THE DETERMINANTS OF HEALTH CARE EXPENDITURE: AN EMPIRICAL EVIDENCE FROM ASEAN COUNTRIES

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ABSTRACT

The main motivation of this research project is to investigate the determinants of Health Care Expenditure (HCE): an empirical evidence from ASEAN countries. There are 200 total observations that involved annual data from 1995 to 2014 in Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam. Data collection for this study is based on secondary data that obtained from the Central of International Data, World Development Indicator (World Bank Database, 2016), World Health Organization (WHO, 2016), ASEAN Up Database and also from the central bank of each country. The data used in this study is to prove the significant relationship between dependent and independent variables for the four models. The first model, Panel A analyses the relationship between HCE with the Gross Domestic Product (GDP), Population, Life Insurance Coverage (LIC), Household Final Consumption Expenditure (HFCE) and Consumer Price Index (CPI). For the second model, Panel B examines the significant influence of HCE, Population, LIC, HFCE and CPI on the economic growth. Based on the variables of these both models, then Panel C and Panel D were generated by using natural logarithm (ln). Pooled Ordinary Least Square (POLS) of Regression Model revealed that Panel A found the GDP, Population, LIC and CPI are positively correlated to the HCE that have the statistical significant at 0.01 level. However, there is a negative relationship between HFCE and HCE at the statistical significant of 0.01 level. Next, Panel B indicated the HCE, LIC and HFCE have positive correlation with GDP at the statistical significant of 0.01 level except for LIC at 0.05 level. While, there is a negative relationship between Population and CPI with the GDP at statistical significant of 0.01 and 0.10 level respectively. Panel C represented the lnGDP, lnLIC, lnHFCE and lnCPI are positively correlated to the lnHCE that have the statistical significant at 0.01 level. However, there is a negative relationship between lnPop and lnHCE at the statistical significant of 0.01. Last but not least, Panel D showed the lnHCE, lnPop and lnLIC have positive correlation with lnGDP at the statistical significant of 0.01 level except for lnLIC that has no statistical influence. While, there is a negative relationship between lnHFCE and lnCPI with lnGDP at the statistical significant of 0.01 level. Regarding to these findings, this study was supported the previous

empirical works as well as presents the several policy implications and recommendations for research improvement in the future.

Keywords:

ASEAN Countries, Health Care Expenditure (HCE), Gross Domestic Product (GDP), Population, Life Insurance Coverage (LIC), Household Final Consumption Expenditure (HFCE), Consumer Price Index (CPI) and Regression Model of Pooled Ordinary Least Square (POLS).

ABSTRAK

Motivasi utama projek penyelidikan ini adalah untuk menyiasat penentu Perbelanjaan Penjagaan Kesihatan (HCE): bukti empirikal dari negara-negara ASEAN. Terdapat 200 jumlah pemerhatian yang melibatkan data tahunan dari 1995 sehingga 2014 di Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam. Pengumpulan data untuk kajian ini adalah berdasarkan data sekunder yang diperoleh daripada Central of International Data, World Development Indicator (World Bank Database, 2016), World Health Organization (WHO, 2016), ASEAN Up Database dan juga daripada bank pusat setiap negara. Data yang digunakan dalam kajian ini adalah untuk membuktikan hubungan yang signifikan antara pembolehubah bersandar dan pembolehubah bergerakbalas bagi keempat-empat model. Model pertama, Panel A menganalisis hubungan antara HCE dengan Keluaran Dalam Negara Kasar (GDP), Populasi, Perlindungan Insurans Hayat (LIC), Perbelanjaan Akhir Penggunaan Isi Rumah (HFCE) dan Indeks Harga Pengguna (CPI). Bagi model kedua, Panel B mengkaji pengaruh penting HCE, Populasi, LIC, HFCE dan CPI terhadap pertumbuhan ekonomi. Berdasarkan pembolehubah bagi kedua-dua model ini, maka Panel C dan Panel D dibentuk dengan menggunakan natural logarithm (ln). Model Regrasi iaitu Pooled Ordinary Least Square (POLS) mendedahkan bahawa Panel A mendapati GDP, Populasi, LIC dan CPI berhubungan positif dengan HCE yang mempunyai signifikan statistik pada tahap 0.01. Manakala, terdapat hubungan negatif antara HFCE dan HCE pada tahap signifikan statistik 0.01. Seterusnya, Panel B menyatakan HCE, LIC dan HFCE mempunyai hubungan positif dengan GDP pada tahap signifikan statistik 0.01 kecuali bagi LIC pada tahap 0.05. Sementara itu, terdapat hubungan yang negatif antara Populasi dan CPI dengan GDP pada tahap signifikan statistik 0.01 dan 0.10 masing-masing. Panel C menunjukkan lnGDP, lnLIC, lnHFCE dan lnCPI berhubungan positif kepada lnHCE yang mempunyai signifikan statistik pada tahap 0.01. Manakala, terdapat hubungan negatif antara lnPop dan lnHCE pada tahap signifikan statistik 0.01. Akhir sekali, Panel D memperlihatkan lnHCE, lnPop dan lnLIC mempunyai hubungan positif dengan lnGDP pada tahap signifikan statistik 0.01 kecuali bagi lnLIC yang tidak mempunyai pengaruh statistic. Sementara itu, terdapat hubungan negative antara lnHFCE dan

lnCPI dengan lnGDP pada tahap signifikan statistic 0.01. Berhubung penemuan berkenaan, didapati kajian ini menyokong hasil empirical terdahulu di samping mengemukakan beberapa implikasi dasar beserta cadangan bagi penambahbaikan penyelidikan pada masa hadapan.

Kata kunci:

Negara-negara ASEAN, Perbelanjaan Penjagaan Kesihatan (HCE), Keluaran Dalam Negara Kasar (GDP), Populasi, Perlindungan Insurans Hayat (LIC), Perbelanjaan Akhir Penggunaan Isi Rumah (HFCE), Indeks Harga Pengguna (CPI) dan Model Regrasi iaitu Pooled Ordinary Least Square (POLS).

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(NOR FAIZAH BINTI AHMAD @ MOHAMMED RAZIKIN)

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LIST OF ABBREVIATIONS

ADF	: Augmented Dickey-Fuller;
ANOVA	: Analysis of Variance;
ASEAN	: Association of Southeast Asian Nations;
BNM	: Bank Negara Malaysia;
CE	: Common Effects;
CPI	: Consumer Price Index;
FE	: Fixed Effects;
GDP	: Gross Domestic Product;
GMM	: Generalized Method of Moments;
HCE	: Health Care Expenditure;
HFCE	: Household Final Consumption Expenditure;
LIC	: Life Insurance Coverage;
MAS	: Monetary Authority of Singapore;
OECD	: Organisation for Economic Co-operation and Development;
POLS	: Pooled Ordinary Least Square;
Pop	: Population;
PP	: Phillips-Peron;
RE	: Random Effects;
UK	: United Kingdom;
U.S.	: United States;
WHO	: World Health Organization;

β_0	: An Intercept;
$\beta_0 + v_i$	: Constant of Each Section;
β_{0i}	: Heterogeneity or Unobserved Effect;
$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$	: Coefficient of the Parameters;
H_1	: Null Hypothesis;
H_2	: Alternate Hypothesis;
i	: Cross-sectional Unit;
ln	: Natural Logarithm;
Sig.	: Significance;
t	: Time Period;
vif	: Variance Inflation Factor;
v_i	: Zero Mean Standard Random Variable;
μit	: Error Term (Disturbance Term);
$\bar{x}$	: Mean of Sample;
σ	: Standard Deviation.

CHAPTER ONE

INTRODUCTION

1.0 Introduction

According to Medical Dictionary, health care could be illustrated as the maintaining and restoration of health by the treatment and prevention of disease especially by trained and licensed professionals such as in medicine, dentistry, clinical psychology and public health (Thomas Fishbein, 2008). The World Health Organization explained health as the perfect conditions either in mental, physical and well-being as well as not merely to infirmity or the absence of disease (Porta, 2014). Last but not least, health care is the prevention or treatment of illness by doctors, dentists or psychologists. In addition, it also can be defined as an effort in order to maintain or restore the physical health by the treatment of professional and licensed bodies (Merriam Webster, 2015).

The main motivation of this research project is to investigate the determinants of Health Care Expenditures (HCE): an empirical evidence from ASEAN countries. There are twenty years of annual data from 1995 to 2014 that involved ten countries such as Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam. By reviewing an existing literature, this study attempts to provide evidence about the main indicators that influenced the expenditures on the health care. Most of the existing literatures have focused on the relationship between health care and economic growth. Therefore, this study contributes to the literature by broadening the body of research on this scarcely investigated area.

The determinants of Health Care Expenditures (HCE) is the most attractive issue to being discussed. There are wide array factors have been taken into consideration including a demographic composition of the population, economic features and performance, institutional background and technological progress. The main determinants of HCE consist of demographic characteristics and socio-economic factors. However, income appears to be the important factor behind the cross-country differentials in order to analyse the determinants of HCE. Besides that, health is estimated as the luxury goods if the income elasticity is more than one and it becomes the necessity goods if the income elasticity is less than one (Baumol, 1967).

The global quest to improve the health outcomes such as child mortalities, life expectancy and maternal required the consistent improvement of HCE especially in Sub-Saharan Africa (SSA) countries. For instance, the Health Expenditures per Capita in SSA were increased from $79.22 (PPP, constant international $) in 2000 to $147.14 in 2010. This situation is quite similar to the North America and OECD countries that have increased within the same period from $4,488.69 and $2,393.29 to $7,856.29 and $4,177.39 respectively. But, there is a different trends across the various regions of the world and this study focused on the determinants of HCE in ASEAN countries (Nicholas, 2016).

Furthermore, this study also provides a significant contribution to its use of large samples by an econometric method. Then, after the data specification testing is robust and finally, the findings of this study itself which proves the worthiness of this instrument. The data used in this study is to prove the significant relationship between dependent and independent variables for both models. The first model (Panel A) analyses the relationship between HCEpC with the Gross Domestic Product (GDP), Population, Life Insurance Coverage (LIC), Household Final Consumption

Expenditure (HFCE) and Consumer Price Index (CPI). For the second model (Panel B), it explores the relationship between GDP with the HCEpC, Population, LIC, HFCE and CPI.

This study used secondary data that collected from the Central of International Data, World Development Indicator (World Bank, 2016), World Health Organization (WHO, 2016), ASEAN Up Database and also from the central bank of each country. Finally, the results of this study become significant by using an appropriate method such as Stata SE 12 to estimate Pooled Ordinary Least Square (POLS) Regression Model, Common Effects (CE), Fixed Effects (FE), Random Effects (RE), Likelihood Ratio, Hausman Test, Lagrange Multiplier Test, Diagnostic Tests: Multicollinearity Test and Heteroskedascity Test. Another technique used is Eviews 9.0 to estimates the Descriptive Statistics, Pearson Correlations and Granger Causality Test. Both of this methods prove the hypothesis testing that stated in the Chapter Four.

1.1 Overview of Health Care Expenditure (HCE) from Global Perspective

There are great variations of the total countries spend on the Health Care across the globe. The Average of Health Expenditure per Capita is over US$3,000 in the high income countries. While, the fund resource on Health Care is only US$30 per Capita in the poor countries. In percentage, some countries spend more than 12% of Gross Domestic Product (GDP) on Health and the others spend less than 3% of GDP on Health. It means, there is a wide variation in Health Expenditure with respect to the economic growth. This section will be discuss about an extensive literature on Health Expenditures and economic growth in the Organisation for Economic Co-operation and Development (OECD).

In 2014, the HCE of the United Stated (U.S.) exceed the other countries such as Australia, Canada, Denmark, France, Germany, Japan, Netherlands, New Zealand, Norway, Sweden, Switzerland and United Kingdom. Higher expenditures could be achieved due to an advance of medical technology and the higher price of health care rather than more frequent doctor visits or hospital admissions. In contrast, U.S. expenditures on social services made up a relatively small share of the economy relative to the other countries. Despite spending more on the health care, U.S. had poor health outcomes, including greater prevalence of chronic conditions and shorter life expectancy.

The comparison of cross-national allowed us to track the performance of health care system in U.S., highlight areas of strength or weakness and then identify the factors that may accelerate or impede an improvement. This analysis is the latest series of Commonwealth Fund cross-national comparisons that use health data from the OECD as well as from other sources to access the U.S. data about the health outcomes, prices relative to other countries, supply, a system of HCE and utilization. There are thirteen high-income countries such as Australia, Canada, Denmark, France, Germany, Japan, Netherlands, New Zealand, Norway, Sweden, Switzerland, the United Kingdom and the United States.

The value of median OECD countries was measured when the data are widely available. Most of the data is for years prior to the major insurance provisions of the Affordable Care Act. In recent years, health care expenditures in the U.S. is more than other high-income countries even the spending growth became slowed in the U.S. and the other countries also. Although U.S. is the only country without a publicly financed universal health system, it still spends more public dollars on health care. Even though Americans have greater users of expensive technologies such as

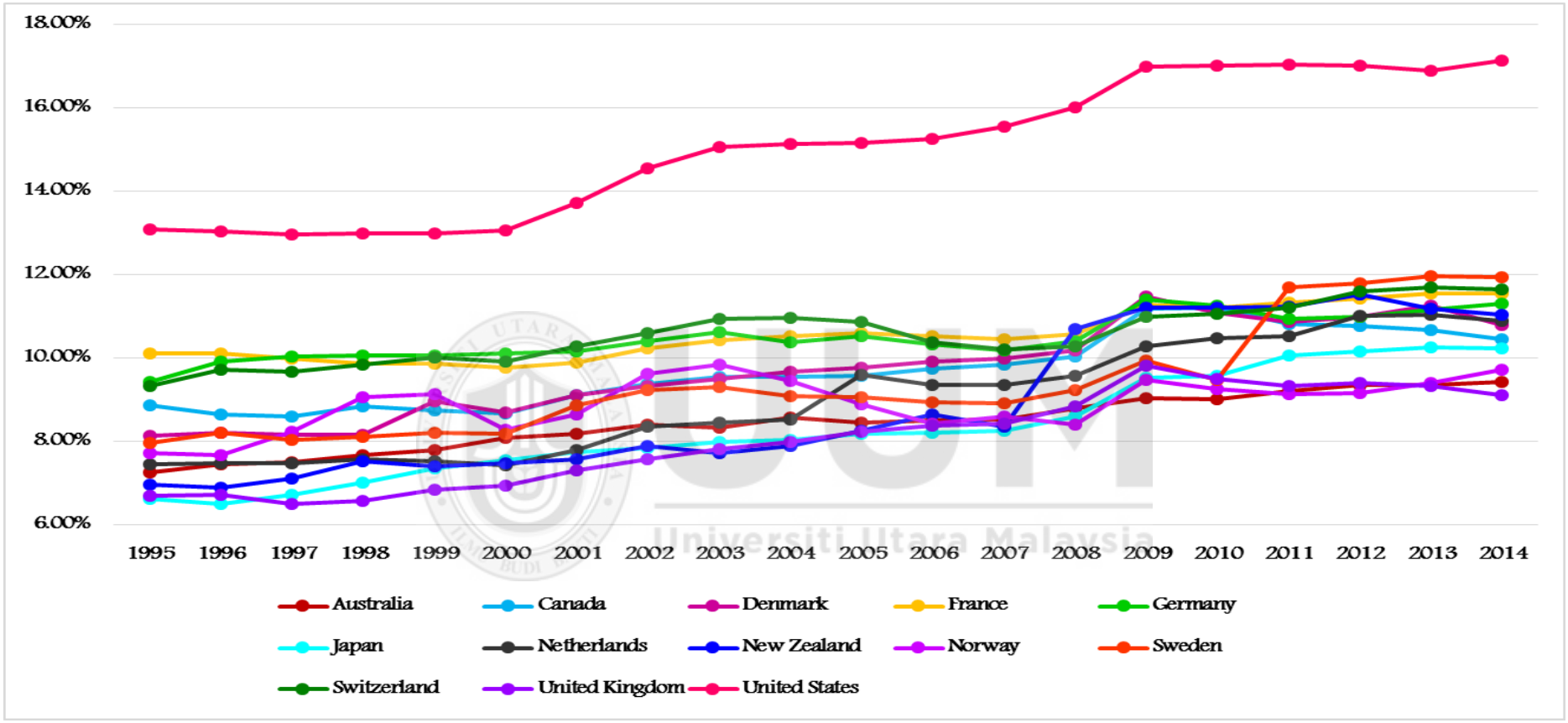
machine of the Magnetic Resonance Imaging (MRI), but there are only a few hospital admissions and physician visits.

Based on the cross-national pricing data, it suggested that the higher price of health care in the U.S. potentially explaining a large part of the higher health care expenditures. In contrast, U.S. focused more on the small share of its economy to social services such as disability benefits, employment programs, food security and housing assistance. Finally, despite its heavy investment in health care, the U.S. sees poorer results on several key health outcome measures such as life expectancy and the prevalence of chronic conditions. The mortality rates due to cancer relatively drop more quickly and lower compared to the mortality from heart disease in the United States.

1.1.1 The United States is the Highest Spender on Health Care

Based on the Figure 1.1, U.S. is the largest spender on health care by 17.14% of Gross Domestic Product (GDP) in 2014. It was exceed almost 50% rather than the second highest spender which is France by 11.54% of GDP and almost double for the U.K. by 9.12% of GDP. U.S. spending on health care per person is equivalent to $9,523, without adjusted for the inflation. Since 2009, the growth of health care expenditures become a little bit slow in the U.S. and followed by the other countries. The real growth rate of health care expenditures per capita in the U.S. was declined from 2.05% between 1995 to 2004 to 1.99% between 2005 to 2014. There is a few countries had negative growth such as Denmark and United Kingdom. The slowdown of cross-national nature and timing have the connection to the global financial crisis in 2007 to 2009.

Figure 1.1: Health Care Expenditure as a Percentage of GDP (1995-2014)



Source: OECD Health Data, 2015

1.1.2 The United States has Poor Population Health

Americans reported the worse results regarding on a measurement of population health rather than the international peers. It means, the life expectancy at birth in U.S. is the lowest rates in 2014 which is 78.7 only compared to the median of 82.0 years in the OECD countries. In addition, the U.S. had the highest infant mortality rate of 5.7 deaths per 1,000 live births at 2014 among the countries studied, while the median rate in the OECD country was 3.3 deaths. The prevalence of chronic diseases also appeared to be higher in the U.S. The 2015 Commonwealth Fund International Health Policy Survey found that 68.0 percent of U.S. adults age 65 or older had at least two chronic conditions. This figure is range from the lowest rate of 33.0 percent in the United Kingdom to the highest rate of 56.0% in Canada. Based on the 2013 report by Institute of Medicine, there are the health disadvantages of Americans relative to residents of other high-income countries.

It found the U.S. performed poorly on several important determinants of health. The obesity rate for adults in the U.S is about 35.3 percent and then followed by the New Zealand as the next-highest rate. Although U.S. had one of the highest rates of tobacco consumption in the 1960s and 1970s, but it is the lowest smoking rates of 13.7 percent in 2014. The heavy use of tobacco in the initial periods may influence to the worse result of health among the aging population. Other potential contributors to the United States' health disadvantage consist the large number of uninsured, differences in lifestyle such as environment as well as the rates of accidents and violence. The Institute of Medicine found that poorer health in the U.S. was not simply the result of economic, social or racial and ethnic disadvantages even well-off, non-smoking and non-obese Americans appear in worse health than their counterparts abroad.

Table 1.1: Population Health Outcomes and Risk Factors at 2014

	Life Expectancy at Birth	Infant Mortality per 1,000 Live Births	% of Population Age 65+ with 2 or More Chronic Conditions	Obesity Rate (BMI > 30)	% of Population (Age 15+) Who are Daily Smokers	% of Population Age 65+
Australia	82.3	3.2	54.0	28.3	12.8	14.7
Canada	82.0	4.4	56.0	25.8	14.9	15.7
Denmark	80.7	3.0	-	14.2	17.0	18.5
France	82.7	3.6	43.0	14.5	24.1	18.7
Germany	81.1	3.2	49.0	23.6	20.9	21.1
Japan	83.6	2.1	-	3.7	19.3	25.7
Netherlands	81.7	3.3	46.0	11.8	18.5	17.7
New Zealand	81.4	4.8	37.0	30.6	15.5	14.4
Norway	82.1	2.2	43.0	10.0	15.0	16.0
Sweden	82.3	2.4	42.0	11.7	10.7	19.6
Switzerland	83.2	3.5	44.0	10.3	20.4	17.8
United Kingdom	81.3	3.7	33.0	24.9	20.0	17.5
United States	78.7	5.7	68.0	35.3	13.7	14.4
OECD Median	82.0	3.3	-	14.5	17.0	17.7

Source: OECD Health Data, 2015

1.2 Overview of Health Care Expenditure in ASEAN Countries

In 1967, Association of Southeast Asian Nations (ASEAN) was founded through the Bangkok Declaration and included 5 original founding members of Malaysia, Indonesia, Singapore, Thailand and Philippines. The membership has now since grown to 10 countries with Vietnam, Myanmar, Cambodia, Laos and Brunei Darussalam added. As a single entity, ASEAN represents a sizeable percentage of global economic and population. There is over 630 million peoples live in the ASEAN countries, compared to 510 million residing in the European Union. As a combination of economic entity, nominal GDP of ASEAN is exceed US$ 2.6 trillion and making it becomes 7th largest economy in the world after the United States, China, Japan, Germany, France and United Kingdom.

Table 1.2: Comparative Profile for ASEAN

	ASEAN	EU	China	India
GDP, $ Billion	2,756	18,160	11,628	2,515
Population, Million	630	510	1,360	1,270
GDP per Capita $	4,370	35,620	8,550	1,980

Source: The Economist, 2015

ASEAN countries could be considered as emerging economies and have the potential to grow faster in the coming years, although the developed countries had the slowing and stagnant growth. Since the year of 2006 to 2012, health care expenditures have stable increased from 14% to 23% due to the economic growth that reflects rising demand and income for health care. Additionally, the burgeoning aging population, which is contributing to rising health care costs globally, is also positioned to have a larger effect on ASEAN. While ASEAN countries currently possess

a younger demographic composition, the elderly population is estimated to increase from 10% in 2015 to over 23% in 2050.

An ongoing evolution in the disease risk profile for ASEAN is the transition from a high communicable disease burden to non-communicable disease burden, which reflects changes in lifestyle and behaviour as well as health care quality and technology. Of course, non-communicable diseases contribute a higher percentage to health care costs over the long term and are much harder to manage and are a hallmark for developed nations grappling with ballooning health expenditures. This is what ASEAN has to look forward to in the future. With regard to health care financing in ASEAN, from 1998 to 2010 health care expenditure increased about 2.5 times and currently is about US $68 billion annually.

Most countries in ASEAN with the exception of Philippines, possess a mixed health care financial scheme that is comprised of several different programs and payer bodies (Table 1.3).

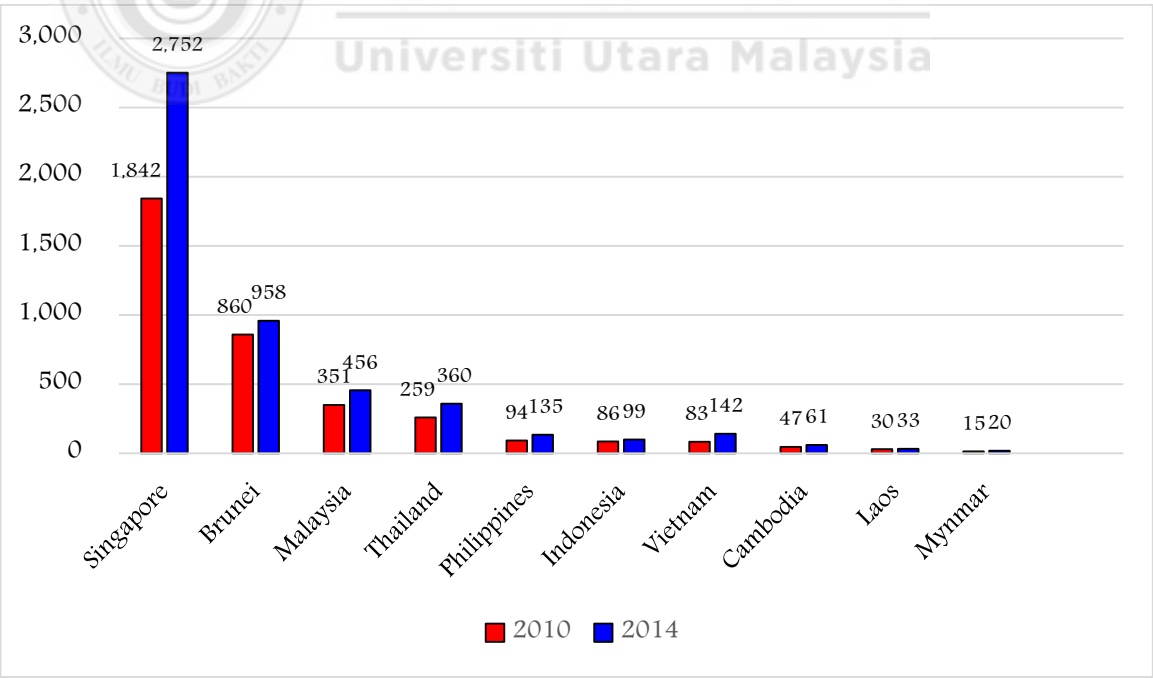
Table 1.3: ASEAN Health Care Financing Schemes

Countries	Schemes
Indonesia	ASKES, Jamsostek, CBHI
Laos	CCS, SSO, CBHI
Philippines	PhiHealth
Singapore	Medisave, Medishield, Medifund
Thailand	SSC, CSMBS, UC
Vietnam	VSS, HCFP

Source: The Economist, 2015

Taken on a country level, health care expenditure (HCE) is quite varied between the ASEAN countries. Among these 10 countries, Singapore's HCE recorded the highest range of about US$1,842 and US$2,752 per capita for the period of 2010 and 2014. This was relatively high compared with other selected ASEAN countries. This was followed by Brunei with an expenditure in the range of about US$ 860 to US$958 per capita, Malaysia US$351 to US$456 per capita, Thailand US$259 to US$360 and Philippines US$94 to US$135. On the other hand, Indonesia, Vietnam, Cambodia, Laos and Myanmar can be considered as countries with low expenditure on health care. The HCE of Indonesia recorded a range of about US$86 to US$99 per capita, Vietnam US$83 to US$142 per capita, Cambodia US$47 to US$61 per capita, Laos US$30 to US$33 per capita and Myanmar US$15 to US$20 per capita (Figure 1.2).

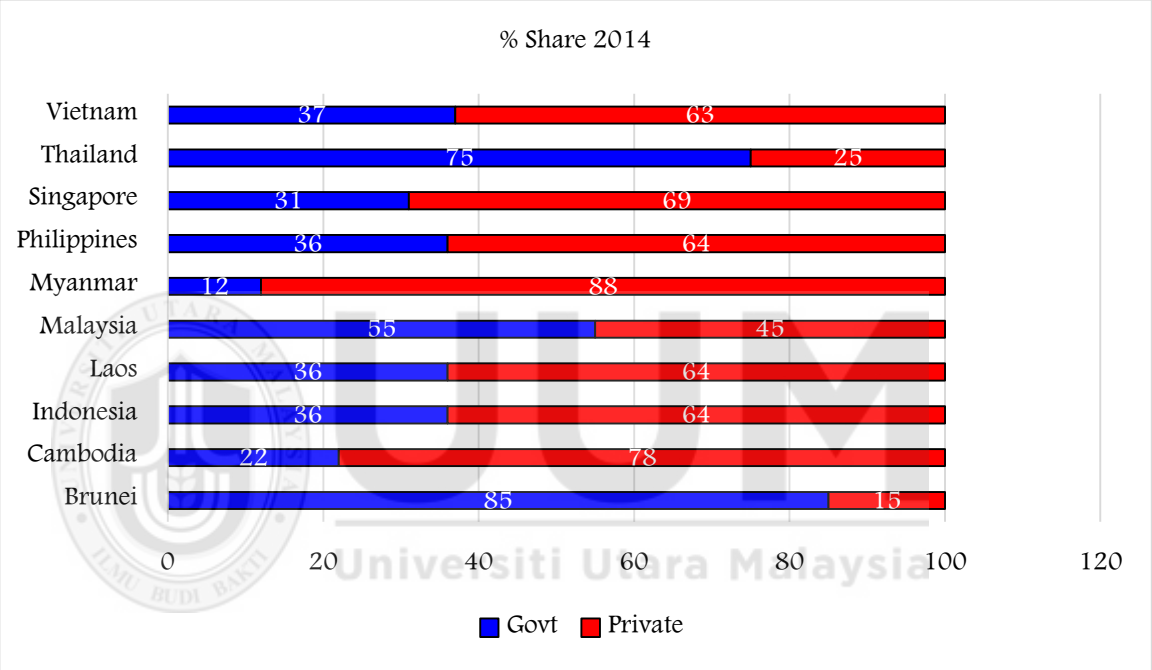
Figure 1.2: Health Care Expenditure (HCE) in ASEAN



Source: WHO World Health Statistics, 2010 & 2015

Countries also exhibit differing balances of public and private financing in their systems, with Cambodia, Myanmar and Singapore possessing a higher share of private funding and Thailand and Brunei having a very low share of private funding. Most countries fall somewhere in the middle with the burden of financing split relatively evenly between public and private payers (Figure 1.3).

Figure 1.3: Public or Private Share of Health Care Funding in ASEAN



Source: WHO World Health Statistics, 2015

1.3 Problem Statements

The global quest to improve the total health expenditures in the most countries (Nicholas, 2016). The most important determinants of HCE are Income per Capita and Aging Population (Murthy & Ukpolo, 1995; Matteo, 1998; Bilgel, 2004). However, there is a persistent problem to access the health care even though the health care expenditure has risen continuously (Srivastava, 2016). The previous empirical work highlighted the spurious relationship between HE and the

determinants of HCE if the variables are not the stationary and non-linear specification that should not be ignored by just relying on the log-linear functional of HE model (Hansen, 1996).

Many scholars have adopted the National Health Insurance Research Database (NHIRD) for all sorts of research studies. The system of life insurance coverage is widely praised by other countries, but the raising of health care expenditure has been a serious financial issue in recent years (Chen, 2014). Only a few studies relating access to rising HCE, widening of the income gap, poor health insurance coverage and inequalities in health care were conducted among the poor and underprivileged groups due to economic downturn especially for the poor and the uninsured (Tansakul, 2010). Driven by inefficient outpatient care, expensive and unnecessary of medical procedures and insurance policy as well arising costs of prescription drugs gave a burden to poor society (Hunnicutt, 2010).

The relationship between Health Care Expenditure (HCE) and Gross Domestic Product (GDP) have attracted much attention in the health economic literature. Research interest in this relationship has been highlighted by the observation for many countries, aggregate health care expenditure has tended to grow over time at a rate faster than the rate of growth of national income (Addo, 2016). Economic analysis also focused on the choices and decisions about the production and consumption of economic goods. Health could be defined as the economic goods to measures the economic growth. But, none of the HCE in the world has achieved levels of sufficient spending to meet all of its clients' wants for health care (Morris, 2012).

1.4 Research Questions

The main motivation of this research project is to investigate the determinants of health care expenditure (HCE): an empirical evidence from ASEAN countries. There are three series of research question were addressed by answering the following questions:

a) What are the relationship between macroeconomic variables and Health Care Expenditure in ASEAN countries?
b) Is there any statistically significant influence between Life Insurance Coverage and Health Care Expenditure?
c) Does Health Care Expenditure gives a positive effect on the economic growth?

1.5 Objectives of the Study

The purpose of this study is to investigate the determinants of health care expenditures (HCE) in ASEAN countries. In order to examine the three specific objectives that presented in the following section, panel data analysis for regression analysis and others specification testing are conducted by using Stata SE 12 and Eviews 9.0 for the four models.

a) To examine the relationship between macroeconomic variables and Health Care Expenditure in ASEAN countries.
b) To investigate the statistical significant influence between Life Insurance Coverage with the Health Care Expenditure.
c) To analyse the effect of Health Care Expenditure on the economic growth.

1.6 Significance of the Study

The importance of this study could be explained in the following context especially for the researchers. The findings of this study could give the significant consequences to the researchers about the determinants of Health Care Expenditure (HCE) in ASEAN countries. In addition, it provides more ideas and perspectives regarding the nature of each variable such as HCE, Gross Domestic Product (GDP), Population, Life Insurance Coverage (LIC), Household Final Consumption Expenditure (HFCE) and Consumer Price Index (CPI). The findings would build theories based on the research outcomes as well as to generate the theoretical framework and hypothesis. It also would be useful materials to the other researchers in the future.

1.7 Scope of the Study

This study was focused on the Determinants of Health Care Expenditure (HCE) in ASEAN Countries. There are two models used in this study that consist of five independent variables respectively. For the first model (Panel A), a dependent variable is Health Care Expenditure (HCE), while the independent variables are Gross Domestic Product (GDP), Population, Life Insurance Coverage (LIC), Household Final Consumption Expenditure (HFCE) and Consumer Price Index (CPI). On the other hand, a dependent variable of the second model (Panel B) is GDP and the independent variables are HCE, Population, LIC, HFCE and CPI. Based the on the variables in these both models, Panel C and Panel D are generated by using natural logarithm (ln). The periods of this study cover up to the recent consecutive twenty years, started from the year 1995 to 2014.

1.8 Organization of the Study

This thesis is comprised of five chapters. The 1st chapter presents an introduction, outlines for the objectives and significance of the thesis. The 2nd chapter reviews the health care structure literature relevant to this study to establish the theoretical context. This review is primarily based on previous studies that focused on health care structure and economic growth. Due to lack of empirical investigation of health care in the context of medical theory, this study applied existing theories to support the results of this study. The 3rd chapter describes research design, theoretical and research framework, hypothesis development, selection of data collection, empirical method, analysis model and technical analysis. The 4th chapter provides a discussion of empirical findings for the event study. Finally, 5th chapter summarizes the contributions and implications of the study and it looks at future research directions to which this thesis points.

1.9 Conclusion

This study investigates the determinants of health care expenditure in ASEAN countries, in particular it examines; a) What are the relationship between macroeconomic variables and Health Care Expenditure in ASEAN countries? b) Is there any statistically significant influence between Life Insurance Coverage and Health Care Expenditure? c) Does Health Care Expenditure give a positive effect on the economic growth? In conclusion, this research is considered as being anew to the lack of studies conducted in this type of instrument. Therefore, it is expected that the empirical findings from this study will be a starting point for future research in similar instrument.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter is focusing on the discussion based on the theories, findings, recommendations and preferences of the previous literature in conducting the research. The purpose of this study is to investigate the determinants of Health Care Expenditure (HCE): an empirical evidence from ASEAN countries. The analysis of HCE has been attracting for the applied econometricians and health economists. Basically, there is a few section that covers in depth, starting with the concept of HCE and each of the independent variables such as Gross Domestic Product (GDP), Population, Life Insurance Coverage (LIC), Household Final Consumption Expenditure (HFCE) and Consumer Price Index (CPI). Last but not least, this study also critically reviewed about the relationship of HCE on the economic growth.

2.1 A Brief Review of the Literature: The Determinants of Health Care Expenditure (HCE)

There are difficulties to distinguish between the expenditure and quantity of the Health Care Expenditure (HCE) in 22 Organization for Economic Cooperation and Development (OECD) countries. In other words, an increase in GDP per capita would lead to the increase of health care either in term of price or quantity (Gerdtham, 1991). The main determinants of HCE in the United States are Ageing Population and the Number of Physical Activities by using cross-sectional and time series data for the year 1960 to 1987. The other variables used in this study are

consist of Gross Domestic Product per Capita (GDPpC) and Public Financing of Health Care. This study has applied cointegration, error correction modelling and unit root testing (Murthy, 1994).

The further study by Murthy (1995) reported the two cointegrating vectors represents the stable system by using the same data set. HCE is found to be cointegrated with Ageing Population, GDPpC, Number of Physical Activities, Relative Price of Health Care and Ratio of Public Health Expenditure to the Total HCE. Consistent with the previous outcomes, Ageing Population and Number of Physical Activities are the important determinants of HCE as well as plus another variable which is GDPpC. There are positive coefficients between Price Index of Medical Care and Ratio of Health Services that indicating an inelastic demand of health care in the United States. However, there is a little bit different in this study in which a large share of public financing represents by the lower expenditures of health care (Murthy & Ukpolo, 1995).

The determinants of HCE in the United Kingdom (UK) by using the regression technique showed there is high value of R-Square and low value of Durbin-Watson Statistic which is 0.924 and 0.062 respectively that suggests a potential regression problem. This study arranged the data in a log-linear form that consists of Dependency Rate, GDPpC, Inflation Rate, Share of Total Public Expenditure in GDP and Shift Dummy of the UK. The re-examined data by using cointegration testing and standard unit root found the overwhelming evidence for non-stationary variables and no conclusive prove based on the existence of equilibrium relationships. It means, there is a short-run income elasticity because the significant statistics is less than one (Hitiris, 1997).

The major determinants of Health Care (HC) in Canadian Provincial are Ageing Population as well as the GDPpC and Federal Transfer Revenues per Capita of Real Provincial. It involved the regression analysis of cross-sectional and pooled-time series by using annual financial data from 1965 to 1991. The outcomes indicated the HC in Canada could not be considered as a luxury good because the income elasticity is equal to 0.77 (Matteo, 1998). This results supported by Bilgel (2004) that revealed the Federal Transfer, Income (GDP) and Share of Ageing Population have statistical significant relationship with the HCE. The outcome is based on the panel data analysis that estimated an income elasticity of HCE is below the unity.

The HCE is a very important measurement to study the success of socioeconomic policies in a country. It can also be used as a tool for policy analysis to identify inequities and measure progress. Economic indicators alone cannot be used to explain the broader HCE within a society. Various models have been developed to measure HCE and this has been a highly debated issue (Sanjivee, 2009). The constitution of World Health Organization (WHO, 1946) defined health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. The government expenditure on health is a critical component of any health system (United Nations, 2007).

However, the Health Care Expenditure (HCE) has more than doubled with an annual growth rate regularly more than twice that of inflation since 1994. Fueled by rising costs of prescription drugs, inefficient outpatient care, expensive and unnecessary medical procedures and ballooning insurance premiums. The costs are the burden on state and federal governments, business and families. HCE in the world has risen per year since 1995 from US$462 until 2014 to US$1060. An increase HCE

will burden ASEAN population, who are forced to cut back on providing coverage and benefits or suffer a competitive disadvantage against international companies who don't bear health costs (Hunnicutt, 2010).

2.2 Modelling Techniques of the Health Care Expenditure (HCE)

There are several approaches applied to analyze the determinants of Health Care Expenditure (HCE). Some studies presented macroeconomic data that consist of Gross Domestic Product (GDP) and Gross National Income (GNI), while the others used socioeconomic factor which is the Household Final Consumption Expenditure (HFCE). A few studies relied on the cross-sectional, time-series or panel data analysis. The outcomes obtained are difference regarding to the techniques that have been used such as dynamic and static model. In particular, Table 2.1 shown the summary of difference approaches of the paper surveyed:

Table 2.1: Techniques by Previous Empirical Works

No.	Author (Year)	Model / Method of Estimation
1.	Addo, S. H. (2016).	Time-series Data. Unit Roots Tests: Augmented Dickey-Fuller (ADF) Test and Augmented Dickey-Fuller Test.
2.	Nicholas, A., Edward, N. A., & Bernardin, S. (2016).	Panel Data. Fixed Effects (FE) Model.
3.	Srivastava, D., & McGuire, A. (2016).	Cross-sectional Data. Double Hurdle Model: Logit and Poisson Distribution.
4.	Zeng, J. (2014).	Data Oriented. Local-constant Least Squares (LCLS) and Local-linear Least Squares (LLLS) Model.

2.3 Key Finding from the Previous Studies

2.3.1 Gross Domestic Product (GDP)

Income (per capita GDP) has been identified as a very important factor for explaining differences across countries in the level and growth of total health care expenditures. In literature from OECD countries, cross-section regressions of aggregate health expenditure per capita on GDP per capita consistently showed an income elasticity significantly above one, from about 1.20 to 1.50 (Kleiman, 1974; Newhouse, 1977; Leu, 1986; Getzen, 2000). Aggregate time-series regressions for individual countries most often showed similar results although with considerable variation between countries.

Similarly, in global literature, Musgrove, Zeramdini and Carrin used cross section data from 191 countries in 1997 and found that income elasticity of health expenditure was between 1.133 and 1.275 depending on the data included. Income elasticity for OOP ranged from 0.884 to 1.033 while it was between 1.069 to 1.194 for government health expenditure (Musgrove, 2002). Another study by Gaag and Stimac using cross section data from a 175 countries in 2004 found that income elasticity for health expenditure was 1.09. They also presented the results by geographical region and found that income elasticity ranged from 0.830 in the Middle East to 1.197 in OECD countries.

Murthy and Okunade used cross-sectional data in 2001 from 44 African countries and found an income elasticity between 1.089 and 1.121, depending on the specification used (Gaag & Stimac, 2008). There is higher income elasticity for public spending than for private spending by using cross section data in 1994 estimated global income elasticity at 1.13 (Schieber & Maeda 1999). The availability

of panel data has made it possible to estimate panel data models for different time periods. Several studies in OECD countries using panel data found the income elasticity was larger than one which is in line with previous results based on cross section data (Gerdtham & Sogaard, 1992).

However, this result is sensitive to the choice of the underlying assumptions of the model. Under additional assumptions, some authors obtained income elasticity close to one (Hitiris & Posnett 1992). Literature using panel data model from non-OECD has not directly looked at the relationship between income and health expenditure. However, Lu et al looked at the effects of official development (ODA)on health spending using data from 1995 to 2006 in low and low middle income countries and found that GDP per capita had no significant relationship with government health expenditure as a share of GDP (Lu, 2010).

An increase of GDP by 1% was associated with 0.66% increase in domestic government health expenditure in low-income countries and 0.96% increase in middle-income countries. This outcome found in examining the fungibility of ODA for health and domestic government health expenditure based on panel data from 1995 to 2006 for a 144 countries (Farag, 2009). One limitation of the above studies is that they have ignored the possibility of non-stationarity in health data and income. Several papers from OECD countries studied the non-stationarity and cointegration properties between health care spending and income and estimated the relationship between health expenditure and GDP controlling for non-income determinants and a proxy of technical progress.

They concluded that the income elasticity was not greater than one (Hansen & King, 1996; Blomqvist & Carter, 1997; Gerdtham & Lothgren, 2000; Gerdtham &

Lothgren, 2002; Okunade & Karakus, 2001; Dreger & Reimers, 2005). Note however that the available time series for some of these studies are rather short which induces some uncertainty with respect to the properties of the time series analyzed in this field of research (Hartwig 2008). More recently, Baltagi and Moscone (Badi H. Baltagi & Moscone 2010) studied the long-run economic relationship between health expenditure and income in 20 OECD countries over the period 1971–2004.

The analysis indicated that health care expenditure and most of its determinants were non-stationary, and that they were linked in the long-run. Their results showed that health care elasticity with respect to income was about 0.87 which was much smaller than that estimated in other OECD studies. It is worth noting at this stage that the above mentioned literature is mainly concerned with the direct effect of GDP on health care expenditures. In fact, there is a reverse causation, where GDP is a function of health care expenditure, also has a theoretical basis (Erdil & Yetkiner, 2009).

One way of considering this reverse causation effect is to treat health as another component of human capital together with education. There are at least two mechanisms through which GDP is a function of health care expenditures. Firstly, if health expenditure can be regarded as an investment in human capital, and given that human capital accumulation is an essential source of economic growth, an increase in health care expenditure must ultimately lead to a higher GDP. Secondly, increase in health care expenditures associated with effective health intervention increases labor supply and productivity, which ultimately increase GDP.

Therefore, a simultaneous causality in both directions may exist and needs to be checked. If GDP and health care expenditure determine each other

simultaneously, then there is an endogeneity problem in their relationship. If this is the case, then standard estimation procedures which assume that GDP is exogenous will produce inconsistent estimates of the parameters. It seems logical, however, to expect that even if causality exists in both directions, it does not occur instantaneously but with a time lag. For this reason the best way to determine the potential direction of causality relationship between health care expenditure and GDP seems to apply the Granger-causality test (Granger 1969).

To our knowledge, there are a very limited number of studies that do this and the evidence so far is mixed. For example, Erkan and Yetzinker covers a sample of 75 low to higher-income countries over the 90s by using Granger causality approach to panel data models. This study found a significant bidirectional Granger causality for 46 countries. In instances where one-way causality is found, the pattern depends on the GDP level of the countries. Their analysis shows that one-way causality usually runs from GDP to health care expenditure in low and middle-income countries, whereas the reverse holds for high income countries.

In contrast, the study by Hartwig (Hartwig 2008) on Granger-causality analysis of a panel of 21 OECD countries finds no evidence that the health care expenditure causes per-capita GDP growth with a positive sign. When the other direction of Granger causality is tested, in fact, the results support the hypothesis that GDP determines health expenditures with a positive sign.

2.3.2 Population

Population age structure is often included as a covariate in health expenditure regressions. Commonly used indicators are the share of young (e.g., under 15 years)

and old people (e.g., above 65 or 75 years) over the active or total population. These variables are generally insignificant when included in regression models explaining per-capita health spending (Leu, 1986; Leu, 1986; Hitiris & Posnett, 1992; L. Di Matteo & R. Di Matteo, 1998). The Population Structure has an impact on the Health Care Expenditures (HCE). Murthy and Ukpolo (1994 & 1995) found Population as the main Determinants on the aggregate of Health Care Expenditure per Capita (HCEpC) in United States by using time-series data for the period of 1960 to 1987.

This study focused on the Age Structure of Population and Number of Practicing Physicians as the main contributors on the Health Expenditure. Another factors that influenced the HCEpC are Income per Capita and Public Financing of Health Care. In term of estimations, this study was applied the cointegration and error-correction modelling as well as unit root test. This statement supported by Ke (2011) that stated the population is often included as a covariate in health expenditure regressions. Normally, the researchers used the share of young (under 15 years old) and old people (above 65 or 75 years old) over the active or total population. However, this variable has insignificant relationship with the Health Expenditure per Capita by using regression model (Leu 1986; Leu 1986; Hitiris & Posnett 1992; L.Di Matteo & R. Di Matteo 1998).

2.3.3. Life Insurance Coverage (LIC)

Life insurance coverage began to increase more rapidly starting from year 2000. By using this approaches, it help people to get the lower hospital utilization, reduced access to specialists and provide the price discounts. With the growth in incomes in the late 1990s, a consumer backlash developed against managed care's

tight restrictions on access to care. People wanted greater access to specialists and broader provider networks, the threat of lawsuits and legislation limited insurers' willingness to deny experimental treatments and hospital mergers reduced the number of competitors, whereby enabling the price increase in the market. As health expenditure continues to rise, as does as financial hardship imposed on many by rising the LIC (Feldstein, 2012).

Many countries have proper life insurance scheme to provide comprehensive health care to its people. This has been a practice for many developed countries and has been introduced in many developing ASEAN countries. For example, in 2001 the Thai Ministry of Public Health launched new universal life insurance a Universal Health Card (UC), a scheme subsidized by the government to extend life insurance to the poor. Rising health care expenditures, widening of income gap, poor health insurance coverage and inequalities in health care are important health care problems in Thailand. These problems have become more severe in recent economic downturn especially for the poor and the uninsured. Until to date, only few studies relating access to health care and service utilization were conducted among the poor and underprivileged groups (Tansakul, 2010).

2.3.4 Household Final Consumption Expenditure (HFCE)

Health maybe priceless but health care costs money and too many households either cannot pay for health services or become catastrophic health expenditure.

Household expenditures are closely interrelated and reflect the notions of well-being and wealth. The level of household expenditures indicates the level of economic system development as a whole. This raises the question of what factors

influence the magnitude of household expenditures in different countries. In this regard, it is necessary to distinguish exogenous factors dictated by the state of a particular country economy and of world economy in general, so as demographic factors, which determine household structure and composition. HFCE as the macroeconomic factor affecting health expenditure of private sector in the Canada and United States (Newhouse, 1977; Hitiris & Posnett, 1992; Matteo & Matteo, 1998; Karatzas, 2000; Newhouse, 1977).

2.3.5 Health and Economic Growth

Economics is refer to a social science and concerned the behaviour of economic agents such as people, firms, governments and other organizations when confronted with scarcity. Economic analysis focused on the choices and decisions about the production and consumption of economic goods. There are defined as any goods or services that are scarce relative to society. Health care is the economic goods. The resources that are used to produce health care services, capital and raw materials are finite. Society can only devote more of these resources to the production and consumption of bounds.

None of the health care expenditures in the world has achieved levels of sufficient spending to meet all of its clients' wants for health care. Economists provide the contributions of the alternative pathway where someone had poor health still can produce their own economic resources. This is due to poor health can inhibit the ability families to generate income or accumulate assets to finance their medical expenses. Besides that, the economic analysis offers a unique and systematic

intellectual framework for analysing the important issues in health care and for identifying solutions to common problems.

Health economics is literally a matter of life and death. The health care sector of the economy is very large. Health care is a major component of spending, investment and employment in every developed economy, so the economic performance of the health care is crucially linked to the overall economic well-being of a country and its citizens. The size of health care expenditures are not just important in countries where it is large but the issue is how low it is (Morris, 2012). The additional resources should be financed in health depends on the Gross Domestic Product (GDP) of a country (Preston, 1976).

The documentation of physiological processes stated that the low economic status would lead to a lower level of health care as well (Smith, 1999). Health can be seen as the luxury goods if the responsiveness is sensitive to income changes (i.e. the income elasticity exceeds unity) and as a necessity good if the responsiveness is insensitive to income changes (i.e. the income elasticity is below unity). This concept was used by Newhouse (1977). If the income elasticity of health expenditure is less than one, then the public health sector does not have a high priority among the goals for social and economic development (Kyriopoulos & Souliotis, 2002).

Estimating the impact of income and other measures on health spending forms the basis of this analysis. If in fact the income elasticity of health spending is less than one, then health expenditures would increase at a lower rate than GDP and the public health sector must not have high priority among the goals of economic and social development. Income elasticity below unity further implies that health is a necessity good and thus the delivery of health is determined according to needs. To

address these issues, this thesis focuses on the demand side of health care and on the determinants that are quantitative in nature rather than factors that measure the quality of life and health.

2.4 Conclusion

In short, this chapter provided the definition and concept of Health Care Expenditure (HCE) and the existing of literature that discusses in depth about the previous research studies. This section is discussing based on the keywords that relate to the studies which are about the relationship between HCE and macroeconomic variables.

CHAPTER THREE

DATA AND RESEARCH METHODS

3.0 Introduction

This chapter provided nine sections that explain about the theoretical basis, describes the data collection and description of panel data, variable specifications, build the theoretical framework, develops the hypothesis, presents empirical models and describes methods for examining the determinants of Health Care Expenditure (HCE): an empirical evidence from ASEAN countries. Besides that, this study also investigates the significance influence of HCE, Population, Life Insurance Coverage (LIC), Household Final Consumption Expenditure (HFCE) and Consumer Price Index (CPI) on the economic growth. There are four models of theoretical framework used in this study, namely Panel A, Panel B, Panel C and Panel D.

This research was applied balanced panel data that involved 200 of total observations as the sample from Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam. This annual data was retrieved from the year of 1995 to 2014. Furthermore, the secondary data has been used as data collection that obtained from the Central of International Data, World Development Indicator (World Bank, 2016), World Health Organization (WHO, 2016), ASEAN Up Database and also from the central bank of each country such as Bank Negara Malaysia (BNM), Monetary Authority of Singapore (MAS), Bank Sentral Republik Indonesia, Bank of Thailand and so on.

3.1 Theoretical Basis

Several studies have continuously found about a practical factual research, not the research that develops theories. This widespread view considers a few assumption that consist of facts and research can be separated from theory as well as theories are not necessarily practical or useful. But theories are integral to Health Care practice, promotion and research. Although the choice of theory often unacknowledged, but it shapes the way practitioners in order to help the researchers to collect and interpret evidence. The theories range from hypothesis development to econometric model and theoretical framework that thinking about the reality. In scientific and practical, it is important to recognise the implicit theories that have powerful to influence the understanding of Health Care (Alderson, 1998).

From an economic perspective, Health is referred to the capital stock that can produce healthy time as output. The level of health stock differs from each individual but it depends so much on the Population's environmental, genetic and lifestyle factors. This study also found that Gross Domestic Product has positive correlation with the Health Care Expenditure (HCE). It means, higher Income will lead to the greater spending on Health (Grossman, 1972). However, there is an argument that stated individuals need to consume preventive health care services such as blood test and health screening due to do not have perfect information about health condition (Copper, 1977).

Besides that, Health can be seen as the luxury goods if the responsiveness is sensitive to the income changes (i.e. the income elasticity exceeds unity). While, it can be referred as a necessity good if the responsiveness is insensitive to income changes. In other word, the income elasticity is below unity (Newhouse, 1977). If the

income elasticity of health expenditure is less than one, then the health sector does not have a high priority among the goals for social and economic development. Income elasticity below unity further implies that health is a necessity good and thus the delivery of health is determined according to needs (Kyriopoulos & Souliotis, 2002). To address these issues, this research project focuses on the determinants of Health Care Expenditure: an empirical evidence from ASEAN countries.

3.2 Data Collection and Description of Panel Data

This section describes an econometric model used to test the theoretical framework and research hypothesis. Besides that, it explains the methodology applied for the data collection, measurement of variables and the model specification for data analysis. Data collection for this study is based on secondary data that obtained from the Central of International Data, World Development Indicator (World Bank, 2016), World Health Organization (WHO, 2016), ASEAN Up Database and also from the central bank of each country. In addition, this study has collected twenty years' worth of annual data, spanning from 1995 to 2014 as well as involved 200 of total observations.

The panel data or pooled data is referred to a cross-sectional and time-series or longitudinal data that can be classified into two parts, namely balanced panel data and unbalanced panel data. This study used balanced panel data, in which a situation for the observation unit of cross-sectional time-series is similar. While, unbalanced panel data is a condition in which the observational unit of cross-sectional time-series is different. There are several advantages of using panel data in research such as dynamic changes to make sample size become large and might be allowed the

researchers to study the complex behaviour at certain times (Gujarati, 2008). Table 3.1 describes the data collection of this study.

Table 3.1: Data Descriptions

No.	Variables	Definition of Variables	Sources of Data
1.	HCE	Health Care Expenditure	World Health Organization & ASEAN Up Database, 2016
	lnHCE	Natural Logarithm of Health Care Expenditure	
2.	GDP	Gross Domestic Product	World Bank Database, 2016
	lnGDP	Natural Logarithm of Gross Domestic Product	
3.	Pop	Population	World Bank Database, 2016
	lnPop	Natural Logarithm of Population	
4.	LIC	Life Insurance Coverage	World Bank Database, 2016
	lnLIC	Natural Logarithm of Life Insurance Coverage	
5.	HFCE	Household Final Consumption Expenditure	World Bank Database, 2016
	lnHFCE	Natural Logarithm of Household Final Consumption Expenditure	
6.	CPI	Consumer Price Index	World Bank Database, 2016
	lnCPI	Natural Logarithm of Consumer Price Index	

The sample used for Health Care Expenditure (HCE) in this study involved ten ASEAN countries that consist of Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam. The data was taken starting from the year 1995 until 2014 as representing in Table 3.2.

Table 3.2: Sampling of the Countries

No.	Name of Countries	Range of the Year	Total
1.	Brunei Darussalam	1995 – 2014	20
2.	Cambodia	1995 – 2014	20
3.	Indonesia	1995 – 2014	20
4.	Laos	1995 – 2014	20
5.	Malaysia	1995 – 2014	20
6.	Myanmar	1995 – 2014	20
7.	Philippines	1995 – 2014	20
8.	Singapore	1995 – 2014	20
9.	Thailand	1995 – 2014	20
10.	Vietnam	1995 – 2014	20
Total Observations			200

3.3 Variable Specifications

A few decades ago have witnessed an analysis of Health Expenditure (HE) become raised at the International Level. So, the main motivation of this research project is to investigate the determinants of Health Care Expenditure (HCE): an empirical evidence from ASEAN countries. There are four theoretical frameworks applied in this study that consist of five independent variables respectively. The first model, Panel A indicated a dependent variable is HCE, while the independent variables are Gross Domestic Product (GDP), Population, Life Insurance Coverage (LIC), Household Final Consumption Expenditure (HFCE) and Consumer Price Index (CPI).

On the other hand, a dependent variable of the second model (Panel B) is GDP and the independent variables are HCE, Population, LIC, HFCE and CPI. Based on the variables of these both models, then Panel C and Panel D are generated by using

natural logarithm (ln). The ln transformation of the variables is to capture the non-linear and non-monotonic relationship between the dependent and independent variables as well as it indicates the coefficients of variables that interpret the elasticity.

3.3.1 Dependent Variables

This study applied four dependent variables, namely Health Care Expenditure (HCE) for the first model or Panel A and the Gross Domestic Product (GDP) for the second model or Panel B. Based on these both dependent variables, then the Panel C and Panel D are generated by using natural logarithm (ln).

3.3.1.1 Health Care Expenditure (HCE)

Health Care (HC) is the most important service that required by everyone that can be consider likes the food and shelter in which it is best provided through the voluntary and mutually beneficial market exchanges (Mackey, 2009). HC also can be defined as the services that provided to individuals or communities by agents of the health services or professions to promote, maintain, monitor or restore health. Health care is not limited to medical care, which implies action by or under the supervision of a physician. Health also could be considered as the resources for daily life, not the objective of living, it is a positive concept, emphasizing social and personal resources as well as physical capabilities (Porta, 2014).

The determinants of Health Care Expenditure (HCE) in the United Kingdom (UK) consist of the Dependency Rate, Gross Domestic Product per Capita, Inflation

Rate, Share of Total Public Expenditure in GDP and Shift Dummy of the UK by using a log-linear form. The regression technique showed there is high value of R-Square and low value of Durbin-Watson Statistic which is 0.924 and 0.062 respectively that suggests a potential regression problem. The re-examined data by using cointegration testing and standard unit root found the overwhelming evidence for non-stationary variables and no conclusive prove based on the existence of equilibrium relationships. It means, there is a short-run income elasticity because the significant statistics is less than one (Hitiris, 1997).

Besides that, HCE also could be the main determinant of the economic growth. This concept was revealed Health as the luxury goods if the responsiveness is sensitive to the income changes (the income elasticity exceeds unity) or as a necessity good if the responsiveness is insensitive to income changes (the income elasticity is below unity). The amount of HCE depends on the many factors such as capability of the countries to pay. There is a constraint when government set the limits on how much the country should spend on Health from the percentage of income. Demographic aspect such as the Share of Populations also reflects to the Health Expenditure (Newhouse, 1977; Bilgel, 2004).

3.3.1.2 Gross Domestic Product (GDP)

Based on the econometric model, Gross Domestic Product per Capita is considered as the most important determinants of Health Care Expenditures (HCE). It involved annual financial data of fourteen years in the twelve selected Asian countries that consist of Cambodia, China, Indonesia, Japan, Laos, Malaysia, Mongolia, Philippines, South Korea, Singapore, Thailand and Vietnam (Smith, 1967;

Pryor, 1968). The cross-section regressions of Aggregate Health Expenditure per Capita on GDP per Capita consistently showed an income elasticity significantly above one, which is from 1.20 to 1.50 (Kleiman 1974; Newhouse 1977; Leu 1986; Getzen 2000). This outcome is quite similar to the aggregate time-series regressions for the individual countries.

Rao (2008) examined the GDPpC could granger cause the expansion of Health Expenditures (HE) in Malaysia and Singapore. While, there is a bidirectional granger causality between GDP and HE in Indonesia and Thailand. Regarding to Murthy and Okunade (2009), the main determinants of Health Care Expenditures (HCE) in African countries consist of the GDPpC and Real Foreign Aid per Capita. The cross-sectional data used for the year of 2001 by using Ordinary Least Square (OLS) and Two-stage Least Square (TSLS) techniques. Last but not least, Ke (2011) found the Income per Capita has been identified as the very important factor to explaining the growth of Health Expenditure per Capita among the cross-sectional countries.

3.3.2 Independent Variables

The next section will be explained about the economic indicators as independent variables that used in this study.

3.3.2.1 Population

The Population Structure has an impact on the Health Care Expenditure (HCE). Murthy and Ukpolo (1994 & 1995) found Population as the main Determinants on the aggregate of Health Care Expenditure per Capita (HCEpC) in

United States by using time-series data for the period of 1960 to 1987. This study focused on the Age Structure of Population and Number of Practicing Physicians as the main contributors on the Health Expenditure. Another factors that influenced the HCEpC are Income per Capita and Public Financing of Health Care. In term of estimations, this study was applied the cointegration and error-correction modelling as well as unit root test.

This statement supported by Ke (2011) that stated the population is often included as a covariate in health expenditure regressions. Normally, the researchers used the share of young (under 15 years old) and old people (above 65 or 75 years old) over the active or total population. However, this variable has insignificant relationship with the Health Expenditure per Capita by using regression model (Leu 1986; Leu 1986; Hitiris & Posnett 1992; L.Di Matteo & R. Di Matteo 1998).

3.3.2.2 Life Insurance Coverage (LIC)

Life insurance coverage began to increase more rapidly starting from year 2000. By using this approaches, it help people to get the lower hospital utilization, reduced access to specialists and provide the price discounts. With the growth in incomes in the late 1990s, a consumer backlash developed against managed care's tight restrictions on access to care. People wanted greater access to specialists and broader provider networks, the threat of lawsuits and legislation limited insurers' willingness to deny experimental treatments and hospital mergers reduced the number of competitors, whereby enabling the price increase in the market. As health expenditure continues to rise, as does as financial hardship imposed on many by rising the LIC (Feldstein, 2012).

3.3.2.3 Household Final Consumption Expenditure (HFCE)

Household expenditures are closely interrelated and reflect the notions of well-being and wealth. The level of household expenditures indicates the level of economic system development as a whole. This raises the question of what factors influence the magnitude of household expenditures in different countries. In this regard, it is necessary to distinguish exogenous factors dictated by the state of a particular country economy and of world economy in general, so as demographic factors, which determine household structure and composition. HFCE as the macroeconomic factor affecting health expenditure of private sector in the Canada and United States (Newhouse, 1977; Hitiris & Posnett, 1992; Matteo & Matteo, 1998; Karatzas, 2000; Newhouse, 1977).

3.3.2.4 Consumer Price Index (CPI)

This independent variable are estimated based on the CPI (2010=100). Consumer Price Index would be used as an indicator to measure the inflation.

3.4 Theoretical Framework

The theoretical framework is built based on the combination of ideas and theories in order to help the researchers to identify the problems. In other words, it may have the capability to prove the relationship between Health Care Expenditure (HCE) with the Gross Domestic Product (GDP), Population, Life Insurance Coverage (LIC), Household Final Consumption Expenditure (HFCE) and Consumer Price Index

(CPI) for the first model (Panel A). This study also attempts to provide evidence of how the HCE, Population, LIC, HFCE and CPI give the significance influence on the economic growth for the second model (Panel B).

Based on the variables of these both models, the third model (Panel C) and fourth model (Panel D) are generated by using natural logarithm (ln). Any changes of independent variables would affect the changes in the dependent variable. Figure 3.1, Figure 3.2, Figure 3.3 and Figure 3.4 illustrated in details about the theoretical framework of this study.

Figure 3.1: Theoretical Framework of the First Model (Panel A)

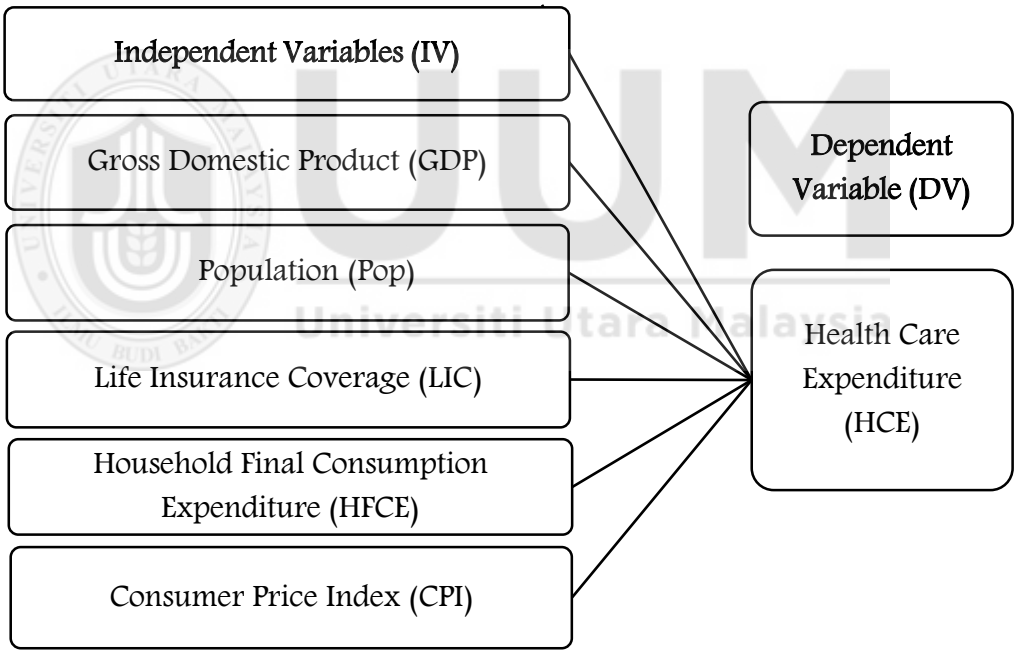


Figure 3.2: Theoretical Framework of the Second Model (Panel B)

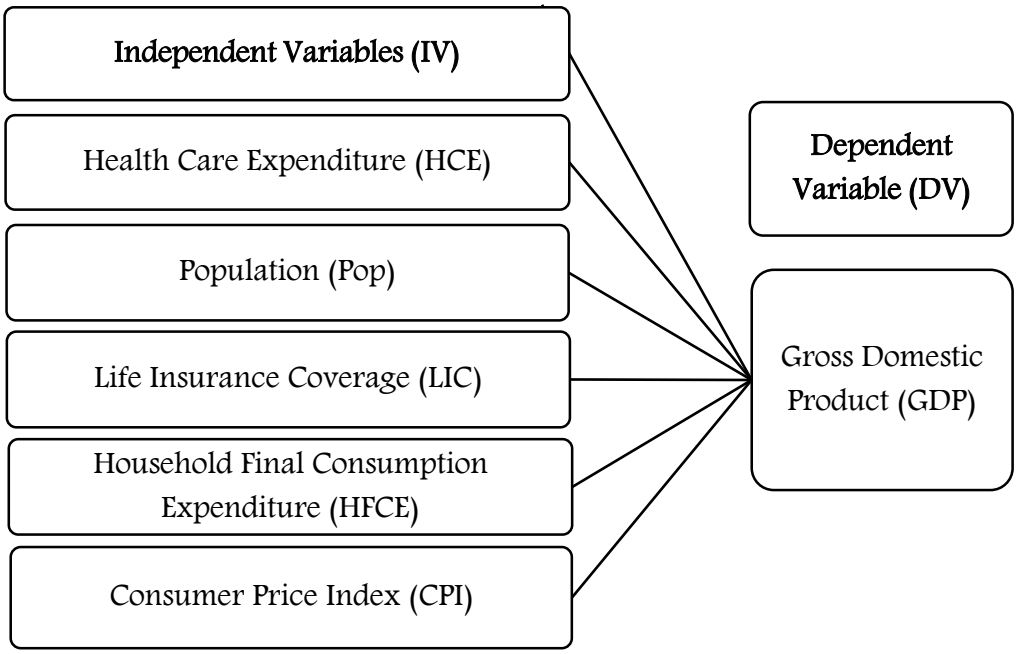


Figure 3.3: Theoretical Framework of the Third Model (Panel C)

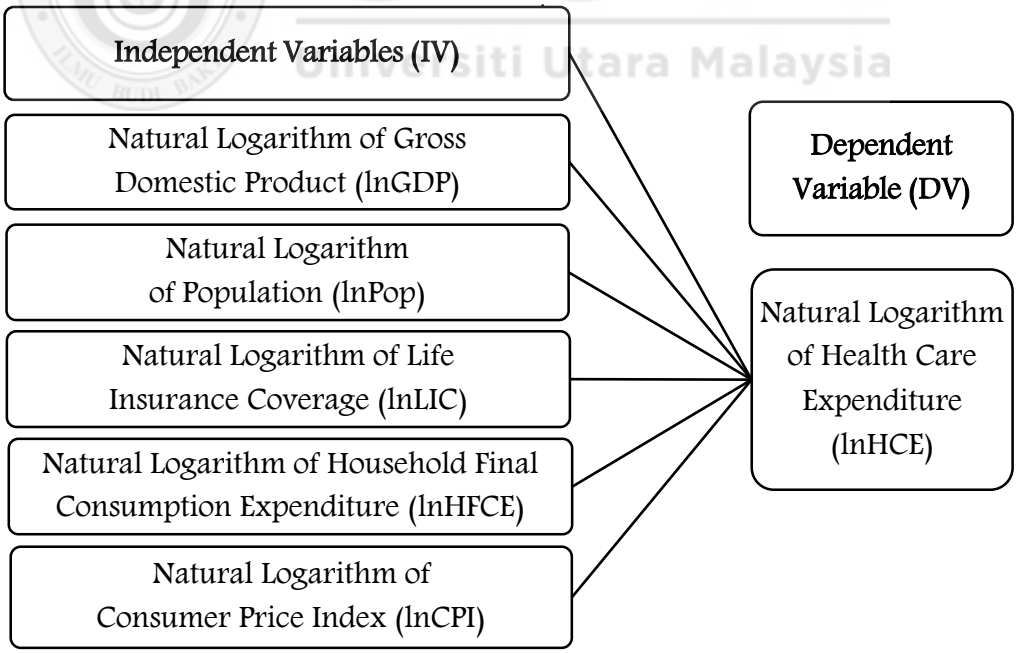
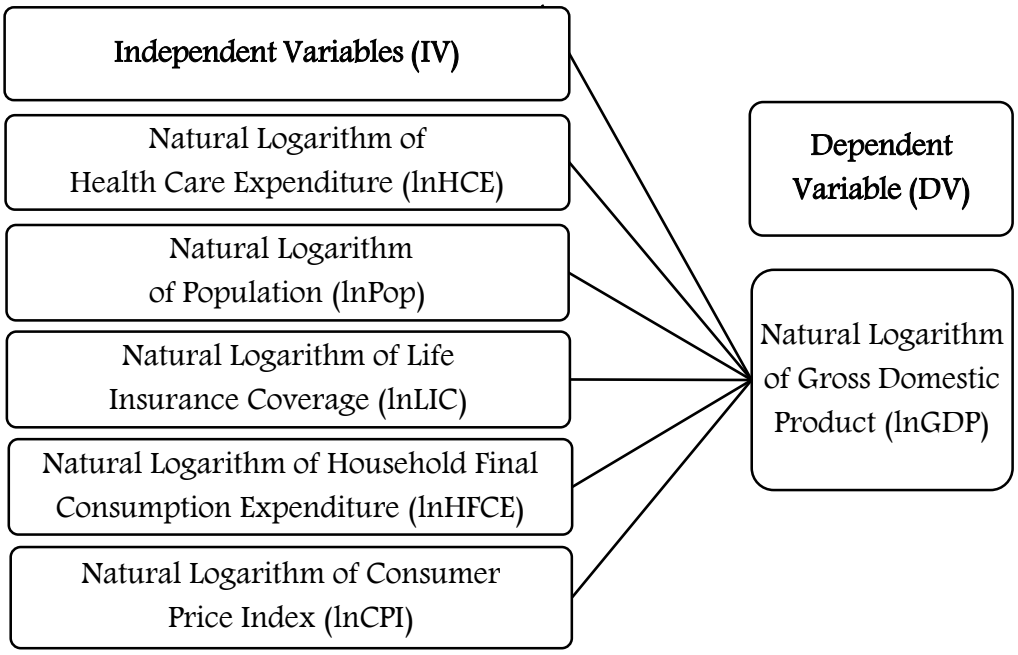


Figure 3.4: Theoretical Framework of the Fourth Model (Panel D)



3.5 Hypothesis Development

The hypothesis constructed in this study have the links with theoretical as well as an empirical and the research questions. The following section is explained about the three hypothesis that have been developed.

a) H_1: There is a significant relationship between Macroeconomic Variables and the Health Care Expenditure in ASEAN countries.

b) H_2: There is a significant relationship between Life Insurance Coverage and the Health Care Expenditure in ASEAN countries.

c) H_3: There is a significant relationship between Health Care Expenditure and the Economic Growth.

3.6 Econometric Model

Based on the hypothesis, it is necessary to establish a regression model that focused on the identify and predicts how the relationship between dependent variable and independent variables. The function of this study is:

$$y = f(x_1, x_2, x_3, x_4, x_5)$$

HCE = f (GDP, Pop, LIC, HFCE, CPI)...(Panel A)

GDP = f (HCE, Pop, LIC, HFCE, CPI)...(Panel B)

lnHCE = f (lnGDP, lnPop, lnLIC, lnHFCE, lnCPI)...(Panel C)

lnGDP = f (lnHCE, lnPop, lnLIC, lnHFCE, lnCPI)...(Panel D)

Where,

HCE	: Health Care Expenditure;
GDP	: Gross Domestic Product;
Pop	: Population;
LIC	: Life Insurance Coverage;
HFCE	: Household Final Consumption Expenditure;
CPI	: Consumer Price Index;
ln	: Natural Logarithm;
y	: Dependent Variable,
x_1, x_2, x_3, x_4, x_5	: Independent Variables.

The equation above shown HCE as a dependent variable, while GDP, Population, LIC HFCE and CPI are independent variables for the first model (Panel A). The GDP becomes a dependent variable for the second model (Panel B) and other variables such as HCE, Population, LIC, HFCE and CPI are expected to effect the DV. Based on the variables of these both models, the third model (Panel C) and fourth model (Panel D) are generated by using natural logarithm (ln). Hence, the function of econometric model can be specified as follows:

$$y_{it} = \beta_0 + \beta_{1it}x_{1it} + \beta_{2it}x_{2it} + \beta_{3it}x_{3it} + \beta_{4it}x_{4it} + \beta_{5it}x_{5it} + \mu_{it}$$

$$HCE_{it} = \beta_0 + \beta_1 GDP_{it} + \beta_2 Pop_{it} + \beta_3 LIC_{it} + \beta_4 HFCE_{it} + \beta_5 CPI_{it} + \mu_{it} \ldots \text{(Panel A)}$$

$$GDP_{it} = \beta_0 + \beta_1 HCE_{it} + \beta_2 Pop_{it} + \beta_3 LIC_{it} + \beta_4 HFCE_{it} + \beta_5 CPI_{it} + \mu_{it} \ldots \text{(Panel B)}$$

$$\ln HCE_{it} = \beta_0 + \beta_1 \ln GDP_{it} + \beta_2 \ln Pop_{it} + \beta_3 \ln LIC_{it} + \beta_4 \ln HFCE_{it} + \beta_5 \ln CPI_{it} + \mu_{it} \ldots \text{(Panel C)}$$

$$\ln GDP_{it} = \beta_0 + \beta_1 \ln HCE_{it} + \beta_2 \ln Pop_{it} + \beta_3 \ln LIC_{it} + \beta_4 \ln HFCE_{it} + \beta_5 \ln CPI_{it} + \mu_{it} \ldots \text{(Panel D)}$$

Where,

β_0	: An Intercept or Constant;
$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$	: Coefficient of the Parameters;
μ_{it}	: Disturbance Term or Error Term;
i	: Cross-sectional Unit;
t	: Time Period.

3.7 Statistical Testing Model

3.7.1 T-static Test

The aim of this statistical test is to identify the significant differences of the Health Care Expenditure (HCE) when the sample was grouped by the Gross Domestic Product (GDP), Population, Life Insurance Coverage (LIC), Household Final Consumption Expenditure (HFCE) and Consumer Price Index (CPI). The t-test used in this study is:

H_0: $\beta_i = 0$

H_1: $\beta_i \neq 0$

Beta is the slope of the independent model. When the value of statistical beta is equal to zero, then the independent variables have no significant relationship to the dependent variable. H_0 acceptance criteria are as follow.

3.7.1.1 The Comparison of t-static and t-table

Comparing the calculation of t-value to t-table, with the degree of freedom n-2, where n is the number of observations as well as the level of significance to be used.

If t static > t table, H_0 is rejected.

If t static < t table, H_0 is accepted.

3.7.1.2 The Probability

If the probability (p-value) > 0.10, so H_0 is accepted.

If the probability (p-value) < 0.10, so H_0 is rejected.

3.7.2 f-static Test

The function of f-test is to tests whether the coefficient of regression is significant or not significant of coefficient regression is statistically not equal to zero. The f-test used in this study is:

H_0: $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5 = 0$.

H_1: $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5 \neq 0$.

Beta is the slope of the independent model, H_0 acceptance criteria are as the following section.

3.7.2.1 The Comparison of f-static and f-table

If f-static > $F_{a;(k, n-k-1)}$, H_0 is rejected.

If f-static < $F_{a;(k, n-k-1)}$, H_0 is accepted.

3.7.2.2 The Probability

If the probability (p-value) > 0.05, so H_0 is accepted.

If the probability (p-value) < 0.05, so H_0 is rejected.

3.7.3 Coefficient Determination

R^2 or adjusted R^2 also known as the coefficient of determination. The function of the coefficient is to identify how large the proportion in which the dependent variable could be explained the independent variables together in the same. This value indicates how close the estimated regression line to the actual data. Furthermore, the range value of the R^2 is between $0<R^2<1$. The larger value of the R^2, the better of the regression model. In addition, if R^2 value is 0, it means the variation of the dependent variable could not be explained at all of the independent variables.

3.8 Empirical Method

The analysis of this study is conducted quantitatively by collecting data, determining the variables, building a theoretical framework and testing the research hypothesis. There are two techniques applied to perform the data processing, namely the Stata SE 12 and Eviews 9.0. It is a statistical technique to predict the indicators that influenced the dependent variable. The first procedure of data management in this study has converted the data into a proxy to be used as independent variables by using Microsoft Excel for the research period of 1995 to 2014. Then, run the data to generate the significance outcomes. The following sections explained in details about the empirical methods used in this research project.

3.8.1 Descriptive Statistics

The descriptive coefficients used in this study to summarize a data set either to represent the total population or sample of the research. The descriptive statistics begin with the data analysis to inspect the data file and to explore the nature of all variables. Descriptive statistics help researchers to understand a large size of data set by converting it into bite-sized descriptions. It can measure a central of a tendency that consists of mode, mean and median. The central of tendency is referred to a central position of the data set to analyze the frequency of each data point. In addition, descriptive statistics also can be used to identify the variability such as standard deviation or variance, minimum and maximum variables as well as the kurtosis and skewness (Leary, 2004).

3.8.2 Pearson Correlation

The Pearson Correlation also refers to a Pearson Product Moment Correlation Coefficient or Zero-order Correlation that illustrates the correlation as a simple bivariate correlation between two variables. It used in this study to determine the strength and direction of a linear relationship between two variables. It means, any changes in independent variables would affect the dependent variable, either in the same or opposite directions. Therefore, the result of correlation matrix analyzed the strength of linear relationship only, not on the non-linear relationship. The result of linear regression is ranging between +1 to -1.

The value of +1 represents a perfect positive relationship between two or more variables. While, the value of -1 shows there is the perfect negative relationship

between two or more variables. Sevilla (1992) suggested the scale to illustrate the relationship between dependent and independent variables as shown in Table 3.3.

Table 3.3: Scale Indices of Pearson Correlation

Pearson's r	Indication
Between ± 0.80 to ± 1.00	High Correlation
Between ± 0.60 to ± 0.79	Moderately High Correlation
Between ± 0.40 to ± 0.59	Moderate Correlation
Between ± 0.20 to ± 0.39	Low Correlation
Between ± 0.01 to ± 0.19	Negligible Correlation

3.8.3 Multiple Regression Model

In the regression, all independent variables included in the model simultaneously to explain it contributions to the dependent variable. It is defined as an extension of simple linear regression and used in order to predict the value of a variable based on the value of two or more other variables. Multiple regression identified how much of the changes in Health Care Expenditure (HCE) or Gross Domestic Product (GDP) could be explained by the Population, Life Insurance Coverage (LIC), Household Final Consumption Expenditure (HFCE) and Consumer Price Index (CPI).

Besides that, multiple regression model also explains the relative influence that each independent variable has in explaining the changes. This study used regression model based on balanced panel data to derive the relationship between dependent variable and independent variables. Therefore, there are two basic

approaches in making a regression that consists of Analysis of Variance (ANOVA) and Pooled Ordinary Least Square (POLS).

3.8.3.1 Analysis of Variance (ANOVA)

ANOVA is referred to a collection of statistical models that used to estimates the differences in group mean and the variation between groups. The f-statistic of AVOVA tests determine the overall regression model is a good fit for the data if its value is more than 1.0 with the statistical significant at 0.05 level. When an effect is statistically significant, the change of GDP, Population, LIC, HFCE and CPI are associated with the changes in HCE for the first model (Panel A). While, the change of HCE, Population, LIC, HFCE and CPI are linked to the changes in the GDP for the second model (Panel B).

These both interpretations were applied for the third and fourth models, namely Panel C and Panel D respectively that are generated by using natural logarithm (ln). In general, the explanation does not change even the value of f-test is not significant because it is a collective significance of the entire model that differ from the significance of specific effects.

3.8.3.2 Pooled Ordinary Least Square (POLS)

This technique would be used without consider the country and time effects for investigates the determinants of Health Care Expenditure (HCE): an empirical evidence from ASEAN countries. POLS estimates an intercept constant of ASEAN countries. The cross-section estimations have no difference and it is beneficial when

the data set is a priori homogeneous (Asteriou, 2011). For example, there is some of restriction in using ASEAN countries as the sample. An equation of Pooled Ordinary Least Square can be written as:

$$y_{it} = \beta_0 + \beta_{1it}x_{1it} + \beta_{2it}x_{2it} + \beta_{3it}x_{3it} + \beta_{4it}x_{4it} + \beta_{5it}x_{5it} + \mu_{it}$$

$$HCE_{it} = \beta_0 + \beta_1 GDP_{it} + \beta_2 Pop_{it} + \beta_3 LIC_{it} + \beta_4 HFCE_{it} + \beta_5 CPI_{it} + \mu_{it} \ldots \text{(Panel A)}$$

$$GDP_{it} = \beta_0 + \beta_1 HCE_{it} + \beta_2 Pop_{it} + \beta_3 LIC_{it} + \beta_4 HFCE_{it} + \beta_5 CPI_{it} + \mu_{it} \ldots \text{(Panel B)}$$

$$\ln HCE_{it} = \beta_0 + \beta_1 \ln GDP_{it} + \beta_2 \ln Pop_{it} + \beta_3 \ln LIC_{it} + \beta_4 \ln HFCE_{it} + \beta_5 \ln CPI_{it} + \mu_{it} \ldots \text{(Panel C)}$$

$$\ln GDP_{it} = \beta_0 + \beta_1 \ln HCE_{it} + \beta_2 \ln Pop_{it} + \beta_3 \ln LIC_{it} + \beta_4 \ln HFCE_{it} + \beta_5 \ln CPI_{it} + \mu_{it} \ldots \text{(Panel D)}$$

3.8.4 Panel Data Analysis

This analysis is referred to a combination of cross-sectional and time-series data, where the observations based on the same units such as corporations, countries and markets in different durations (monthly, quarterly or annually). This study used annual data from 1995 to 2014 that involves ten ASEAN countries such as Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam. The panel data analysis applied in this research project is consists of Common Effects, Fixed Effects and Random Effects.

3.8.4.1 Common Effects (CE)

In traditional specifications, Random Effects is biased even though it more precise and quite flexible. Alternatively, Fixed Effects is unbiased but it less flexible, less precise and cannot be used to explore the effect of group-level characteristics. So, this subsection introduced one estimation variant meant which is Common Effects. This technique also known as the between regression model that refers to the cross-sectional dimension (differences units) of the data by regressing the individual averages of dependent variable (y) on the individual averages of the independent variables (x) and a constant using Pooled Ordinary Least Square (POLS).

$$y_{it} = \beta_0 + \beta_{1it}(x_{1it} - \bar{x}_{1i}) + \beta_{2it}(x_{2it} - \bar{x}_{2i}) + \beta_{3it}(x_{3it} - \bar{x}_{3i}) + \beta_{4it}(x_{4it} - \bar{x}_{4i}) + \beta_{5it}(x_{it} - \bar{x}_{5i}) + \mu_{it}$$

$$HCE_{it} = \beta_0 + \beta_1 (GDP_{it} - \overline{GDP_i}) + \beta_2 (Pop_{it} - \overline{Pop_i}) + \beta_3 (LIC_{it} - \overline{LIC_i}) + \beta_4 (HFCE_{it} - \overline{HFCE_i}) + \beta_5 (CPI_{it} - \overline{CPI_i}) + \mu_{it} \ldots \text{(Panel A)}$$

$$GDP_{it} = \beta_0 + \beta_1 (HCE_{it} - \overline{HCE_i}) + \beta_2 (Pop_{it} - \overline{Pop_i}) + \beta_3 (LIC_{it} - \overline{LIC_i}) + \beta_4 (HFCE_{it} - \overline{HFCE_i}) + \beta_5 (CPI_{it} - \overline{CPI_i}) + \mu_{it} \ldots \text{(Panel B)}$$

$$lnHCE_{it} = \beta_0 + \beta_1 (lnGDP_{it} - \overline{lnGDP_i}) + \beta_2 (lnPop_{it} - \overline{lnPop_i}) + \beta_3 (lnLIC_{it} - \overline{lnLIC_i}) + \beta_4 (lnHFCE_{it} - \overline{lnHFCE_i}) + \beta_5 (lnCPI_{it} - \overline{lnCPI_i}) + \mu_{it} \ldots \text{(Panel C)}$$

$$lnGDP_{it} = \beta_0 + \beta_1 (lnHCE_{it} - \overline{lnHCE_i}) + \beta_2 (lnPop_{it} - \overline{lnPop_i}) + \beta_3 (lnLIC_{it} - \overline{lnLIC_i}) + \beta_4 (lnHFCE_{it} - \overline{lnHFCE_i}) + \beta_5 (lnCPI_{it} - \overline{lnCPI_i}) + \mu_{it} \ldots \text{(Panel D)}$$

Where,

$(x_{it} - \bar{x}_i)$: Group-level Mean of Each Independent Variables.

3.8.4.2 Fixed Effects (FE)

An intercept of FE Model is considered as the group specific that enable for dissimilar intercepts of ASEAN countries, namely Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam. The concept of Fixed Effects was considered a few elements such as geographical factor and natural treasures that involves the entire effects of particular countries but not vary over the time. This study concentrated on the determinants of Health Care Expenditure (HCE) of ASEAN countries and the One-way Fixed Effects is an appropriate model that constant for group of the countries. This technique illustrated an intercept is varies across the countries, but the slope is still common. An equation of the One-way FE Model can be written as:

$$y = \beta_{0i} + \beta_{1it}x_{1it} + \beta_{2it}x_{2it} + \beta_{3it}x_{3it} + \beta_{4it}x_{4it} + \beta_{5it}x_{5it} + \mu_{it}$$

$$HCE_{it} = \beta_{0i} + \beta_1 GDP_{it} + \beta_2 Pop_{it} + \beta_3 LIC_{it} + \beta_4 HFCE_{it} + \beta_5 CPI_{it} + \mu_{it} \ldots \text{(Panel A)}$$

$$GDP_{it} = \beta_{0i} + \beta_1 HCE_{it} + \beta_2 Pop_{it} + \beta_3 LIC_{it} + \beta_4 HFCE_{it} + \beta_5 CPI_{it} + \mu_{it} \ldots \text{(Panel B)}$$

$$\ln HCE_{it} = \beta_{0i} + \beta_1 \ln GDP_{it} + \beta_2 \ln Pop_{it} + \beta_3 \ln LIC_{it} + \beta_4 \ln HFCE_{it} + \beta_5 \ln CPI_{it} + \mu_{it} \ldots \text{(Panel C)}$$

$$\ln GDP_{it} = \beta_{0i} + \beta_1 \ln HCE_{it} + \beta_2 \ln Pop_{it} + \beta_3 \ln LIC_{it} + \beta_4 \ln HFCE_{it} + \beta_5 \ln CPI_{it} + \mu_{it} \ldots \text{(Panel D)}$$

Where,

β_{0i} : Heterogeneity or unobserved effect of ASEAN countries that effects the HCE for Panel A, GDP for the Panel B, lnHCE for Panel C and lnGDP for Panel D.

3.8.4.3 Random Effects (RE)

Another technique to estimates the panel data analysis is Random Effects, in which the random outcome is derived from an intercept of RE Model. The function of random outcome is a mean value added of the disturbance term. There is a need of particular assumptions in the distribution of random component due to the weakness of Random Effects Model. However, the benefits of using this techniques are enable the independent variables that have equal value of all observations to make estimation within a group (Asrteriou, 2011). Hence, the RE Models can be written as the following equation:

$$y = (\beta_0 + v_i) + \beta_{1it}x_{1it} + \beta_{2it}x_{2it} + \beta_{3it}x_{3it} + \beta_{4it}x_{4it} + \beta_{5it}x_{5it} + \mu_{it}$$

$$HCE_{it} = (\beta_0 + v_i) + \beta_1 GDP_{it} + \beta_2 Pop_{it} + \beta_3 LIC_{it} + \beta_4 HFCE_{it} + \beta_5 CPI_{it} + \mu_{it} \ldots \text{(Panel A)}$$

$$GDP_{it} = (\beta_0 + v_i) + \beta_1 HCE_{it} + \beta_2 Pop_{it} + \beta_3 LIC_{it} + \beta_4 HFCE_{it} + \beta_5 CPI_{it} + \mu_{it} \ldots \text{(Panel B)}$$

$$lnHCE_{it} = (\beta_0 + v_i) + \beta_1 lnGDP_{it} + \beta_2 lnPop_{it} + \beta_3 lnLIC_{it} + \beta_4 lnHFCE_{it} + \beta_5 lnCPI_{it} + \mu_{it} \ldots \text{(Panel C)}$$

$$\ln GDP_{it} = (\beta_0 + v_i) + \beta_1 \ln HCE_{it} + \beta_2 \ln Pop_{it} + \beta_3 \ln LIC_{it} + \beta_4 \ln HFCE_{it} + \beta_5 \ln CPI_{it} + \mu_{it} \ldots \text{(Panel D)}$$

Where,

$(\beta_0 + v_i)$: Constant of Each Section,

v_i : Zero Mean Standard Random Variable.

3.8.5 Specification Test of the Panel Data Analysis

The Common Effects (CE), Fixed Effects (FE) and Random Effects are probably same model by taking dissimilar expectation of covariance. In order to prove which technique is an appropriate model, then Likelihood Ratio, Hausman Test and Lagrange Multiplier (LM) Test are estimated.

3.8.5.1 Likelihood Ratio

Likelihood ratio or commonly known as Redundant Fixed Effect can be defined as a statistical test to compare the fit goodness between two or more variables. In this study, this technique used to select which model is more preferable between the Common Effects (CE) Model and Fixed Effects (FE) Model. If the value of chi-square is greater than 0.05 (p-value > 0.05), then the CE Model is much better rather than FE Model. The hypothesis testing of Likelihood Test are:

H_0 : Common Effects is an appropriate model.

H_1 : Fixed Effects is an appropriate model.

3.8.5.2 Hausman Test

The Hausman test is used to select the best model between the Fixed Effects (FE) Model and Random Effects (RE) Model. Besides that, it examining either the regressors have the connection with the countries effect or not. This technique generates a consistent result even the estimators are correlated to the countries. If null hypothesis (H_0) is accepted, then the RE Model more efficient, whereas if H_0 rejected, then the FE Model is more appropriate than the RE Model. Generally, there are at least two estimators of β_0 and β_1 as well as consists of two hypothesis testing. Under H_0, the value of β_0 is incompetent, while the both estimators are consistent. In contrast, under the alternate hypothesis (H_1) the value of β_0 is competent and consistent but β_1 is inconsistent.

In other words, if p-value less than 0.05 or 5%, it is a significant value and should reject the null hypothesis. It means, fixed effect model is more preferable rather than random effect model. The specific hypothesis of Hausman Test as follow:

H_0 : Random Effects (RE) is an appropriate model.

H_1 : Fixed Effect (FE) is an appropriate model.

3.8.5.3 Lagrange Multiplier (LM) Test

LM Test is referred to a general principle to prove the hypothesis testing of the Determinants of Health Care Expenditure (HCE) in ASEAN countries. This statistical test estimates the null hypothesis of Common Effects (CE) Model is adequate against the Random Effects (RE) Model. The hypothesis testing of LM Test are:

H_0 : Common Effects (CE) is an appropriate model.

H_1 : Random Effects (RE) is an appropriate model.

3.8.6 Diagnotic Test

This techniques used to check the reliability of the four models (Panel A, Panel B, Panel C and Panel D) that consists of Multicollinearity Test and Heteroskedasticity Test. In order to check the existence of Multicollinearity problem, Variance Inflation Factor (VIF) is conducted. While, a Modified Wald Test was used to detect the Heteroskedasticity problem.

3.8.6.1 Multicollinearity Test

The Multicollinearity is referred to a strong relationship between independent variables. The purpose of this technique is to determine either each variable has linear correlation with the regression model. The Multicollinearity problem is detected when independent variables have the relationship between each other (Gujarati, 2003). Besides that, a few disadvantages of using Multicollinearity test is it makes the indicator become untrusted when there is a standard error coefficient (t-test). The Variance of Inflation Factor (VIF) is used to test this technique. It means, there is a Multicollinearity problem if the value of VIF is more than 10.

3.8.6.2 Heteroscedasticity Test

This technique is a residual of the model that has or does not has the constant variance. Heteroscedasticity happened when there is an error in expectation and variance that different for the each duration (time period). The Autoregressive Conditional Heteroscedasticity (ARCH) is used to test either it has the Heteroscedasticity problem or not.

3.8.7 Cointegration Test: Granger Causality Test

In recent years, the panel dataset are reasonably large in both cross-sectional and time dimensions. If the two variables are cointegrated then it would has granger causality at least in one direction (Eagle, 1987; Granger, 1988). The Granger Causality is a statistical concept of causality that is based on prediction (Seth, 2007). The purpose of this technique is to examine the causality relationship between Health Care Expenditure (HCE) with the Gross Domestic Product (GDP), Population, Life Insurance Coverage (LIC), Household Final Consumption Expenditure (HFCE) and Consumer Price Index (CPI) for the first model (Panel A).

This study also analyse the way of a causal relationship between GDP with HCE, Population, LIC, HFCE and CPI for the second model (Panel B). Besides that, there are another two models generated by using natural log (ln) for a dependent variable and the independent variables in the Panel A and Panel B. The independent variables (IV) are granger-causes of dependent variable (DV) if DV can be greater predicted by using the history of IV alone or the histories of both, IV and DV.

3.9 Conclusion

In conclusion, this chapter represents the data collection, provides a clear explanation about the variables and build a theoretical framework that were used in this study. The main motivation of this research project is to investigate the determinants of Health Care Expenditure (HCE): an empirical evidence from ASEAN countries. The techniques were applied to analyse the hypothesis testing for the four models are consist of Descriptive Statistic; Pearson Correlation; Regression Model: Pooled Ordinary Least Square (POLS); Common Effects (CE); Fixed Effects (FE); Random Effects (RE); Likelihood Ratio; Hausman Test; Lagrange Multiplier (LM) Test; Diagnotic Test: Multicollinearity Test and Heteroskedasticity Test; as well as the Cointegration Test: Granger Causality Test.

CHAPTER FOUR

RESULTS AND FINDINGS

4.0 Introduction

The main motivation of this research project is to investigate the determinants of Health Care Expenditure (HCE): an empirical evidence from ASEAN countries. The first model, Panel A examine the relationship between HCE with the Gross Domestic Product (GDP), Population, Life Insurance Coverage (LIC), Household Final Consumption Expenditure (HFCE) and Consumer Price Index (CPI). For the second model, Panel B identifies the significance influence of HCE, Population, LIC, HFCE and CPI on the economic growth. Based on the variables of these both models, Panel C and Panel D were generated by using natural logarithm (ln).

There are two techniques applied to analyse the significance results, namely Stata SE 12 and Eviews 9.0. The first approach of Stata SE 12 estimates the Pooled Ordinary Least Square; Common Effects (CE); Fixed Effects (FE); Random Effects (RE); Likelihood Ratio; Hausman Test; Lagrange Multiplier Test; Diagnostic Test: Multicollinearity and Heteroskedasticity Test. While, Eviews 9.0 used to evaluate the Descriptive Statistics; Pearson Correlations and Cointegration Test: Granger Causality Test. Both of these techniques prove the hypothesis testing in the following section and supported by the previous empirical works.

4.1 Descriptive Statistics

Table 4.1 illustrated the mean, median, maximum, minimum, standard deviation, skewness and kurtosis of each variable for the four models.

Table 4.1: Descriptive Statistics

	Mean	Medium	Maximum	Minimum	Std. Deviation	Skewness	Kurtosis
Panel A and Panel B							
HCE	261.0160	63.60000	2752.300	1.800000	454.0714	2.972040	13.23327
GDP	1.24E+11	8.19E+10	9.18E+11	1.28E+09	1.65E+11	2.663928	11.96439
Pop	55486199	37306464	2.54E+08	295010.0	64735379	1.694703	5.228174
LIC	1.264589	0.683150	9.021100	-0.002300	1.601801	1.769157	6.319565
HFCE	1.68E+11	7.51E+10	1.32E+12	8.75E+08	2.32E+11	2.406094	10.06914
CPI	78.63200	84.75000	143.6000	5.500000	28.58928	-0.671503	3.021940
Panel C and Panel D							
lnHCE	4.320449	4.152750	7.920200	0.603600	1.663162	0.112764	2.368876
lnGDP	24.54744	25.12815	27.54530	20.97030	1.666964	-0.370600	1.985620
lnPop	16.84698	17.41455	19.35460	12.59480	1.806330	-0.892169	3.082137
lnLIC	1.264589	0.683150	9.021100	-0.002300	1.601801	1.769157	6.319565
lnHFCE	24.62037	25.04260	27.90550	20.58920	1.898373	-0.337221	1.880763
lnCPI	4.247408	4.439700	4.967300	1.713500	0.589580	-2.336298	8.959142

Note: HCE: Health Care Expenditure; GDP: Gross Domestic Product; Pop: Population; LIC: Life Insurance Coverage; HFCE: Household Final Consumption Expenditure and CPI: Consumer Price Index.

Based on the table above, Panel A represent HCE as a dependent variable while GDP, Population, LIC, HFCE and CPI as the independent variables. For Panel B, it indicates GDP as a dependent variable while HCE, Population, LIC, HFCE and CPI as the independent variables. This study reported the highest and lowest mean values are HFCE and CPI for both Panel A and Panel B which is $\bar{x}_{HFCE}$=1.68E+11 and $\bar{x}_{CPI}$=78.6320 respectively. The highest and lowest standard deviation are recorded in HFCE (σ_{HFCE}=2.32E+11) and LIC (σ_{LIC}=1.6018). Regarding to the variables in Panel A and Panel B, there are another two models were generated by using natural logarithm (ln).

Another two models, Panel C and Panel D reported the highest and lowest mean values are lnHFCE ($\bar{x}_{lnHFCE}$=24.6204) and lnLIC ($\bar{x}_{lnLIC}$=1.2646) respectively. The highest and lowest standard deviation are lnHFCE (σ_{lnHFCE}=1.8984) and lnCPI (σ_{lnCPI}=0.5896) respectively. For overall, the mean and standard deviation of HCE ($\bar{x}_{HCE}$=261.0160, σ_{HCE}=454.0714) is lower than GDP ($\bar{x}_{GDP}$=1.24E+11, σ_{GDP}=1.65E+11) for the Panel A and Panel B. This outcome quite similar to the Panel C and Panel D, the mean and standard deviation of lnHCE ($\bar{x}_{lnHCE}$=4.3204, σ_{lnHCE}=1.6632) is lower than lnGDP ($\bar{x}_{lnGDP}$=24.5474, σ_{lnGDP}=1.6670).

The skewness indicated a symmetry of the distribution. Positive skewness explained the clustered scores situated on the left-hand side and low values. For Panel A and Panel B, the positive skewness shown by HCE, GDP, Population, LIC and HFCE which is 2.9720, 2.6639, 1.6947, 1.7692 and 2.4061 respectively. However, the negative skewness value is clustered score at the high-end that situated on the right-hand side. It shown by CPI which is -0.6715. For the Panel C and Panel D, the positive skewness value

indicated by lnHCE of 0.1128 and lnLIC of 1.7692. While, the negative skewness value shown by lnGDP, lnPop, lnHFCE and lnCPI which is -0.3706, -0.8922, -0.3372 and -2.3363 respectively. This findings supported by Sulku (2011) that reported there is a negative skewness between lnPop and lnHCE.

Kurtosis provided information of distribution peak. Positive kurtosis value displays the distribution is rather peaked (clustered in the center) with long thin tails. While, the kurtosis value below than zero means a distribution is relatively flat. This study found there is a positive kurtosis value for the dependent and independent variables in the four models. For Panel A and Panel B, HCE of 13.2333 and CPI of 3.0219 are the highest and lowest kurtosis. While, Panel C and Panel D found the highest and lowest kurtosis are lnCPI of 8.9591 and lnHFCE of 1.8808.

In conclusion, Panel A and Panel B represent the highest and lowest values of mean and standard deviation are HFCE and LIC as well as the highest and lowest values of skewness and kurtosis represent by HCE and CPI. For Panel C and Panel D, lnHFCE has the highest value of mean and standard deviation while lnLIC and lnCPI have the lowest value mean and standard deviation respectively. The highest and lowest values of skewness represent by lnLIC and lnCPI as well as the highest and lowest values of kurtosis are lnCPI and lnHFCE respectively.

4.2 Pearson Correlation

This correlation was used to investigate the relationship between two or more variables.

Table 4.2: Correlation Matrix

	HCE	GDP	Pop	LIC	HFCE	CPI
Panel A and Panel B						
HCE	1.000000 --					
GDP	0.117741 0.0968	1.000000 --				
Pop	-0.336726 0.0000	0.665301 0.0000	1.000000 --			
LIC	0.606741 0.0000	0.317635 0.0000	-0.162837 0.0212	1.000000 --		
HFCE	-0.125024 0.0777	0.937992 0.0000	0.824626 0.0000	0.127997 0.0709	1.000000 --	
CPI	0.365134 0.0000	0.357607 0.0000	-0.095856 0.1769	0.315803 0.0000	0.260414 0.0002	1.000000 --

Note: HCE: Health Care Expenditure; GDP: Gross Domestic Product; Pop: Population; LIC: Life Insurance Coverage; HFCE: Household Final Consumption Expenditure and CPI: Consumer Price Index.

Table 4.2: Correlation Matrix

	lnHCE	lnGDP	lnPop	lnLIC	lnHFCE	lnCPI
Panel C and Panel D						
lnHCE	1.000000 --					
lnGDP	0.378072 0.0000	1.000000 --				
lnPop	-0.500065 0.0000	0.580675 0.0000	1.000000 --			
lnLIC	0.681895 0.0000	0.537075 0.0000	-0.098731 0.1643	1.000000 --		
lnHFCE	0.241766 0.0006	0.856776 0.0000	0.659353 0.0000	0.392366 0.0000	1.000000 --	
lnCPI	0.632290 0.0000	0.355353 0.0000	-0.153634 0.0299	0.312582 0.0000	0.323595 0.0000	1.000000 --

Note: lnHCE: Natural Logarithm of Health Care Expenditure; lnGDP: Natural Logarithm of Gross Domestic Product; lnPop: Natural Logarithm of Population; lnLIC: Natural Logarithm of Life Insurance Coverage; lnHFCE: Natural Logarithm of Household Final Consumption Expenditure and lnCPI: Natural Logarithm of Consumer Price Index.

Table 4.2 showed the correlation coefficients in order to estimate the strength of the relationship between Health Care Expenditure (HCE) with the Gross Domestic Product (GDP), Population, Life Insurance Coverage (LIC), Household Final Consumption Expenditure (HFCE) and Consumer Price Index (CPI). The variables might have Multicollinearity problem if the value of Pearson correlation is more than 0.80 (Gujarati, 2003). However, the purposes of the study are the main element to interpreting and explaining this correlation coefficient. For Panel A, a positive correlation with the moderately strong relationship of 0.6067 between LIC and HCE suggests the greater of LIC will lead to the higher level of HCE at 0.01 level of statistical significant.

The positive correlation with the weak relationship of 0.3651 between CPI and HCE suggests the greater of CPI associated with the higher level of HCE at 0.01 level of statistical significant. Next, a positive correlation with the very weak relationship of 0.1177 between GDP and HCE suggests the greater of GDP will lead to the higher level of HCE at 0.10 level of statistical significant. A negative correlation with the weak relationship of -0.3367 between Population and HCE suggests the lesser of Population associated with the higher level of HCE at 0.01 level of statistical significant. The negative correlation with the very weak relationship of -0.1250 between HFCE and HCE suggests the lesser of HFCE will lead to the higher level of HCE at 0.10 level of statistical significant.

For Panel B, a positive correlation with the strong relationship of 0.9380 between HFCE and GDP suggests the greater of HFCE associated with the higher level of GDP at 0.01 level of statistical significant. The positive correlation with the moderately strong relationship of 0.6653 between Population and GDP suggests the greater of Population

will lead to the higher level of GDP at 0.01 level of statistical significant. A positive correlation with the weak relationship of 0.3176 and 0.3576 between LIC and CPI respectively with the GDP suggest the greater of LIC and CPI associated with the higher level of GDP at 0.01 level of statistical significant. The positive correlation with the very weak relationship of 0.1177 between HCE and GDP suggests the greater of HCE will lead to the higher level of GDP at 0.10 level of statistical significant.

For Panel C, a positive correlation with the moderately strong relationship of 0.6819 and 0.6323 between lnLIC and lnCPI respectively with the lnHCE suggest the greater of lnLIC and lnCPI associated with the higher level of lnHCE at 0.01 level of statistical significant. The positive correlation with the weak relationship of 0.3781 and 0.2418 between lnGDP and lnHFCE respectively with the lnHCE suggest the greater of lnGDP and lnHFCE will lead to the higher level of lnHCE at 0.01 level of statistical significant. While, the negative correlation with the moderately strong relationship of -0.5001 between lnPop and lnHCE suggests the lesser of lnPop associated with the higher level of lnHCE at 0.01 level of statistical significant.

For Panel D, a positive correlation with the strong relationship of 0.8568 between lnHFCE and lnGDP suggests the greater of lnHFCE will lead to the higher level of lnGDP at 0.01 level of statistical significant. The positive correlation with the moderate relationship of 0.5807 and 0.5371 between lnPop and lnLIC respectively with the lnGDP suggest the greater of lnPop and lnLIC associated to the higher level of lnGDP at 0.01 level of statistical significant. Next, a positive correlation with the weak relationship of 0.3781 and 0.3554 between lnHCE and lnCPI respectively with the lnGDP suggest the

greater of lnHCE and lnCPI will lead to the higher level of lnGDP at 0.01 level of statistical significant.

4.3 Analysis of Static Model: Multiple Regressions

This section discussed an extension of simple linear regression that used to predict the value of a variable based on the value of two or more other variables. Multiple regression analyzed how much the changes of dependent variable could be explained by the independent variables. Table 4.3 shows the summary of the regression model used in this study.

Table 4.3: Model Summary

	Mode	R	R^2	Adjusted R^2	Std. Error of Regression	Durbin – Watson
Panel A	1	0.772578	0.596877	0.586488	291.9903	0.111780
Panel B	1	0.973788	0.948263	0.946929	3.80E+10	0.265856
Panel C	1	0.985610	0.971427	0.970691	0.284733	0.245342
Panel D	1	0.973310	0.947332	0.945975	0.387458	0.153251

*Note: The *, ** and *** are 10%, 5% and 1% level of significant.*

For the first model (Panel A), the value of R^2_A=0.5969 referred to the variance of 59.69% in the HCE that explains by the GDP, Population, LIC, HFCE and CPI. For Panel B, R^2_B=0.9483 is indicating the second model would be able to explain 94.83% of the variation in the GDP is influenced by the HCE, Population, LIC, HFCE and CPI. These

interpretations are quite similar for the third and fourth models because it used the same variable by converting into natural log (ln). For the Panel C, the value of R^2_C=0.9714 referred to the variance of 97.14% in the lnHCE that explains by the lnGDP, lnPop, lnLIC, lnHFCE and lnCPI.

While, R^2_D=0.9473 is indicating the Panel D would be able to explain 94.73% of the variation in the lnGDP is influenced by the lnHCE, lnPop, lnLIC, lnHFCE and lnCPI. The value of R^2 does not reflect the extent of variance for dependent variable is associated with the independent variables. Adjusted R^2 is estimated to analyze the effect of independent variables on the dependent variable. It quite similar to the R^2, but adjusted R^2 has been adjusted for the possibility the outcome is driven by chance to generate a more reliable result. Durbin-Watson statistic value is used to prove there is a positive serial correlation for the Panel A, Panel B, Panel C and Panel D which is 0.1118, 0.2659, 0.2453 and 0.1533 respectively.

4.3.1 Analysis of Variance (ANOVA)

ANOVA measures a fit goodness of the model used in this study by using regression model in which the F-value should be greater than 1. The following table shows the result of ANOVA for the first model (Panel A), second model (Panel B), third model (Panel C) and fourth model (Panel D).

Table 4.4: ANOVA

Source	Mode	Sum of Squares	df	Mean Square	F	Sig.
Panel A						
Model	1	24490072.3	5	4898014.45	57.45	0.0000
Residual		16539871.3	194	85257.0688		
Total		**41029943.6**	**199**	**206180.621**		
Panel B						
Model	1	5.1329e+24	5	1.0266e+24	711.14	0.0000
Residual		2.8005e+23	194	1.4436e+21		
Total		**5.4130e+24**	**199**	**2.7201e+22**		
Panel C						
Model	1	534.72563	5	106.945126	1319.11	0.0000
Residual		15.7283152	194	0.08107379		
Total		**550.453945**	**199**	**2.76610023**		
Panel D						
Model	1	523.8513	5	104.77026	697.89	0.0000
Residual		29.1241443	194	0.150124455		
Total		**552.975444**	**199**	**2.77877108**		

Note: HCE: Health Care Expenditure; GDP: Gross Domestic Product; Pop: Population; LIC: Life Insurance Coverage; HFCE: Household Final Consumption Expenditure and CPI: Consumer Price Index.

For Panel A, the value of ANOVA explained the impact of GDP, Population, LIC, HFCE and CPI on the HCE. While, the value of ANOVA for Panel B indicated the impact of HCE, Population, LIC, HFCE and CPI on the GDP. Based on the variables of these two models, then Panel C and Panel D are generated by using natural logarithm (ln). The difference of statistical significant at the 0.01 level for all independent variables are

F(5,194)=57.45 and p=0.0000 for the first model (Panel A). It means, when the effect is statistically significant it suggests the changes of the GDP, Population, LIC, HFCE and CPI are associated with the changes of HCE.

For the second model (Panel B), the F(5,194)=711.14 and p=0.0000 represents the changes of the HCE, Population, LIC, HFCE and CPI are associated with the changes of GDP. The third model (Panel C) found the F(5,194)=1319.11 and p=0.0000. It means, the changes of the lnGDP, lnPop, lnLIC, lnHFCE and lnCPI are associated with the changes of lnHCE. Last but not least, the fourth model (Panel D) represents the F(5,194)=697.89 and p=0.0000 that explained the changes of the lnHCE, lnPop, lnLIC, lnHFCE and lnCPI are associated with the changes of lnGDP. This interpretation does not change even the value of F-test become insignificant due to a collective significant of the entire model that differ from a significant of the specific effects.

4.3.2 Pooled Ordinary Least Square (POLS)

As mentioned in Chapter 3, to know the influence of independent variables to the dependent variable, then the analysis of Pooled Regression Model is conducted.

Table 4.5: Pooled Ordinary Least Square

	Coef.	Std. Err.	t	P > |t|	[95% Conf.	Interval]
Panel A						
GDP	3.80E-09	4.80E-10	7.93	0.000	2.86E-09	4.75E-09
Pop	1.91E-06	7.92e-07	2.42	0.017	3.53E-07	3.48E-06
LIC	102.3985	16.38751	6.25	0.000	70.07795	134.719
HFCE	-3.43e-09	4.29E-10	-8.00	0.000	-4.27E-09	-2.58E-09
CPI	3.815406	0.912378	4.18	0.000	2.015953	5.61486
-cons	-170.9433	80.62455	-2.12	0.035	-329.9565	-11.93013
Panel B						
HCE	6.44E+07	8119035	7.93	0.000	4.84E+07	8.04E+07
Pop	-531.3673	97.34552	-5.46	0.000	-723.3588	-339.3759
LIC	4.34E+09	2.32E+09	1.87	0.062	-2.26E+08	8.91E+09
HFCE	0.8067303	0.0279971	28.81	0.000	0.7515124	0.8619482
CPI	-2.09E+08	1.23E+08	-1.70	0.090	-4.52E+08	3.33E+07
-cons	1.64E+10	1.06E+10	1.17	0.243	-8.48E+09	3.32E+10

Note: HCE: Health Care Expenditure; GDP: Gross Domestic Product; Pop: Population; LIC: Life Insurance Coverage; HFCE: Household Final Consumption Expenditure and CPI: Consumer Price Index.

Table 4.5: Pooled Ordinary Least Square

	Coef.	Std. Err.	t	P > |t|	[95% Conf.	Interval]
Panel C						
lnGDP	0.6160494	0.0287656	21.42	0.000	0.559316	0.6727828
lnPop	-0.9797299	0.0219642	-44.61	0.000	-1.023049	-0.9364106
lnLIC	0.0755158	0.0191969	3.93	0.000	0.0376544	0.1133773
lnHFCE	0.3057588	0.0235283	13.00	0.000	0.2593546	0.3521629
lnCPI	0.3208197	0.044287	7.24	0.000	0.2334739	0.4081655
-cons	-3.282543	0.3596835	-9.13	0.000	-3.991935	-2.573151
Panel D						
lnHCE	1.14074	0.0532653	21.42	0.000	1.035686	1.245793
lnPop	1.214708	0.0494913	24.54	0.000	1.117097	1.312318
lnLIC	0.0227557	0.0270953	0.84	0.402	-0.0306834	0.0761948
lnHFCE	-0.2355856	0.0403895	-5.83	0.000	-0.3152446	-0.1559266
lnCPI	-0.2320566	0.0658532	-3.52	0.001	-0.3619367	-0.1021765
-cons	5.911855	0.4028034	14.68	0.000	5.117419	6.706291

Note: lnHCE: Natural Logarithm of Health Care Expenditure; lnGDP: Natural Logarithm of Gross Domestic Product; lnPop: Natural Logarithm of Population; lnLIC: Natural Logarithm of Life Insurance Coverage; lnHFCE: Natural Logarithm of Household Final Consumption Expenditure and lnCPI: Natural Logarithm of Consumer Price Index.

Care Expenditure (HCE) as a constant variable with the predictors such as GDP, Population, LIC, HFCE and CPI for the first model (Panel A). While, GDP is a dependent variable as well as HCE, Population, LIC, HFCE and CPI as the independent variables for the second model (Panel B). Based on the variables of these two models, then Panel C and Panel D are generated as the third and fourth models respectively by using the natural logarithm (ln). The coefficient of determination (R^2) for the four models are R^2_A=0.596877, R^2_B=0.948263, R^2_C=0.971427 and R^2_D=0.947332 respectively by comparing the coefficient values of the five independent variables.

The value of t-statistic will determine the significant value of each variable. The smaller significant value and the larger value of t-statistic, the greater contribution of the independent variables. For Panel A, Table 4.5 revealed that when a controlling of independent variables is constant, an increase of GDP, Population, LIC and CPI by 1% would lead to the increase of HCE by 0.0000000038%, 0.0000019%, 102.3985% and 3.8154% respectively. The highest coefficient value is indicated by LIC of 102.3985 and followed by CPI of 3.8154. However, the increase of HFCE by 1% will reduce the HCE by 0.0000000034%. The independent variables of GDP, Population, LIC and CPI are positively correlated to the HCE that have the statistical significant at 0.01 level, in which 0.000, 0.020, 0.002 and 0.000 respectively.

While, there is a negative relationship between HFCE and HCE at 0.01 level of statistical significant. For Panel B, an increase of HCE, LIC and HFCE by 1% would lead to the increase of GDP by 0.00000064%, 0.0000000043% and 0.8067% respectively. The highest coefficient value is indicated by HFCE of 0.8067. However, the increase of Population and CPI by 1% will reduce the GDP by 531.3673% and 0.000000021%. The

independent variables of HCE and HFCE are positively correlated to the GDP that have the statistical significant at 0.01 level as well as LIC is positively correlated to the GDP at statistical significant of 0.05 level. While, there is a negative relationship between Population and CPI with the GDP at the statistical significance of 0.01 and 0.10 level respectively.

The third model, Panel C represented an increase of lnGDP, lnLIC, lnHFCE and lnCPI by 1% would lead to the increase of lnHCE by 0.6160%, 0.0755%, 0.3058% and 0.3208% respectively. The highest coefficient value is indicated by lnGDP of 0.6160. However, the increase of lnPop by 1% will reduce the lnHCE by 0.9797%. The independent variables of lnGDP, lnLIC, lnHFCE and lnCPI are positively correlated to the lnHCE that have the statistical significant at 0.01 level. While, there is a negative relationship between lnPop and lnHCE at the statistical significance of 0.01 level.

For Panel D, an increase of lnHCE, lnPop and lnLIC by 1% would lead to the increase of lnGDP by 1.1407%, 1.2147% and 0.0228% respectively. The highest coefficient value is indicated by lnPop of 1.2147. However, the increase of lnHFCE and lnCPI by 1% will reduce the lnGDP by 0.2356% and 0.2321%. The independent variables of lnHCE and lnPop are positively correlated to the lnGDP that have the statistical significant at 0.01 level as well as lnLIC is positively correlated to the lnGDP at the insignificant statistical level. While, there is a negative relationship between lnHFCE and lnCPI with the lnGDP at the statistical significance of 0.01 level.

4.3.3 Panel Data Analysis

The following table presented the estimation results for the determinants of Health Care Expenditure (HCE): an empirical evidence from ASEAN countries. Under panel data, there are few techniques applied such as Common Effects (CE), Fixed Effects (FE) and Random Effects (RE).

4.3.3.1 Common Effects (CE)

For common effects of the first model (Panel A), Table 4.6 illustrated an increase of GDP, Population, LIC and CPI by 1% would lead to the increase of HCE by 0.0000000051%, 0.0000082%, 50.6644% and 24.7150% respectively. The highest coefficient value is indicated by LIC of 50.6644 and followed by CPI of 24.7150. However, the increase of HFCE by 1% will reduce the HCE by 0.0000000059%. The independent variables of GDP, Population and LIC are positively correlated to the HCE and have no statistical influence because the p-value is more than 0.10 level. CPI has positive correlation with the HCE at statistical significant of 0.10 level. While, HFCE is negatively correlated to HCE and has insignificant statistical value.

The second model (Panel B) showed an increase of HCE, LIC and HFCE by 1% would lead to the increase of GDP by 0.00000040%, 0.00000000021% and 0.6836% respectively. The highest coefficient value is indicated by HFCE of 0.6836. However, the increase of Population and CPI by 1% will reduce the GDP by 279.6655% and 0.0000000017% respectively. The independent variables of HCE is positively correlated

to the GDP and has no statistical influence because the p-value is more than 0.10 level. The LIC and HFCE also have positive correlation with the GDP at statistical significant at 0.10 and 0.01 level respectively. While Population and CPI are negatively correlated to the GDP and have insignificant statistical value.

For the third model, Panel C represented an increase of lnGDP, lnLIC, lnHFCE and lnCPI by 1% would lead to the increase of lnHCE by 0.5348%, 0.1200%, 0.1038% and 1.6142% respectively. The highest coefficient value is indicated by lnCPI of 1.6142. However, the increase of lnPop by 1% will reduce the lnHCE by 0.7182%. The independent variables of lnGDP and lnCPI are positively correlated to the lnHCE at statistical significant 0.01 and 0.05 level respectively. Although lnLIC and lnHFCE have positive correlation with the lnHCE, but there is insignificant statistic because the p-value is more than 0.10. While, lnPop is negatively correlated to the lnHCE at statistical significant of 0.01 level.

Last but not least, Panel D shown an increase of lnHCE and lnPop by 1% would lead to the increase of lnGDP by 1.6747% and 1.2584% respectively at the statistical significant of 0.01 level. However, an increase of lnLIC, lnHFCE and lnCPI by 1% will reduce the lnGDP by 0.1503%, 0.1583% and 2.5870% respectively. The independent variables of lnLIC and lnHFCE are negatively correlated to the lnGDP and have no statistical significant value because the p-value is more than 0.10. The lnCPI also has negative correlation with the lnGDP but at the statistical significant of 0.05 level.

Table 4.6: Panel Data Analysis

	Common Effects (CE)		Fixed Effects (FE)		Random Effects (RE)	
	Coef.	P > |t|	Coef.	P > |t|	Coef.	P > |t|
Panel A						
GDP	5.06E-09	0.372	3.84E-09	0.000	3.82E-09	0.000
Pop	8.20E-06	0.168	4.76-06	0.512	3.96-07	0.786
LIC	50.66435	0.768	-3.049582	0.901	16.44847	0.458
HFCE	-5.92e-09	0.138	-3.24E-09	0.000	-3.05E-09	0.000
CPI	24.71496	0.084	1.306245	0.077	1.616447	0.012
-cons	-1835.693	0.096	-35.50272	0.913	129.0129	0.250
Panel B						
HCE	3.98E+07	0.372	7.08E+07	0.000	8.12E+07	0.000
Pop	-279.6655	0.636	-6217.808	0.000	-738.4517	0.000
LIC	2.10E+10	0.100	-6.57E+09	0.047	-2.58E+09	0.393
HFCE	0.6836413	0.019	1.106411	0.000	0.860223	0.000
CPI	-1.66E+09	0.239	2.07E+08	0.039	-1.08E+08	0.265
-cons	1.18E+11	0.275	2.57E+11	0.000	1.13E+10	0.380

Note: HCE: Health Care Expenditure; GDP: Gross Domestic Product; Pop: Population; LIC: Life Insurance Coverage; HFCE: Household Final Consumption Expenditure and CPI: Consumer Price Index.

Table 4.6: Panel Data Analysis

	Common Effects (CE)		Fixed Effects (FE)		Random Effects (RE)	
	Coef.	P > |t|	Coef.	P > |t|	Coef.	P > |t|
Panel C						
lnGDP	0.5347791	0.004	0.6379039	0.000	0.6688984	0.000
lnPop	-0.7182459	0.002	-0.4731234	0.123	-1.015932	0.000
lnLIC	0.1200263	0.135	0.0186192	0.503	0.0343302	0.147
lnHFCE	0.1038199	0.323	0.2817625	0.004	0.311125	0.000
lnCPI	1.614175	0.023	0.1996468	0.000	0.2233437	0.000
-cons	-6.270665	0.018	-11.17639	0.009	-3.63597	0.000
Panel D						
lnHCE	1.6747	0.004	0.4104583	0.000	0.571299	0.000
lnPop	1.258393	0.003	1.121892	0.000	0.5204866	0.000
lnLIC	-0.1503451	0.332	-0.0791508	0.000	-0.0519775	0.027
lnHFCE	-0.1583201	0.404	0.599089	0.000	0.4617131	0.000
lnCPI	-2.586992	0.060	-0.0542452	0.114	-0.0391128	0.301
-cons	11.18791	0.016	-10.54571	0.002	2.174864	0.026

Note: lnHCE: Log of Health Care Expenditure; lnGDP: Log of Gross Domestic Product; lnPop: Log of Population; lnLIC: Log of Life Insurance Coverage; lnHFCE: Log of Household Final Consumption Expenditure and lnCPI: Log of Consumer Price Index.

4.3.3.2 Fixed Effects (FE)

Based on the technique of Fixed Effects (FE), there is a statistical significant relationship between the dependent and independent variables for both models because p-value is 0.000 (at 0.01 level). For Panel A, an increase of GDP, Population and CPI by 1% would lead to the increase of HCE by 0.0000000038%, 0.0000048% and 1.3062% respectively. The independent variables of GDP, Population and CPI are positively correlated at 0.01 level, no statistical significant and at 0.05 level respectively. However, the increase of LIC and HFCE by 1% will reduce the HCE by 3.0496% and 0.0000000032%. The LIC and HFCE are negatively correlated to the HCE at no significant influence and at statistical significant of 0.01 level. The highest and lowest coefficient values are indicated by CPI of 1.3062 and LIC of -3.0496.

The second model, Panel B represented an increase of HCE, HFCE and CPI by 1% would lead to the increase of GDP by 0.00000071%, 1.1064% and 0.000000021% respectively. The independent variables of HCE, HFCE and CPI are positively correlated to the GDP as well as have the statistical significant at 0.01, 0.01 and 0.05 level respectively. While, the increase of Population and LIC by 1% will reduce the GDP by 6217.808% and 0.0000000066% respectively. Both of the Population and LIC are negatively correlated at the statistical significant of 0.01 and 0.05 level. The highest and lowest coefficient values are indicated by HFCE of 1.1064 and Population of -6217.808.

For Panel C, an increase of lnGDP, lnLIC, lnHFCE and lnCPI by 1% would lead to the increase of lnHCE by 0.6379%, 0.0186%, 0.2818% and 0.1996% respectively. The independent variables of lnGDP, lnLIC, lnHFCE and lnCPI are positively correlated to the

lnHCE at the statistical significant of 0.01 level. However, the increase of lnPop by 1% will reduce the HCE by 0.4731%. The lnPop has negative correlation to the lnHCE and no significant statistical because the p-value is more 0.10 level. The highest and lowest coefficient values are indicated by lnGDP of 0.6379 and lnPop of -0.4731.

The fourth model, Panel D reported an increase of lnHCE, lnPop and lnHFCE by 1% would lead to the increase of lnGDP by 0.4105%, 1.1219% and 0.5991% respectively. The independent variables of lnHCE, lnPop and lnHFCE are positively correlated to the lnHCE at the statistical significant at 0.01 level respectively. While, the increase of lnLIC and lnCPI by 1% will reduce the lnGDP and lnCPI by 0.0792% and 0.0542% respectively. Both of lnLIC and lnCPI have negative correlation with the lnGDP at the statistical influence of 0.01 level and no statistical significant respectively. The highest and lowest coefficient value are indicated by lnPop of 1.1219 and -0.0792.

4.3.3.3 Random Effects (RE)

Another approach used in this study is Random Effects. For Panel A, Table 4.6 revealed that an increase of GDP, Population, LIC and CPI by 1% would lead to the increase of HCE by 0.0000000038%, 0.00000040%, 16.4485% and 1.6164% respectively. The independent variables of GDP and CPI are positively correlated to the HCE at the statistical significant at 0.01. The Population and LIC also have positive correlation with the HCE but no statistical influence because the p-value is more than 0.10 level. However, the increase HFCE by 1% will reduce the GDP by 0.00000000031%. It means, HFCE is negatively correlated to the HCE at statistical significant of 0.01 level.

The highest coefficient value is indicated by LIC of 16.44847 and followed by CPI of 1.6164. The second model, Panel B represented an increase of HCE and HFCE by 1% would lead to the increase of GDP by 0.00000081% and 0.8602% respectively. The independent variables of HCE and HFCE are positively correlated to the GDP at the statistical significant at 0.01 level. However, the increase of Population, LIC and CPI by 1% will reduce the GDP by 738.4517%, 0.0000000026% and 0.000000011% respectively. It means, the Population is negatively correlated to the GDP at the statistical significant of 0.01 level. While the LIC and CPI also have negative correlation but it has no significant influence because the p-value is more than 0.10 level.

The highest and lowest coefficient value are indicated by HFCE of 0.8602 and Population of -738.4517 respectively. For Panel C, an increase of lnGDP, lnLIC, lnHFCE and lnCPI by 1% would lead to the increase of lnHCE by 0.6689%, 0.0343%, 0.3111% and 0.2233% respectively. The independent variables of lnGDP, lnHFCE and lnCPI are positively correlated to the lnHCE at statistical significant of 0.01 level. While, lnLIC also has positive correlation with the lnHCEpC but it has no statistical influence because the p-value is more than 0.10 level. However, an increase of lnPop by 1% will reduce the lnHCE by 1.0159% at statistical significant of 0.01 level. The highest and lowest coefficient value are indicated by lnGDP of 0.6689 and followed by lnHFCE of 0.3111.

The fourth model, Panel D reported an increase of lnHCE, lnPop and lnHFCE by 1% would lead to the increase of lnGDP by 0.5713%, 0.5205% and 0.4617% respectively. The independent variables of lnHCE, lnPop and lnHFCE are positively correlated to the lnGDP at the statistical significant of 0.01 level. However, the increase of lnLIC and lnCPI by 1% will reduce the lnGDP by 0.0520% and 0.0391%. Both of lnLIC

and lnCPI have negative correlation with the lnGDP at statistical significant of 0.05 level and insignificant influence respectively. The highest and lowest coefficient value is indicated by lnHCE of 0.5713 and lnLIC of -0.0520 respectively.

4.3.4 Specification Tests of the Panel Data Analysis

In order to test which technique is an appropriate model between Common Effects (CE), Fixed Effects (FE) or Random Effects (RE), then the Likelihood Ratio, Hausman Test and Lagrange Multiplier Test were estimated.

4.3.4.1 Likelihood Ratio

This approach used to determine either Common Effects (CE) or Fixed Effects (FE) is an appropriate model in this study. Likelihood ratio compared the fit goodness of two techniques and it explains how many times more likely the data are under one technique rather than another. The p-value of Panel A and Panel B is same, which is 1.0000 that more than the statistical significant of 0.05. Panel D also shown insignificant statistical level when the p-value is equal 0.4906. It means, this study is failed to reject the null hypothesis (H_0). So, a CE is more appropriate for the Panel A, Panel B and Panel D. While, there is a statistical significant at 0.01 level for Panel B that represents FE is an appropriate model rather than CE.

Table 4.7: Specification Tests

Specification Test	p-value	Tested	Selection
Panel A			
Likelihood Ratio	1.0000	Common Effects & Fixed Effects	Common Effects
Hausman Test	0.6865	Random Effects & Fixed Effects	Random Effects
Lagrange Multiplier Test	0.0000	Common Effects & Random Effects	Random Effects
Panel B			
Likelihood Ratio	1.0000	Common Effect & Fixed Effect	Common Effects
Hausman Test	0.0002	Random Effects & Fixed Effects	Fixed Effects
Panel C			
Likelihood Ratio	0.0099	Common Effects & Fixed Effects	Fixed Effects
Hausman Test	0.3984	Random Effects & Fixed Effects	Random Effects
Panel D			
Likelihood Ratio	0.4906	Common Effects & Fixed Effects	Common Effects
Hausman Test	0.0000	Random Effects & Fixed Effects	Fixed Effects

4.3.4.2 Hausman Test

This technique used to identify which model is more appropriate between the Fixed Effects (FE) and Random Effects (RE). It involved an asymptotic chi-squared distribution with k degrees of freedom under the null hypothesis of regressor-effect

independence. A small p-value of Hausman Test indicates the coefficient estimation of FE and RE are unequal. Based on the Table 4.7, Panel A and Panel C rejected the null hypothesis (H_0) and accept the alternate hypothesis due to has no statistical significant because of p-value are 0.6865 and 0.3984 (more than 0.05 level). It means, RE is an appropriate model for Panel A to explain the relationship between HCE with GDP, Population, LIC, HFCE and CPI.

This interpretation is similar for the Panel C in order to explain the relationship between each variable by using natural logarithm (ln). In contrast, Panel B and Panel D accepted the H_0 because it have a statistical significant at 0.01 level which is the p-value is equal to 0.0002 and 0.0000 respectively. Then, FE is more appropriate for Panel B to examine the relationship between GDP with the HCE, Population, LIC, HFCE and CPI as well as to identify the relationship between lnGDP with the lnHCE, lnPop, lnLIC, lnHFCE and lnCPI.

4.3.4.3 Lagrange Multiplier (LM) Test

In this study, LM Test is used to analyze the static model of HCE for the first model (Panel A) only after performing the Likelihood Ratio and Hausman Test. Based on the results of Likelihood Ratio and Hausman Test in Table 4.7, an appropriate model for the both are Common Effects (CE) and Random Effects (RE) respectively rather than the Fixed Effects (FE). In order to determine which technique is more appropriate between CE and RE, then Lagrange Multiplier Test is performed. There is a statistical significant at 0.01

level for this technique because the p-value of LM is 0.0000. It means, the null hypothesis (H_0) is rejected and RE is accepted as an appropriate model compared to CE.

4.3.5 Diagnotic Test

The purpose of this technique is to identify the reliability of the four models, namely Panel A, Panel B, Panel C and Panel D by using Multicollinearity Test and Heteroskedasticity Test.

4.3.5.1 Multicollinearity Test

The Multicollinearity is referred to the phenomenon of two or more variables highly correlated to each other. The benefit of using panel data is can reduce this problem. Variance Inflation Factor (VIF) is used to determine a Multicollinearity problem if the VIF is more than 10. Based on the results in Table 4.8, there is no Multicollinearity problem for the four models because the VIF value is less than 10 in which VIF_A=9.41, VIF_B=3.36, VIF_C=3.68 and VIF_D=6.66.

Table 4.8: Variance Inflation Factor (VIF)

Variable	VIF	1/VIF
Panel A		
HFCE	23.15	0.043198
GDP	14.60	0.068502
Pop	6.13	0.163122
LIC	1.61	0.621776
CPI	1.59	0.629719
Mean VIF	**9.41**	
Panel B		
HFCE	5.83	0.171525
Pop	5.47	0.182671
LIC	1.90	0.526981
HCE	1.87	0.533737
CPI	1.71	0.586272
Mean VIF	**3.36**	
Panel C		
lnGDP	5.64	0.177186
lnHFCE	4.90	0.204212
lnPop	3.86	0.258822
lnLIC	2.32	0.430871
lnCPI	1.67	0.597569
Mean VIF	**3.68**	
Panel D		
lnPop	10.59	0.094394
lnHCE	10.40	0.096126
lnHFCE	7.79	0.128321
lnLIC	2.50	0.400493
lnCPI	2.00	0.500447
Mean VIF	**6.66**	

4.3.5.2 Heteroskedasticity Test

The Heteroskedasticity is referred to a circumstance in which the variability of dependent variable is unequal across the range of value of the independent variables. This problem detected by using the Modified Wald Test for groupwise Heteroskedasticity in the residuals of a fixed effect regression model. The hypothesis testing of Heteroskedasticity Test are:

H_0 : Heteroskedasticity.

H_1 : Horocedasticity.

Table 4.9: Modified Wald Test of Panel A and Panel B

Model	p-value
Panel A	0.0000
Panel B	0.0000
Panel C	0.0000
Panel D	0.0000

*Note: The *, ** and *** are 10%, 5% and 1% level of significant.*

Based the results above, H_0 is rejected because the p-value of the four models at the statistical significant of 0.01 level (p-value=0.0000). It means, there is a Heteroskedasticity problem and the variances for the both models are not constant.

4.3.6 Granger Causality Test

This technique used to identify an existence of potential causal relationship between the dependent and independent variables for the four models.

Table 4.11: Pairwise Granger Causality Tests

Null Hypothesis	F-Statistic	Prob.	Result
Panel A and Panel B			
GDP does not Granger Cause HCE	0.84922	0.4295	No Causality
HCE does not Granger Cause GDP	0.04957	0.9517	
Pop does not Granger Cause HCE	0.56007	0.5722	No Causality
HCE does not Granger Cause Pop	0.50766	0.6028	
LIC does not Granger Cause HCE	7.54294	0.0007***	LIC → HCE
HCE does not Granger Cause LIC	1.74851	0.1771	Unidirectional (1-way Causality)
HFCE does not Granger Cause HCE	0.56160	0.5713	No Causality
HCE does not Granger Cause HFCE	0.64882	0.5239	
CPI does not Granger Cause HCE	0.58712	0.5570	HCE → CPI
HCE does not Granger Cause CPI	2.45470	0.0888*	Unidirectional (1-way Causality)
Pop does not Granger Cause GDP	3.12340	0.0465**	Pop → GDP
GDP does not Granger Cause Pop	1.83259	0.1631	Unidirectional (1-way Causality)
LIC does not Granger Cause GDP	0.13394	0.8747	No Causality
GDP does not Granger Cause LIC	0.18502	0.8312	

Note: HCE: Health Care Expenditure; GDP: Gross Domestic Product; Pop: Population; LIC: Life Insurance Coverage; HFCE: Household Final Consumption Expenditure and CPI: Consumer Price Index.

Table 4.11: Pairwise Granger Causality Tests

Null Hypothesis	F-Statistic	Prob.	Result
Panel A and Panel B			
HFCE does not Granger Cause GDP	12.9803	5.54E-06***	HFCE ◄► GDP
GDP does not Granger Cause HFCE	7.47864	0.0133***	Unidirectional (2-way Causality)
CPI does not Granger Cause GDP	0.80860	0.4471	No Causality
GDP does not Granger Cause CPI	0.92047	0.4003	
LIC does not Granger Cause Pop	0.07183	0.9307	No Causality
Pop does not Granger Cause LIC	0.26258	0.7694	
HFCE does not Granger Cause Pop	0.15930	0.8529	Pop ➔HFCE
Pop does not Granger Cause HFCE	6.85766	0.0526**	Unidirectional (1-way Causality)
CPI does not Granger Cause Pop	3.50686	0.0321	Pop ➔ CPI
Pop does not Granger Cause CPI	3.19572	0.0433**	Unidirectional (1-way Causality)
HFCE does not Granger Cause LIC	0.01868	0.9815	No Causality
LIC does not Granger Cause HFCE	0.95014	0.3887	
CPI does not Granger Cause LIC	0.35464	0.7019	No Causality
LIC does not Granger Cause CPI	1.46422	0.2341	
CPI does not Granger Cause HFCE	1.42743	0.2427	HFCE ➔ CPI
HFCE does not Granger Cause CPI	1.47757	0.2310*	Unidirectional (1-way Causality)

*Note: The *, ** and *** are 10%, 5% and 1% level of significant.*

Table 4.11: Pairwise Granger Causality Tests

Null Hypothesis	F-Statistic	Prob.	Result
Panel C and Panel D			
lnGDP does not Granger Cause lnHCE	4.84747	0.0089***	lnGDP➔ lnHCE
lnHCE does not Granger Cause lnGDP	0.13628	0.8727	Unidirectional (1-way Causality)
lnPop does not Granger Cause lnHCE	2.78283	0.0646**	lnPop➔ lnHCE
lnHCE does not Granger Cause lnPop	0.09543	0.9090	Unidirectional (1-way Causality)
lnLIC does not Granger Cause lnHCE	2.53721	0.0820*	lnLIC ➔lnHCE
lnHCE does not Granger Cause lnLIC	0.94686	0.3899	Unidirectional (1-way Causality)
lnHFCE does not Granger Cause lnHCE	4.38174	0.0139***	lnHFCE ➔lnHCE
lnHCE does not Granger Cause lnHFCE	0.45521	0.6351	Unidirectional (1-way Causality)
lnCPI does not Granger Cause lnHCE	11.2023	2.64E-05***	lnCPI ➔lnHCE
lnHCE does not Granger Cause lnCPI	0.45250	0.6368	Unidirectional (1-way Causality)
lnPop does not Granger Cause lnGDP	1.93408	0.1476	No Causality
lnGDP does not Granger Cause lnPop	0.90895	0.4048	
lnLIC does not Granger Cause lnGDP	0.07700	0.9259	No Causality
lnGDP does not Granger Cause lnLIC	0.99187	0.3730	

Note: lnHCE: Natural Logarithm of Health Care Expenditure; lnGDP: Natural Logarithm of Gross Domestic Product; lnPop: Natural Logarithm of Population; lnLIC: Natural Logarithm of Life Insurance Coverage; lnHFCE: Natural Logarithm of Household Final Consumption Expenditure and lnCPI: Natural Logarithm of Consumer Price Index.

Table 4.11: Pairwise Granger Causality Tests

Null Hypothesis	F-Statistic	Prob.	Result
Panel C and Panel D			
lnHFCE does not Granger Cause lnGDP	1.78329	0.1711	lnHFCE → lnGDP
lnGDP does not Granger Cause lnHFCE	2.40479	0.0933*	Unidirectional (1-way Causality)
lnCPI does not Granger Cause lnGDP	19.2213	2.84E-08***	lnCPI → lnGDP
lnGDP does not Granger Cause lnCPI	0.70388	0.4961	Unidirectional (1-way Causality)
lnLIC does not Granger Cause lnPop	0.01789	0.9823	No Causality
lnPop does not Granger Cause lnLIC	0.08218	0.9211	
lnHFCE does not Granger Cause lnPop	0.69040	0.5027	No Causality
lnPop does not Granger Cause lnHFCE	1.43753	0.2403**	
lnCPI does not Granger Cause lnPop	0.11963	0.8873	No Causality
lnPop does not Granger Cause lnCPI	0.57431	0.5642**	
lnHFCE does not Granger Cause lnLIC	0.55559	0.5747	No Causality
lnLIC does not Granger Cause lnHFCE	0.22378	0.7997	
lnCPI does not Granger Cause lnLIC	0.25900	0.7721	No Causality
lnLIC does not Granger Cause lnCPI	0.08988	0.9141	
lnCPI does not Granger Cause lnHFCE	8.24648	0.0004***	lnCPI ↔ lnHFCE
lnHFCE does not Granger Cause lnCPI	4.36017	0.0142***	Unidirectional (2-way Causality)

*Note: The *, ** and *** are 10%, 5% and 1% level of significant.*

Based on the Table 4.11, Panel A and Panel B shown there is a unidirectional one-way causality relationship between two variables such as LIC and HCE at statistical significant of 0.01 level, Population with GDP, HFCE and CPI at 0.05 level, HCE and HFCE with CPI at 0.10 level. It indicates the direction of causality running from LIC to HCE, from Population to GDP, HFCE and CPI as well as from HCE and HFCE to CPI in ASEAN countries. This result also illustrated a unidirectional two-way causality relationship between HFCE with GDP. It means, there is causality running for the both directions between GDP and HFCE at statistical significant of 0.01 level.

On the other hand, the Granger Causality between GDP, Population and HFCE with HCE, LIC and CPI with GDP, LIC with Population, HFCE and CPI with LIC show no existence of a relationship in any direction. This results indicate that GDP, Population and HFCE do not granger with the HCE, LIC and CPI do not granger with the GDP, LIC does not granger with the Population as well as HFCE and CPI do not granger with the LIC. Panel C and Panel D found there is a unidirectional one-way causality relationship between two variables such as lnGDP, lnHFCE and lnCPI with the lnHCE, lnCPI with lnGDP at statistical significant of 0.01 level, lnPop with lnHCE, lnHFCE and lnCPI at 0.05 level, lnLIC with lnHCE at 0.10 level.

It shows the direction of causality running from lnGDP, lnHFCE and lnCPI to the lnHCE, from lnCPI with lnGDP, from lnPop to lnHCE, lnHFCE and lnCPI as well as from lnLIC to lnHCE. Besides that, a unidirectional two-way causality explained the relationship between lnCPI and lnHFCE. It means, there is a causality running for the both directions between lnCPI and lnHFCE at statistical significant of 0.01 level. On the other hand, the Granger Causality between lnPop and lnLIC with lnGDP, lnLIC with

lnPop, lnHFCE and lnCPI with lnLIC show no existence of a relationship in any direction. This results indicate that lnPop and lnLIC do not granger with the lnGDP, lnLIC does not granger with lnPop as well as lnHFCE and lnCPI do not granger with lnLIC.

4.4 Discussion of the Findings

The results from this study are consistent with the previous outcomes. There is a statistical significant and positive relationship between Gross Domestic Product per Capita (GDPpC) with the Health Expenditure (HE) in 30 African countries (Gbesemete, 1992). An increase of GDP per Capita by 1% associated to the slower increase total health expenditure by 0.36% in Canadian (Bilgel, 2004). This statement supported by Murthy (2009) that stated the main determinants of Health Care Expenditure (HCE) in African are GDPpC and Real Foreign Aid per Capita. The cross-sectional data used for the year of 2001 by using Ordinary Least Square (OLS) and Two-stage Least Square (TSLS) techniques. However, Kanavos (1996) argued that GDP has no significant relationship and not effective in explaining HE at France, Germany, Greece, Ireland and Netherlands.

Population age structure is often included as a covariate in health expenditure regressions. Commonly used indicators are the share of young (e.g., under 15 years) and old people (e.g., above 65 or 75 years) over the active or total population. Squires (2012) found a positive relationship between population and HCE. It means a larger size of population is corresponding to the greater spending of health care in the United States. This statement is supported by Anazia (2012) that the Health Care Expenditure (HCE) has risen highly due to the population growth in Canada and U.S. Hartwig (2012) stated

there is positive relationship between Population and Health Care Expenditures per Capita (HCEpC). It means the growth of Population would lead to the growth of HCEpC.

4.5 Conclusion

In conclusion, there is a significant relationship between Gross Domestic Product (GDP), Population, Life Insurance Coverage (LIC), Household Final Consumption Expenditure (HFCE) and Consumer Price Index (CPI) with the Health Care Expenditure (HCE) for the first model (Panel A). The independent variables of HCE, Population, LIC, HFCE and CPI gave the impact on the economic growth for the second model (Panel B). Similar to the results of these two models, the third and fourth models are generated by using natural logarithm (ln) for each dependent and independent variables. Another two models are consist of Panel C and Panel D.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

A few decades ago have witnessed an analysis of Health Expenditure (HE) become raised at the International Level. Although there are some restrictions remained in this study, but the results should be interpreted with great caution. The main motivation of this research project is to investigate the determinants of Health Care Expenditure: an empirical evidence from ASEAN countries. This final chapter consists of objective summary of the study, summary of the previous empirical works, summary of the hypothesis testing and empirical findings, policy implications and the limitations of the current study. It also provides the conclusion and recommendations that may help the other researchers to conduct the further research in the future.

5.2 Objective Summary of the Study

In particular, this study examining the relationship between Health Care Expenditure (HCE) with the Gross Domestic Product (GDP), Population, Life Insurance Coverage (LIC), Household Final Consumption Expenditure (HFCE) and Consumer Price Index (CPI) for the first model (Panel A). It also attempts to provide evidence of how the HCE, Population, LIC, HFCE and CPI give the significance influence on the economic growth for the second model (Panel B). Based on the variables of these both models, the

third model (Panel C) and fourth model (Panel D) are generated by using the natural logarithm (ln).

This study concentrates on the secondary data that obtained from the ASEAN Up Database, Central of International Data, World Development Indicator (World Bank, 2016), World Health Organization (WHO, 2016) and also from the central bank of each country such as Bank Negara Malaysia (BNM), Bank of Thailand, Bank Sentral Republik Indonesia, Monetary Authority of Singapore (MAS) and so on. In addition, this study was used balanced panel data that involved 200 of total observations. Due to insufficient publication data for the year below than 1995 as well as for the latest periods of 2015 and 2016, this study only focused to the twenty years' worth of annual data that have been collected, spanning from 1995 to 2014.

Since there are three specific objectives of this study, then two techniques were applied to examine the significance outcomes which is Stata SE 12 and Eviews 9.0. The first approach of Stata SE 12 analyses the Pooled Ordinary Least Square (POLS), Common Effects (CE), Fixed Effects (FE), Random Effects (RE), Likelihood Ratio, Hausman Test, Lagrange Multiplier Test, Diagnostic Test: Multicollinearity Test and Heteroskedasticity Test. While, another method used is Eviews 9.0 to estimates Descriptive Statistics, Pearson Correlation and Cointegration Test: Granger Causality Test.

5.3 Summary of the Previous Empirical Works

The following table illustrated the several previous observations to examine the determinants of Health Care Expenditure from difference countries.

Table 5.1: Summary of the Previous Empirical Works

No.	Author (Year)	Country / Data Frequency	Model / Method of Estimation	Variables Used	Findings
1.	Nicholas, A., Edward, N. A., & Bernardin, S. (2016).	40 Sub-Saharan Africa (SSA) Countries. 2000-2010.	Panel Data. Fixed Effects (FE) Model.	DV: Health System: Under-five Mortality Rate (U5MR); Infant Mortality Rate (IMR) and Maternal Mortality Rate (MMR). IV: Public HE: External Borrowings; Grants & Social Insurance Fund; Recurrent & Capital Spending from Government Budgets. Private HE: Direct Household (Out-of-pocket) Spending; Private Insurance, Charitable Donations and Direct Service Payments by Private Corporations.	Public Health Expenditure (HE) is inversely and significantly related to the U5MR and IMR. The Public HE is negatively correlated and no significant effect on the MMR. This findings suggest government of SSA to increase the shares of Public HE to achieve improved health outcomes. While, Private HE did not prove to be significant in improving maternal-child health outcomes (IMRR, U5MR and MMR) in SSA countries.

Note: HE: Health Expenditure; U5MR: Under-five Mortality Rate; IMR: Infant Mortality Rate; MMR: Maternal Mortality Rate; SSA: Sub-Saharan Africa and FE: Fixed Effects.

Table 5.1: Summary of the Previous Empirical Works

No.	Author (Year)	Country / Data Frequency	Model / Method of Estimation	Variables Used	Findings
2.	Srivastava, D., & McGuire, A. (2016).	India. 1995-1996 and 2004.	Cross-sectional Data. Double Hurdle Model: Logit and Poisson Distribution.	DV: Total Health Care Utilization. IV: Age; Education; Location of Patient Lived; Marital Status; Private Health Insurance (HI); Number of Members Living in the Household; Occupation and Sex.	Most of the coefficients are consistent across the Logit and Poisson models. The elasticity range from -0.13 to 0.03 between Government Regulation, Household Expenditure, HI and Socio-demographic Information with the Health Status.
3.	Boachie, M. K., Mensah, I. O., Sobiesuo, P., Immurana, M., Iddrisu, A. A., & Kyei-Brobbey, I. (2014).	Ghana. 1970-2008.	Annual Time-series Data. Elliot Rothenberg and Stock (ERS) Optimal Point Unit Root Test and Engle-granger Cointegration Tests.	DV: Public Health Care Expenditure (HCE). IV: Healthiness of Population: Crude Birth Rate and Life Expectancy; Environmental Pollution of Factories & Households (CO_2 Emissions); Inflation Rate; Real Gross Domestic Product (GDP) and Urbanization on Public HCE.	There is long-run relationship between demographic, incorporating income, environmental and macroeconomic indicators with the Public HCE. Real GDP and Healthiness of Population are positively correlated to the Public HCE at statistical significant of 0.01 level. There is a strong evidence that said health care is the necessity in Ghana.

Note: CO_2 Emissions: Environmental Pollution of Factories & Households; GDP: Gross Domestic Product; HCE: Health Care Expenditure and HI: Health Insurance.

Table 5.1: Summary of the Previous Empirical Works

No.	Author (Year)	Country / Data Frequency	Model / Method of Estimation	Variables Used	Findings
4.	Zeng, J. (2014).	China. National Data of 2002-2010. Regional Data of 2005-2010.	Data Oriented. Local-constant Least Squares (LCLS) and Local-linear Least Squares (LLLS) Model.	DV: Average Health Expenditure (HE): Average Drug Expenditures & Average Expenditure of Medical Care Service for Inpatients. IV: Professional Indicators: No. of Inpatients; Average Treatment No. of Inpatients for Each Physician per Day; No. of Licensed Physicians and No. of Inpatient Beds in General Hospital. Macroeconomic Variables: Aging Rate; Disposable Income of Urban Households per Capita; Gross Domestic Product per Capita (GDPpC); Governmental HE; Illiteracy Rate; Price Index of Medical Health and Urbanization.	Root mean square error tends to decrease with Professional Indicators smoothed out in regression model, validating the modelling reasonability of the semi-parametric approach. The Macroeconomic Variables have an impact with the Average HE for inpatients to a certain extent. Both of linear decisive and nonlinear control variables vary greatly with National and Regional Data.

Note: GDPpC: Gross Domestic Product per Capita; LCLS: Local-constant Least Squares and LLLS: Local-linear Least Squares.

Table 5.1: Summary of the Previous Empirical Works

No.	Author (Year)	Country / Data Frequency	Model / Method of Estimation	Variables Used	Findings
5.	Lavado, R. F., Brooks, B. P., & Hanlon, M. (2013).	Iraq: 10-days Data. Bulgaria, Côte d'Ivoire, the Federated States of Micronesia, Gambia, Ghana, Madagascar, Mauritius and Saint Lucia: 12-months Data. 2006.	Cross-sectional Data. Regression Model: Pooled Ordinary Least Square (POLS) and Fixed Effects (FE).	DV: Share of Health Expenditure (HE). IV: No. of Health Questions; No. of Total Expenditure Questions and Recall Period (Months).	No. of Health Questions is positively correlated to the Share of Health Expenditure. One unit increase in the no. of health exp. questions was accompanied by a 1% increase in the estimated HE share. While, there is a negative correlation between No. of Total Expenditure Questions. One unit increase in the no. of non-HE resulted in a 0.2% decrease in the estimated share. Increasing the recall period by one month was accompanied by a 6% decrease in the HE share.

Note: HE: Health Expenditure; FE: Fixed Effects and POLS: Pooled Ordinary Least Square.

Table 5.1: Summary of the Previous Empirical Works

No.	Author (Year)	Country / Data Frequency	Model / Method of Estimation	Variables Used	Findings
6.	Naidu, S., & Chand, A. (2013).	Pacific Island Countries (PICs). 2000-2012.	Augmented Cobb-douglas Production Function & Linear Least Square Regression Model.	DV: Gross Domestic Product (GDP). IV: Advancement in Medical Technology and Central Government Health Expenditure (HE) and Capital Investment per Worker.	Central Government HE has a significant impact on the Economic Growth of the PICs. There is a contemporary level of usage of Advanced Medical Technology in the PICs is relatively low as compared to the total population of the country. Improvement in Health Service improve the National Economic Welfare.
7.	Wranik, D. (2012).	21 OECD Countries. 1970-2008.	Panel Data. Stochastic Frontier Approach (SFA).	DV: Health Outcome: Life Expectancy. IV: Health System: Health Expenditure (HE); Consumption; Employment; Gross Domestic Product per Capita and Population Age Structure.	Health-system Structures have not significant relationship with the Health Outcome. While, Consumption, Employment, Gross Domestic Product per Capita and Population Age Structure have a significant contribution to the Life Expectancy.

Note: GDP: Gross Domestic Product; HE: Health Expenditure; PICs: Pacific Island Countries and SFA: Stochastic Frontier Approach.

Table 5.1: Summary of the Previous Empirical Works

No.	Author (Year)	Country / Data Frequency	Model / Method of Estimation	Variables Used	Findings
8.	Hilsenrath, P. (2011).	United States. 2008-2019 (Forecasted Data by CMS or Center for Medicare & Medicaid Services).	Bivariate Regression.	DV: Health Care Expenditure (HCE). IV: Share of Gross Domestic Product (GDP); Share of Private Finance; Public Finance; Pharmaceutical Detailing and Marketing Forms.	U.S. HCE is high as a Share of GDP and associated with a relatively high Share of Private Finance. But Public Sector Finance is displacing private payment and this trend is for Pharmaceuticals. Public Finance & fiscal pressure can be control the use of Pharmaceutical Detailing & other Marketing forms.
9.	Ke, X., Saksena, P., & Holly, A. (2011).	Organisation for Economic Cooperation & Development (OECD) Countries. 1995-2008.	Panel Data. Standard Fixed Effects and Dynamic Models.	DV: Out-of-pocket Payments; Government Health Expenditure (HE) and Total HE: Private & Public HE. IV: GDP per Capita; Population Age Structure & Epidemiological Needs; Technological Progress & Variation in Medical Practice.	HE does not grow faster than GDP. Income elasticity is between 0.75 and 0.95 in the fixed effect model. No difference in HE between Tax-based and Insurance based Health Financing Mechanisms. Government HE and Out-of-pocket Payments are differ from HE growth.

Note: HCE: Health Care Expenditure; GDP: Gross Domestic Product and OECD: Organisation for Economic Cooperation & Development.

5.4 Summary of the Hypothesis Testing and Findings

Table 5.2: Summary of the Hypothesis Testing and Empirical Findings

	Coef. and P > |t|	Hypothesis Testing	Empirical Findings	Supported by Previous Empirical Works
Panel A				
GDP	3.80E-09 (0.000)***	Reject H_0	There is a positive correlation between GDP & HCE at statistical significant of 0.01 level.	Farag, 2009; Newhouse, 1977; Kleiman, 1974.
Pop	1.91E-06 (0.017)***	Reject H_0	There is a positive correlation between Pop & HCE at statistical significant of 0.01 level	Bech, 2011; Ke, 2011; Hakkinen, 2008; Seshamani, 2004; Hooveretal, 2002; Felderetal, 2000.
LIC	102.3985 (0.000)***	Reject H_0	There is a positive correlation between LIC & HCE at statistical significant of 0.01 level	Sghari, 2013; Novignon, 2012; Ke, 2011.
HFCE	-3.43e-09 (0.000)***	Reject H_0	There is a negative correlation between HFCE & HCE at statistical significant of 0.01 level	Piabuo, 2017.
CPI	3.815406 (0.000)***	Reject H_0	There is a positive correlation between CPI & HCE at statistical significant of 0.01 level	Xiaolong, 2014; Ke, 2011.
-cons	-170.9433 (0.035)**			

Table 5.2: Summary of the Hypothesis Testing and Empirical Findings

	Coef. and P > |t|	Hypothesis Testing	Empirical Findings	Supported by Previous Empirical Works
Panel B				
HCE	6.44E+07 (0.000)***	Reject H_0	There is a positive correlation between HCE & GDP at statistical significant of 0.01 level.	Bakare, 2011; Nurudeen, 2010; Erdil, 2009; Mellinger, 1998; Hansen & King, 1996; Hitiris, 1992; Gerdtham & Jonsson, 1991; Milne & Molana, 1991; Newhouse, 1987; Parkin, 1987.
Pop	-531.3673 (0.000)***	Reject H_0	There is a negative correlation between Pop & GDP at statistical significant of 0.01 level	Kremer, 1993; Rostow, 1990; Coale, 1986; Shultz, 1985.
LIC	4.34E+09 (0.062)**	Reject H_0	There is a positive correlation between LIC & GDP at statistical significant of 0.05 level	Akinlo, 2014; Verma, 2013.
HFCE	0.8067303 (0.000)***	Reject H_0	There is a positive correlation between HFCE & GDP at statistical significant of 0.01 level	Ceritoglu, 2013.
CPI	-2.09E+08 (0.090)*	Reject H_0	There is a negative correlation between CPI & GDP at statistical significant of 0.10 level	Gerdtham, 1991.
-cons	1.64E+10 (0.243)			

5.5 Policy Implications

The findings of this study are very useful implications for policy formulations regarding to the determinants of Health Care Expenditure (HCE): an empirical evidence from ASEAN countries. It suggests the government policies could play an important role such as the setting of Consumer Price Index (CPI) in increasing access to Health Care Expenditure. The government also can provide better Life Insurance Coverage (LIC) for a poor society to encourage the awareness of Health Care (HC). The financing policies of HC determine who will have access to basic health services such as LIC. There could be scope from sharing of good practices between ASEAN countries to improve the quality control of Health Care.

Besides that, it is crucial to policymakers to know the long-term relationship between Gross Domestic Product (GDP) and Health Care Expenditure (HCE) that enables to make a judgement on how much the government will spend the expenditure on health care in the coming years based on the forecast of the trend in national income. It helps policymakers to plan health reforms and to allocate resources efficiently. Most of the studies focused on the link between health expenditure and GDP in OECD countries, then this project paper tries to examine the statistical significant influence of HCE on the economic growth.

5.6 Limitations of the Current Study

Notwithstanding the findings, the current study does have many limitations, which point potentially fruitful research opportunities. This project paper focused on the determinants of Health Care Expenditures (HCE): an empirical evidence from ASEAN countries. Although there are some restrictions remained in this study, but the results should be interpreted with great caution. First, the availability of data publication was covered twenty years of annual data, started from 1995 to 2014 only. It quite difficult to get the complete data for ASEAN countries which is below the year of 1995 as well as for the latest periods of 2015 and 2016. For instance, experimental data for the use of life insurance coverage are limited and often outdated (Shen, 2013).

Second, the process of selecting the most suitable variables in this study also become quite challenging in order to generates the significant outcomes for the four models, namely Panel A, Panel B, Panel C and Panel D. In addition, the variables that related to the Health Care Expenditures (HCE) such as Medical Tourism and Quality of Treatment have insufficient data. Third, some countries may have good data reporting systems while the others may rely on estimation to fill in the data gaps. For example, the data of Household Final Consumption Expenditure (HFCE) in Myanmar could be obtained from Trading Economic Website only. Sometimes, the method used to computing the data of Health Expenditure and other variables was predicted based on the value of Income or Gross Domestic Product (GDP).

Forth, this study is limited to the ten ASEAN countries only as the sample such as Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines,

Singapore, Thailand and Vietnam. So, the future further studies could consider the comparison of HCE among the developed and developing countries in order to enlarge the total observations to generate the valid conclusion of the research project. Lastly, some methodological issues remained problematic especially for the Diagnostic Tests and Generalized Method of Moments. There are changes of the dependent and independent variables for several times in order to generate the significance results for the all models in this study.

5.7 Recommendations for the Future Research

This study generated the significance results for the four models, namely Panel A, Panel B, Panel C and Panel D by using 200 of total observations that consist of five independent variables for each model. So, the researchers can add some variables for the further research that related to the Health Care Expenditures per Capita (HCEpC) such as Level of Educations, Medical Tourism, Private or Public Health Care Provider and Quality of Treatment. The researchers also can include the variable of dcrisis to see either financial crisis of 2007 and 2008 given the bad impact or not to the HCEpC and economic growth. Besides that, the sample of this study involved ten ASEAN countries only. So, the researchers can expand a scope of the study by making a comparison between the developed and developing countries.

5.8 Conclusion

The purpose of this study is to investigate the determinants of Health Care Expenditures per Capita (HCEpC) in ASEAN countries. The data collection is based on the secondary data that obtained from the Central of International Data, World Development Indicator (World Bank, 2016), World Health Organization (WHO, 2016), ASEAN Up Database and also from the central bank of each country. There are a few technique used to generate the outcome of this study such as Pooled Regression Model, Common Effects (CE), Fixed Effects (FE), Random Effects (RE), Likelihood Ratio, Hausman Test, Lagrange Multiplier (LM) Test, Diagnotic Test: Multicollinearity Test and Heteroskedasticity Test and Granger Causality Test.

The first model, Panel A analyses the relationship between HCEpC with the Gross Domestic Product (GDP), Population, Life Insurance Coverage (LIC), Household Final Consumption Expenditure (HFCE) and Consumer Price Index (CPI). For the second model, Panel B explores the relationship between GDP with the HCEpC, Population, LIC, HFCE and CPI. Based on the dependent and independent variables of these two models, then Panel C and Panel D are generated by using natural log (ln). Pooled Ordinary Least Square (POLS) of Regression Model revealed that Panel A found the GDP, Population, LIC and CPI are positively correlated to the HCEpC that have the statistical significant at 0.01 level. However, there is a negative relationship between HFCE and HCEpC at the statistical significant of 0.01 level.

Next, Panel B indicated the HCEpC, LIC and HFCE have positive correlation with GDP at the statistical significant of 0.01 level except for LIC at 0.05 level. While, there is

a negative relationship between Population and CPI with the GDP at statistical significant of 0.01 and 0.10 level respectively. Panel C represented the lnGDP, lnLIC, lnHFCE and lnCPI are positively correlated to the lnHCEpC that have the statistical significant at 0.01 level. However, there is a negative relationship between lnPop and lnHCEpC at the statistical significant of 0.01. Last but not least, Panel D showed the lnHCEpC, lnPop and lnLIC have positive correlation with lnGDP at the statistical significant of 0.01 level except for lnLIC that has no statistical influence. While, there is a negative relationship between lnHFCE and lnCPI with lnGDP at the statistical significant of 0.01 level.

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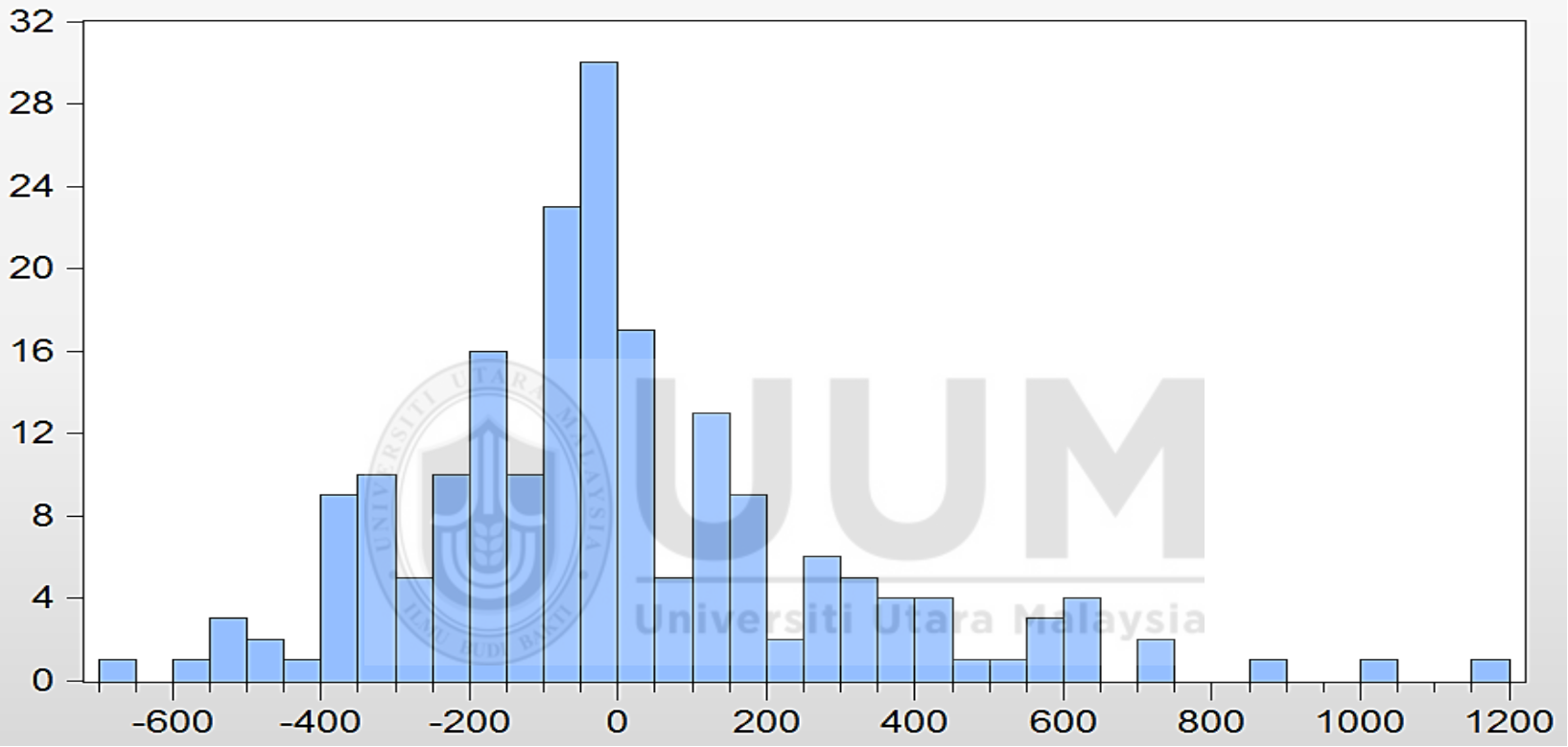
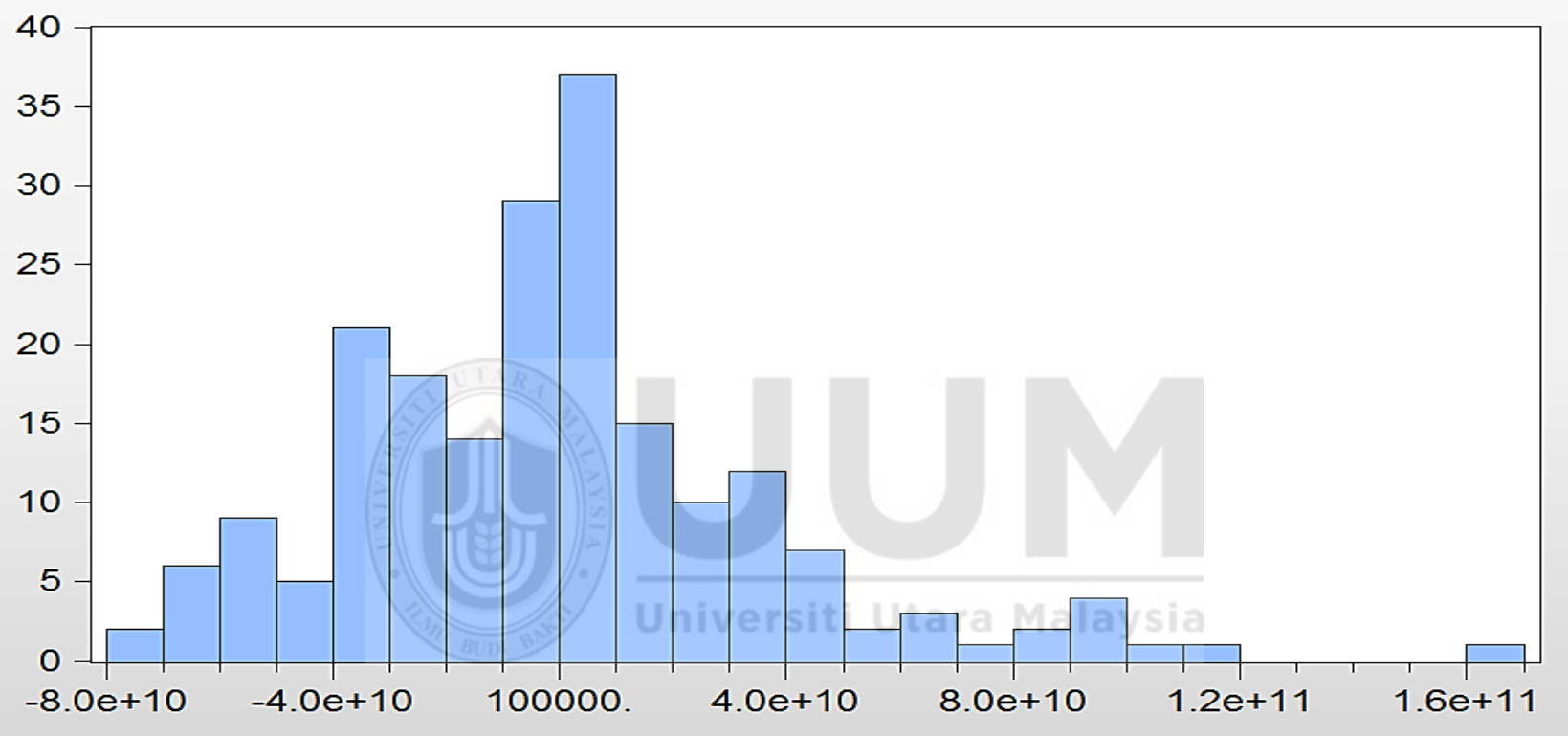
APPENDIX 1: RESIDUAL NORMALITY TEST [MODEL 1 @ PANEL A]



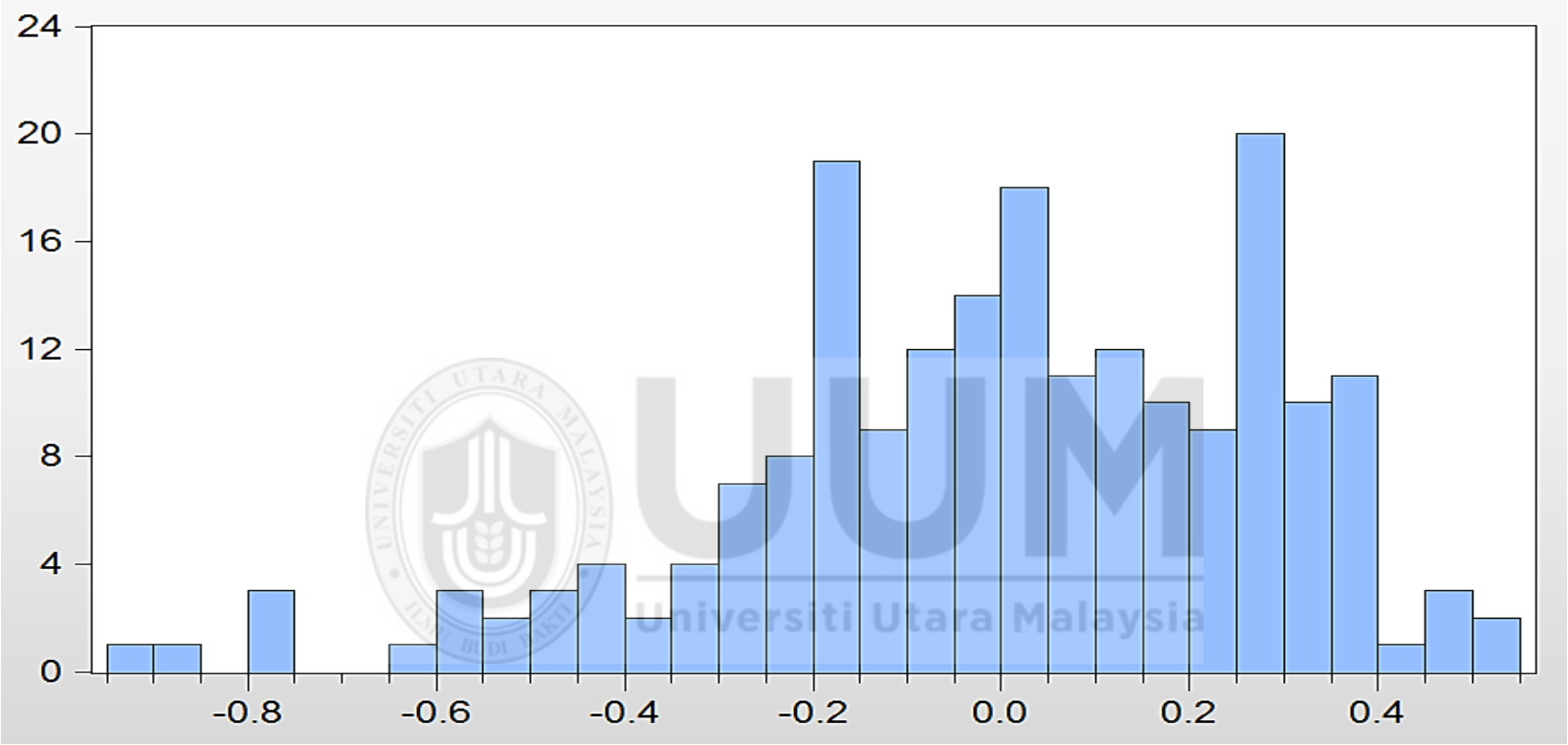
Series	: Standardized Residuals	Mean	: 9.44E-14	Std. Dev.	: 288.2988	Jarque-Bera	: 62.28331
		Median	: -34.96017	Skewness	: 0.965508	Probability	: 0.000000
Sample	: 1995 2014	Maximum	: 1181.818	Kurtosis	: 4.935246		
Observations	: 200	Minimum	: -697.9235				

APPENDIX 1: RESIDUAL NORMALITY TEST [MODEL 2 @ PANEL B]



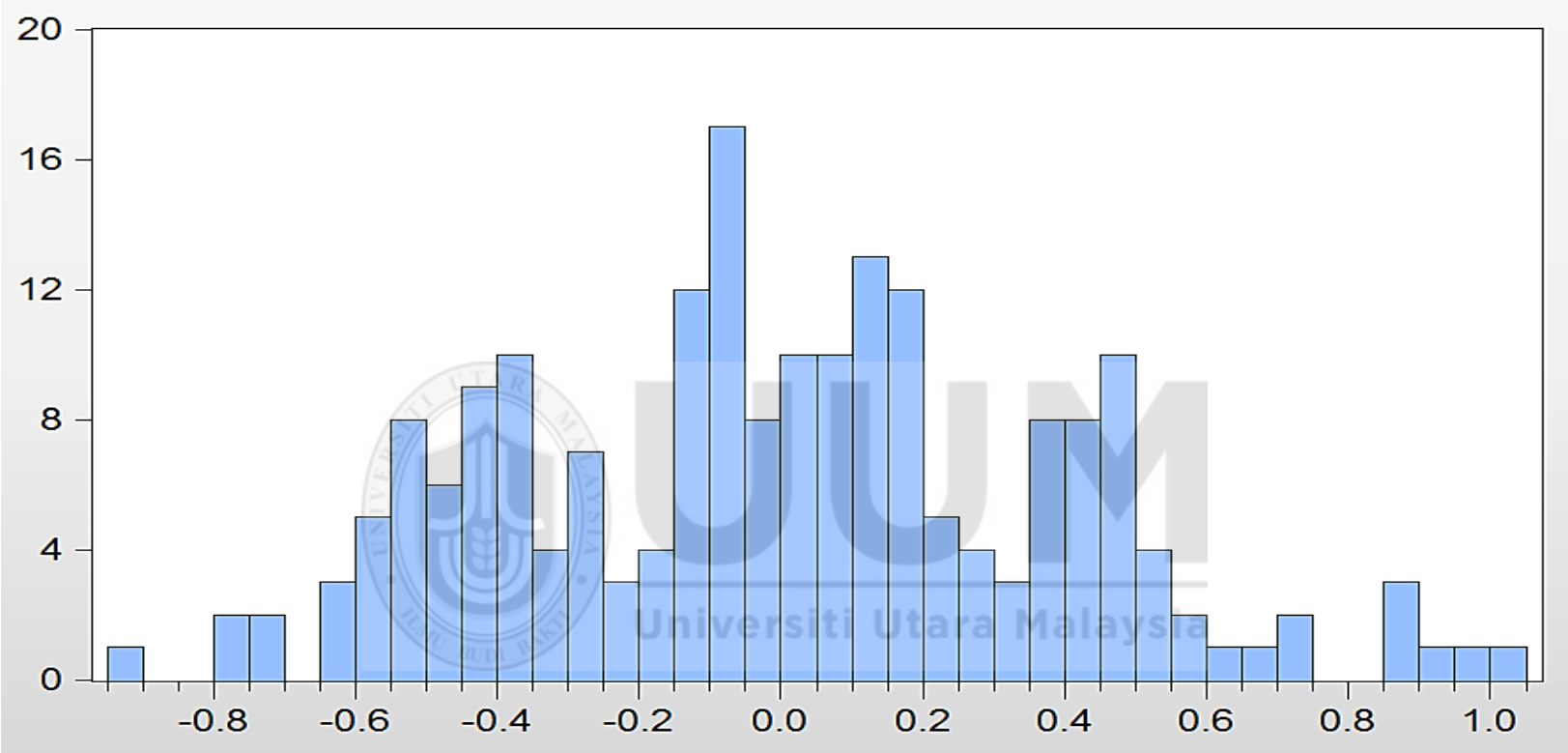
Series	: Standardized Residuals	Mean	: 3.55E-05	Std. Dev.	: 3.75E+10	Jarque-Bera	: 56.23565
		Median	: -1.93E+08	Skewness	: 0.867521	Probability	: 0.000000
Sample	: 1995 2014	Maximum	: 1.66E+11	Kurtosis	: 4.933367		
Observations	: 200	Minimum	: -7.98E+10				

APPENDIX 1: RESIDUAL NORMALITY TEST [MODEL 3 @ PANEL C]



Series	: Standardized Residuals	Mean	: 3.23E-15	Std. Dev.	: 0.281133	Jarque-Bera	: 19.50534
		Median	: 0.024800	Skewness	: -0.708266	Probability	: 0.000058
Sample	: 1995 2014	Maximum	: 0.540833	Kurtosis	: 3.577994		
Observations	: 200	Minimum	: -0.940066				

APPENDIX 1: RESIDUAL NORMALITY TEST [MODEL 4 @ PANEL D]



Series	: Standardized Residuals	Mean	: 5.92E-15	Std. Dev.	: 0.382560	Jarque-Bera	: 1.854025
Sample	: 1995 2014	Median	: -0.008794	Skewness	: 0.185691	Probability	: 0.395734
Observations	: 200	Maximum	: 1.036288	Kurtosis	: 2.709211		
		Minimum	: -0.939035				

APPENDIX 2: GENERALIZED METHOD OF MOMENTS [MODEL 1 @ PANEL A]

Variable	One Step		Variable	Two Step	
	GMM Difference	GMM System		GMM Difference	GMM System
Panel A					
HCE	1.093651	1.096353	HCE	1.078103	1.094706
L1.	(0.000)***	(0.000)***	L1.	(0.000)	(0.000)***
GDP	1.87E-10	2.21E-10	GDP	1.46E-10	1.61E-10
	(0.111)	(0.037)**		(0.130)	(0.214)
Pop	7.95E-07	1.34E-06	Pop	-1.78E-06	9.67E-07
	(0.647)	(0.000)***		(0.175)	(0.097)*
LIC	3.191196	0.0021082	LIC	1.658712	6.114555
	(0.521)	(0.908)		(0.361)	(0.011)***
HFCE	-2.19E-10	-2.53E-10	HFCE	-1.45E-10	-1.67E-10
	(0.151)	(0.019)***		(0.091)	(0.165)***
CPI	0.1398696	0.0681994	CPI	0.9019969	-0.1081328
	(0.544)	(0.746)		(0.041)	(0.344)
_cons	-50.75865	-80.50212	cons	30.99947	-51.1141
	(0.521)***	(0.001)***		(0.440)	(0.000)***

Note: HCE: Health Care Expenditure; GDP: Gross Domestic Product; Pop: Population; LIC: Life Insurance Coverage; HFCE: Household Final Consumption Expenditure and CPI: Consumer Price Index.

APPENDIX 2: GENERALIZED METHOD OF MOMENTS [MODEL 2 @ PANEL B]

Variable	One Step		Variable	Two Step	
	GMM Difference	GMM System		GMM Difference	GMM System
Panel B					
GDP	0.5708762	-1.77E-09	GDP	-1.11E-09	0.6143729
L1.	(0.000)***	(0.008)***	L1.	(0.095)***	(0.000)***
HCE	3.80E+07	5.644644	HCE	-0.589323	-1.09E+08
	(0.000)	(0.000)***		(0.002)	(0.000)***
Pop	-1003.485	2.31E-06	Pop	-0.0000208	-721.1619
	(0.217)	(0.000)***		(0.000)	(0.000)***
LIC	-1.17EE+08	-863.9484	LIC	107.5766	6.114555
	(0.965)	(0.000)***		(0.002)	(0.011)***
HFCE	6.64E-09	2.18E-09	HFCE	6.64E-09	-1.67E-10
	(0.000)	(0.000)***		(0.000)	(0.165)***
CPI	2.236087	-12.8861	CPI	2.236087	-0.1081328
	(0.107)	(0.000)***		(0.107)	(0.344)
_cons	0	1814.072	cons	0	-51.1141
	(omitted)	(0.000)***		(omitted)	(0.000)***

*Note: The *, ** and *** are 10%, 5% and 1% level of significant.*

APPENDIX 2: GENERALIZED METHOD OF MOMENTS [MODEL 3 @ PANEL C]

Variable	One Step		Variable	Two Step	
	GMM Difference	GMM System		GMM Difference	GMM System
Panel C					
lnHCE	0.6059715	0.6547864	lnHCE	0.0316289	0.0412629
L1.	(0.000)***	(0.000)***	L1.	(0.907)	(0.887)
lnGDP	3307888	0.2998672	lnGDP	0.4562355	0.4227007
	(0.000)***	(0.000)***		(0.112)	(0.166)
lnPop	0.0595437	-0.3658087	lnPop	-4.193433	-4.498311
	(0.772)	(0.000)***		(0.322)	(0.294)
lnLIC	0.0021082	0.0234853	lnLIC	-0.0596058	-0.0584618
	(0.908)	(0.111)		(0.279)	(0.400)***
lnHFCE	0.0197291	0.0929847	lnHFCE	1.882122	1.919299
	(0.768)	(0.001)***		(0.021)	(0.018)***
lnCPI	0.0590095	0.0554339	lnCPI	-0.3200125	-0.2255723
	(0.157)	(0.090)*		(0.645)	(0.765)
_cons	-8.116945	-2.214283	cons	18.5917	23.32608
	(0.006)***	(0.000)***		(0.740)	(0.682)***

Note: lnHCE: Natural Log of Health Care Expenditures, lnGDP: Natural Log of Gross Domestic Product, lnPop: Natural Log of Population, lnLIC: Natural Log of Life Insurance Coverage, lnHFCE: Natural Log of Household Final Consumption Expenditure and lnCPI: Natural Log of Consumer Price Index.

APPENDIX 2: GENERALIZED METHOD OF MOMENTS [MODEL 4 @ PANEL D]

Variable	One Step		Variable	Two Step	
	GMM Difference	GMM System		GMM Difference	GMM System
Panel D					
lnGDP	0.5043596	0.6500758	lnGDP	0.2923397	0.1811359
L1.	(0.000)***	(0.000)***	L1.	(0.311)	(0.376)
lnHCE	0.2565488	0.280535	lnHCE	0.4050988	0.3058407
	(0.000)***	(0.000)***		(0.162)	(0.086)*
lnPop	0.4649498	0.3237044	lnPop	-3.163498	-4.038632
	(0.006)**	(0.000)***		(0.387)	(0.065)**
lnLIC	-0.0136286	0.0068228	lnLIC	0.069847	0.158752
	(0.359)	(0.649)		(0.613)	(0.047)**
lnHFCE	0.2848588	0.023448	lnHFCE	0.9252942	1.621458
	(0.000)***	(0.284)		(0.013)	(0.036)**
lnCPI	-0.0007772	0.0887008	lnCPI	0.3347679	0.2061663
	(0.980)	(0.001)***		(0.436)	(0.459)
_cons	-3.735359	1.005388	cons	44.52119	45.80779
	(0.140)	(0.015)***		(0.364)	(0.113)

*Note: The *, ** and *** are 10%, 5% and 1% level of significant.*