insurance* [online], Available: http://www.searo.who.int/LinkFiles/Meetings_SEA-HSD-266.pdf. [2006, May 17].

WHO 2004, *Reaching universal coverage via social health insurance: key design figures in the transition period*, Discussion Paper, Geneva.

Williams, A and Cookson, R. 2005, *Equity in Health*, Centre for Health Economics, University of York, England.

Wilson-Rogers, N. And Pinto, D. 2010, *Introduction to International Taxation,* Curtin University Press, Perth, Australia.

Witter, S., Ensor, T., Jowett, M. and Thompson, R. 2000, *Health Economics for Developing Countries: A practical guide*, Macmillan Education, England.

Witter, S., Ensor, T., Jowett, M. and Thompson, R. 2000, *Health Economics for Developing Countries: A practical guide*, Macmillan Education, Malaysia.

Wolf, C. Jr. 1979, 'theory of nonmarket failure: Framework for implementation analysis', Journal of Law and Economics, Vol. 22, pp.107-139.

Wolf, C. Jr. 1993, Markets or Governments: Choosing Between Imperfect Alternatives, CA: RAND Books, U.S.A.

Woolcock, M. 2000, *The Place of Social Capital in Understanding Social and Economic Outcomes*, The World Bank, Washington D.C., U.S.A.

World Bank 2002, *Health Care Financing for Rural and Low Income Populations: The Role of Communities in Resource Mobilization and Risk Sharing*, World Bank, Washington D.C.

Yap MEC 2003, *An overview of Community Health Insurance Initiatives in the Philippines*. Presented at the Third Health Sector Development Technical Advisory Group Meeting WHO/WPRO, February 17-19, 2003, Manila, Philippines.

Zweifel, P. and Breyer, F.1997, *Health Economics*, Oxford University Press, New York. U.SA.

Zweifel, P. 2000, *Moral Hazard and Consumer Incentives In Health Care*, Handbook of Health Economics, edited by Arrow, K.J. and Intriligator, M.D., Vol.1, Elsevier Science B.V. Amsterdam, Netherlands, pp. 410-449.

Zweifel, P. and Pauly, M. 2004, *Private Voluntary Health Insurance in Developing Countries*, The World Bank, Washington, DC., U.S.A.

Zweifel, P., Schneider, Y. and Wyss, C. 2005, *Spatial Effects in Willingness-to-pay: The Case of Nuclear Risks* [online], Available: http://www.actuaries.org/ASTIN/Colloquia/Zurich/Zweifel_Schneider_Wyss.pdf [2006 Mar 14].

Zweifel, P., Schneider, Y. and Wyss,C. 2005, *Spatial Effects in Willingness-to-Pay: The Case of Nuclear Risks*, [online], Available: www.actuaries.org/ASTIN/Colloquia/Zurich/Zweifel_Schneider_Wyss.pdf [2006, March 17].

Zweifel,P., Telser, H., and Vaterlaus, S. 2006, 'Consumer Resistance Against Regulation: the Case of Health Care'. *Journal of Regulatory Economics*, Vol.29, pp.319-332.