CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

There has been an increased interest among health economists and health care policy makers in understanding medical care expenditures. When ad hoc functions on medical care are used, inferences made of theoretical insights and policy purposes for an individual country cannot be relied on.

In order to fill in the research void, several personal health capital models have been established to investigate the demand for health and medical care expenditures. As a result, personal health capital models became common after the 70s. For instance, **Grossman (1972)** developed a personal health capital model to examine the demand for health. Following the introduction of Grossman's model, **Jaana-Marja Muurinen (1982)** also analyzed a generalized Grossman-type health investment model to examine health patterns.

2.1 Health Models

Michael Grossman (1972) developed a personal health capital model to examine the demand for health. This model is also called the Grossman's Intertemporal Health Consumption Model, because Grossman considered health-related consumption choices for a consumer as an investment problem over a lifetime. Furthermore, **Grossman (1972)** also remarked that medical care is regarded as a derived demand for an input to produce health since goods and services are inputs into the production of commodities, which is created within the household. Regarding the paper published by Grossman (1972) in the Journal of Political Economy, the central proposition of the Grossman model is that a person's health can be viewed as a durable capital stock in that it wears down due to ageing and is also increased by investment in health. Thus, it is construct dealing with the demand for the commodity "good health[24]".

As **Grossman (1972)** argued in his paper, health capital is distinct from other forms of human capital such as a person's stock of knowledge, which shows that an increase in a person's stock of knowledge or human capital will raise market and nonmarket productivity, while the total amount of time spent for money earnings and commodities producing will be ascertained by the stock of health. In addition, Grossman also included the consumers' utility functions in his model to represent the preference of the consumer in terms of his demand for medical care. Grossman (1972) argued that

---

[24] Review the "On the Concept of Health Capital and the Demand for Health" published by Michael Grossman (1972a) in his Journal of Political Economy, pp. 224 and also National Bureau of Economic Research (1972b), as well as "The Human Capital Model of the Demand for Health" in his National Bureau of Economic Research working paper series (April 1999) pp. 1.

health could be viewed as a pure consumption good or a pure investment good. Grossman investments in health capital is incorporating with household production functions, which include medicare, diet, exercise, recreation and housing. Moreover, the production function also depends on certain "environmental variables", where the most important is the level of education of the producer, which influences the efficiency of the production process. According to Grossman, the resources distributed to its production, endogenously influence the health level for an individual. Since the demand curve is downward sloping, therefore the quantity of health demanded is negatively correlated with its shadow price (e.g.: price of medical care and price of other variables) but positively correlated with the wage rate and education. However, if the demand curve is relatively inelastic, the medical expenses would negatively correlate with education. Finally, Grossman also noticed that the age of death for a consumer is a complete certainty if he or she can fully anticipate intertemporal variation in depreciation rates of health.

Muurinen (1982) has constructed a generalized Grossman-type Health Investment Model for the demand for health and medical care. Muurinen introduced this model to amend the deficiencies of Grossman's model. For instance, he argued that Grossman's model is unrealistic as a description of the complete certainty in consumer health and utilization behavior since there are uncertainties in natural deterioration of health. In addition, Muurinen also considered the direct increases in utility and healthy time[25], which was neglected by previous literature. However, he agreed with the

---

[25] Jaana-Marja Muurinen (1982) mentioned in his paper "Demand for Health: A Generalized Grossman Model", the benefits of increased in health for Grossman's model can be viewed from two aspects, first is

Grossman (1972) notion, which stated that health could be viewed as either a pure investment good or a pure consumption good because both are rival hypotheses of the 'true' nature of health services[26].

Nevertheless, **Muurinen (1982)** does not support the household production theory and time prices of **Grossman (1972)**. Muurinen (1982) presented a mathematical model in his paper with different types of stocks such as stock of health; stock of skills and knowledge as well as stock of wealth[27]. Muurinen also disagreed with Grossman's notion assuming positive investment in all periods. He perceived that it is unrealistic to include the environmental variables in gross investment because when none of the beneficial inputs are utilized, the environmental external effect would not be operative on health.

Cropper (1977) has introduced two models of investment in health, which explicitly recognize the random nature of illness and death. The first model is about medical demand, which is derived from the fundamental demand for health capital to investigate the life-cycle behavior of investment and health capital. The second model shows that individual investments in health is related to occupational choices, namely, it helps in the identification of the exposure to a pollutant, for example asbestos, the effect of which can cause death. Thus, this survey postulates a scenario for individual workers

---

the direct increases in utility, considered as consumption benefits of health and second is the increased in healthy time, which indicates as investment benefits of health, pp. 6, 7.

[26] Found from J. M. Muurinen (1982): Demand for Health, in the contents of the criticism of Grossman's basic model and the suggested remedies, pp. 7.

[27] According to Muurinen (1982) in his paper "Demand for Health" had mentioned that individual has three different types of stocks available for service creation along his lifetime, these stocks are stock of health, stock of skills and knowledge (e.g.: education), whereas the human capital of the individual is constituted by these two kinds of stocks and the final one is the stock of wealth such as the external financial capital and so on, mentioned in pp. 8.

to make intelligent decisions in choosing a "safe" occupation and be more sensitive to the information for occupational dangers as well as being aware of the trade-off between earning higher wages and the exposure to pollution.

2.2 Demand for Medical Care, Health Care Expenditure and Elasticities

Grossman (1972); Muurinen (1982); Dardanoni and Wagstaff (1990); Lee and Kong (1999) as well as Sidorenko (2000) studied health models to examine the demand for medical care. On the other hand, Cropper (1977) also developed a model about the medical demand, which is derived from the basic demand for health capital to investigate the life-cycle behavior of investment and health capital.

Parkin, McGuire and Yule (1987); Blomquist and Carter (1997) have examined the relationship between national expenditures on health care and national income, which argued about health care as a luxury good. Parkin, McGuire and Yule (1987), however, disagreed with the suggestion that health care is a luxury good. They argued that the type of health care delivery system in a country are of little importance in determining expenditure levels since it relies upon the application of microeconomic analysis to macroeconomic data. Parkin, McGuire and Yule considered the possibility that the aggregate data might be useful in examining various types of problems if the aggregate data have been treated properly[28]. The effect can be seen particularly in the Purchasing Power Parity approach. In addition, they also implied that the effects of

---

[28] As suggested by Parkin, McGuire and Yule (1987), the right direction to handle the aggregate data is to disaggregate national expenditures into their component division, stated in conclusion pp.125.

difference in prices on the above-mentioned international comparisons should not be ignored for too long because the variations in prices are of some concern. In conclusion, the evidence by using aggregate data has supported their view showing that medical care is considered more as a necessity rather than a luxury good.

Blomqvist and Carter (1997) consider health care as a luxury good. According to them pooling restrictions are of doubtful validity and the results do not necessarily reflect the differences occurred between true income elasticities and common trend across countries[29]. Since the confounding of time trend and the time series structure has a biased upward effect on real income, Blomqvist and Carter used the Phillips-Loretan estimator to counter this effect. As a result of using this estimator, real expenditure on health care has grown by 2% annually; this is due to the influence of technological change. On the other hand, they observed that the demand for health services, as a derived demand would shift upward following this progress. Thus, the total expenditures could increase even if the price is inelastic. From here, they concluded that as countries become richer, health spending would tend to rise disproportionately.

On the other hand, **Milne and Molana (1991)** examined the effect of income and relative price on the demand for health care using the EC data for 1980 and 1985. However, they have extended the role of relative prices, which allowed for exerting their independent influences on demand, and the income elasticity turned out to be significantly greater than unity. Furthermore, they also found that the demand for health

---

[29] It may also reflect specification error, asymptotical, imperfections and inconsistencies appeared in different countries data (Blomqvist and Carter, 1997, pp. 226).

care is homogenous of degree one in income and the relative price of health care. Therein, they argued that it is not entirely correct to refer to health care as a luxury good based on the size of income elasticity estimated from a cross-section sample. This is because the excessive income effect may simply be eroded by the inevitable rise in relative price.

Gerdtham, Søgaard, Andersson and Jönsson (1992); Hansen and King (1996) conducted an empirical examination for health care expenditure using cross-section data series across OECD countries. **Gerdtham, Søgaard, Andersson and Jönsson (1992)** investigated 19 countries in OECD. They found that countries with a larger share of public financing could not be simply characterized as higher health care expenditure countries. This is mainly due to the fact that inpatient health care system is more expensive compared to other types of health care expenditures. Furthermore, they also found that their dummy variable for 'fee-for-service' has a significant impact on health care expenditure, for instance about 11% of the health care expenditures have been needed as dominant of the remuneration in outpatient health care. **Gerdtham et. al. (1992)** constructed the Box-Cox power transformation to investigate the bivariate relationship between health care expenditure and per capita Gross Domestic Product (GDP). The result demonstrated that double-log form is the most preferred functional form and GDP has a significant impact on the health care expenditure, which is free from misspecification error.

Hitiris and Posnett (1992) also investigated the relationship between health care expenditure and per capita Gross Domestic Product (GDP) by re-examining the results of **Gerdtham et. al. (1992)** using a sample of 560 pooled time series and cross-sectional developed countries data. From the results, with estimated income elasticity at around unity, they corroborate the importance of GDP as a determinant of health care spending based on a larger sample data. Owing to the fact that the relative price of health care is an important determinant of the demand for health, if this variable had been omitted, the estimated income elasticity would face downward bias concomitant with the understatement of the task of the non-income variables. They finally concluded that parameters used in the health finance and delivery system have an important effect on the demand for health care.

Rosett and Huang (1973) investigated the effect of health insurance on the demand for medical care by using data drawn from the 1960 Survey of Consumer Expenditures of the Bureau of Labor Statistics. They employed this data to predict the hospitalization and physicians' services demand from the aspects of price and income elasticity. According to their survey report, the 1960 market showing that the price elasticity ranges from -0.35 to -1.5 if the prices ranging from 20 to 80 percent; while for income elasticity, the ranges is from 0.25 to 0.45 if income ranging from $4,000 to $10,000. Furthermore, they also found that a family with an earning of $7,000 is willing to pay 2.5 times the actuarial value of the loss with the intention to avoid a highly probable $110 loss, whereas, small losses are generally covered by health insurance.

Phelps and Newhouse (1974) employed different sources of data (e.g.: published or survey data) to reckon the elasticity of demand for medical care (h) with respect to coinsurance rate (c). All these data support the theory of health care demand. Subsequently, they concluded that services with a relatively high time price represent relatively low coverage elasticities and relatively high time elasticities. On the other hand, services with a relatively high money price show considerably higher own-price elasticities. However, if the coinsurance rates increase, the money-price elasticities would decrease. Since some people disagreed with the result and said that coinsurance is irrelevant to medical consumption, therefore, Phelps and Newhouse self-selection estimate may be biased away from zero.

According to **Newhouse (1977)**, both cross-nation and time series (within nation) data implied that the income elasticity of national medical care expenditure is greater than one. This can be explained for developed countries which showed that medical care services at the margin is less effective with common measures, while morbidity and mortality is more effective with easily measured services, such as, relief of anxiety. Furthermore, Newhouse also noted that a country would employ methods where ration services are consistent with the per capita income.

Murthy and Ukpolo (1994) drew upon the role of the determinants of aggregate health care expenditure per capita using 1960 to 1987 United States time series data. They applied the Unit Root Test, Cointegration and Error Correction Modeling to test the stationarity and cointegrated property of the variable series. The results showed that

20

cointegration relation existed among the series. They noted that the number of physicians and age structure of the population were the major contributing factors. As a result, they identified the policies that would enable the society to constrain health care costs, which would then cause aggregate health care expenditure to grow at a lower rate. In addition, they also encouraged policy makers to undertake the long run investment in medical and health care education instead embarked on the short run policy controls. This is because long run policies will help to decrease the price of health care via market-clearing adjustment, thus leading towards allocative efficiency.

2.3 Effects of Uncertainty in Health Models

Muurinen (1982) constructed a generalized Grossman-type Health Investment Model to show that the Grossman's model is unrealistic as a description of the complete certainty in consumer health and utilization behavior since there are uncertainties in natural deterioration of health.

Dardanoni and Wagstaff (1990); Lee and Kong (1999) investigated the effects of uncertainty on the demand for medical care with the use of a simplified Grossman's human capital model. **Dardanoni and Wagstaff (1990)** portrayed two types of uncertainties viz uncertainty of the illness incidence and the uncertainty surrounding the effectiveness of medical care. They performed two types of comparative static analysis to examine the implications of both uncertainties. The former is Rothschild-Stiglitz increase

21

in risk[30] while the latter is a second-order stochastically dominating shift[31]. Dardanoni and Wagstaff summarized their findings as, a Rothschild-Stiglitz increase in uncertainty if the demand for medical care is increased. Conversely, an increase in the expected effectiveness of medical care would result in the decrease of the demand for medical care where never the elasticity of health demand is less than one with respect to shadow price. In this case, the demand for medical care will increase when the uncertainty surrounding the effectiveness of medical care increases, given the two-good index of relative risk aversion is non-increasing in medical care consumption.

Sidorenko (2000) proposed an uncertain demand model for medical care. **Sidorenko (2000)** constructed a continuous time stochastic by applying the correlated Wierer process. The continuous time stochastic optimization technique was used to derive optimal solutions for consumption, leisure and medical care. From the result, Sidorenko noticed that the presence of uncertainty would cause the marginal evaluation of both health and wealth to change; variances of the shock components would become additional discount factors. Besides, the model would also extend to incorporate health insurance under the assumption of constant relative risk aversion, constant elasticity, relative risk aversion and relative prudence of the health investment function.

---

[30] This is assumed a random variable in the consumer's basic level of health, where the mean of the variable abide unchanged but its riskiness alter (Dardanoni and Wagstaff, 1990; pp. 35).
[31] This is assumed that the effectiveness of medical care is random, where an increase (decrease) in the mean of the variable is following by a reduction (increase) in its riskiness (Dardanoni and Wagstaff, 1990; pp. 35).

22

2.4 Conclusion

Presently, many economists have extended or generalized Grossman's model since they realize that health care is also one of the important sectors in economies after being neglected for a long time. However, most of the studies were primarily conducted in developed countries such as United States, United Kingdom, Australia and so on, with only a few in ASEAN countries such as Japan, Korea and Hong Kong. This study employs the simplified generalized version of Grossman Health Capital Model to examine the Singapore and Malaysia cases via the method of cointegration and is essentially based on macroeconomic foundations.

Summary of the Literature Review

Grouping Items for the Literature Review	Authors Name (Year)		
Health Models	Grossman (1972)	Muurinen (1982)	Cropper (1977)
Demand for Medical Care, Health Care Expenditure and Elasticities	Grossman (1972)	Rosett and Huang (1973)	Phelps and Newhouse (1974)
	Cropper (1977)	Newhouse (1977)	Muurinen (1982)
	Parkin, McGuire and Yule (1987)	Dardanoni and Wagstaff (1990)	Milne and Molana (1991)
	Gerdtham, Sogaard, Andersson and Jönsson (1992)	Hitiris and Posnett (1992)	Murthy and Ukpolo (1994)
	Hansen and King (1996)	Blomqvist and Carter (1997)	Lee and Kong (1999)
	Sidorenko (2000)		
Effects of Uncertainty in Health Models	Muurinen (1982)	Dardanoni and Wagstaff (1990)	Lee and Kong (1999)
	Sidorenko (2000)		