GOVERNMENT EXPENDITURE AND ECONOMIC GROWTH:

EVIDENCE FROM PANEL DATA

MAIZATUL MAZNI BINTI ZAINUN @ ZAINOL

MASTER OF SCIENCE (FINANCE)

UNIVERSITI UTARA MALAYSIA

JUNE 2017

GOVERNMENT EXPENDITURE AND ECONOMIC GROWTH:

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By

MAIZATUL MAZNI BINTI ZAINUN @ ZAINOL

Thesis submitted to

School of Economics, Finance and Banking (SEFB)

Universiti Utara Malaysia

In Partial Fulfillment of the Requirement for the Master of Science (Finance)

Pusat Pengajian Ekonomi, Kewangan dan Perbankan
SCHOOL OF ECONOMICS, FINANCE, AND BANKING
Universiti Utara Malaysia

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Nama Penyelia (Name of Supervisor) : **Dr. Sabri Nayan**

Tandatangan (Signature) :

Dr. Sabri Nayan
Senior Lecturer
School of Economics, Finance and Banking (SEFB)
038 Economic Building, College of Business
Universiti Utara Malaysia
06010 Sintok, Kedah Darul Aman
MALAYSIA

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Abstrak

Kesan perbelanjaan kerajaan ke atas pertumbuhan ekonomi pertama kali dikaji secara empirikal oleh Adolf Wagner. Wagner mencadangkan terdapat hubungan (*causal relationship*) antara perbelanjaan kerajaan dengan perkembangan ekonomi. Perbelanjaan kerajaan dianggap sebagai kesan kepada aktiviti ekonomi. Walau bagaimanapun, hipotesis Keynesian bersetuju arah kesan (*causality direction*) adalah daripada perbelanjaan kerajaan kepada aktiviti ekonomi. Kajian ini adalah penting untuk mendedahkan pemahaman yang jelas kepada pembuat dasar dan kerajaan tentang perkaitan antara perbelanjaan kerajaan dengan pertumbuhan ekonomi. Menggunakan pendekatan Data Panel, kajian ini mengkaji impak perbelanjaan kerajaan ke atas pertumbuhan ekonomi bagi negara ASEAN-5 dan menyiasat hubungan (*causal relationship*) antara pemboleh ubah berkenaan. Keputusan menunjukkan bahawa perbelanjaan kerajaan mempunyai hubungan ketara yang positif dengan pertumbuhan ekonomi. Kerajaan perlu memastikan bahawa perbelanjaan kerajaan diuruskan dengan baik. Pengurusan bajet kerajaan yang bagus akan memberi manfaat kepada produktiviti sesebuah negara. Bagi kajian selanjutnya, kedua-dua data kuantitatif dan kualitatif perlu digunakan untuk menerangkan hubungan antara perbelanjaan kerajaan dan pertumbuhan ekonomi.

Kata kunci: Perbelanjaan kerajaan, pertumbuhan ekonomi, negara ASEAN-5, Data Panel

Abstract

The impact of government expenditure on economic growth was first investigated empirically by Adolf Wagner. Wagner suggests that there is a causal relationship between government spending and economic development. Government expenditure is considered as the outcome of economic activities. However, Keynesian hypothesis agrees that the causality direction runs from government expenditure to economic activities. This paper is important to reveal a clear understanding to policy makers and governments about inter-linkages between government spending and economic growth. Using Panel Data approach, the study examines the impact of government expenditure on economic growth for ASEAN-5 countries and investigates the causal relationship between the variables. The result shows that government expenditure has a positive significant relationship with economic growth. Government should ensure that expenses of the governments are properly managed. A proper managed government budget will be benefit to productivity of the country. For future research, both quantitative and qualitative data should be used to explain the relationship between government expenditure and economic growth.

Key words: Government Expenditure, Economic Growth, ASEAN-5 Countries, Panel Data

Acknowledgement

Bismillahirrahmanirrahim. Alhamdulillah, there are many great people who helped me during my journey to complete this paper. I would like to express my gratitude to my supervisor, Dr. Sabri bin Nayan for his guidance, patience and kindness. Special thanks to my beloved husband, Roslin bin Jamaludin, and children, Muhammad Rais Mirza and Muhammad Haris Mirza. I am very grateful to have their love. My sincere appreciation goes to Jabatan Perkhidmatan Awam (JPA) and Government of Malaysia. I am blessed for this opportunity from them to further my study. My life would not have been the same without my HLP batchmates: Adill bin Bahatim, Ahmad Fuad bin Ishak, Hishamuddin Fitri bin Abu Hasan and Asron bin Hussein; and also my sisters and brother; Nor Faizah binti Ahmad @ Mohammed Razikin, Pilly Hamisi Mtepa, Maimuna Yahaya and Shittu Waliu Olawale. Thank you for sharing knowledge, encouragement and support. I enjoy true friendship that we had in UUM. Lastly, I am thankful to have my family, lecturers and friends who always give guidance to me. May Allah protect them with His Endless Kind, Love and Care. Amin.

Table of Contents

List of Tables

Lists of Figures

List of Appendices

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

1.1.1. Wagner's Law and Keynesian Hypothesis

Numerous of previous research have been conducted regarding government spending and economic growth. This relationship is an important part studied in public economics. The relationship was first investigated empirically by Wagner more than a hundred years ago. Wagner introduced the 'law of the expanding state role'. It is also called Wagner's Law.

Wagner's Law suggests that public spending may cause economic progress. According to Wagner, government spending is positively respond to economic growth. Increasing income of a country will increase public sector's size of the country. Wagner also found that public spending is income-elastic.

Wagner suggests that consumption of elasticity for public good is greater than one and elasticity consumption from private sector is less than one. Most of public goods and services are considered as civil goods. Education and health care services are examples of civil goods.

As income increases, the demand for civil goods increases faster than increment in income level. Therefore, public spending should also increase faster compared to increment in national income due to a greater demand of enactment, laws and policy of civil goods (Dritsakis and Adamopoulos, 2004).

Wagner concluded that the economic development leads to more administrative functions of the states; increase in allocation of money in social and cultural goods and services; and increase in proper administrative and bureaucratic controls (Wahab, 2004). Adamopoulos & Dritsakis (2004) and Al-Faris (2002) agree with Wagner's Law.

Devarajan, et. al (1996) conclude that governments spend money for certain goals. For example, to increase per-capita income. Therefore, they have responsibility to ensure different components of expenditure meet the objectives. However, there is no exact economic theory or empirical evidence to measure the correct composition of public expenditure in boosting economic growth.

If one market fails to provide public goods, then only governments will justify their intervention for the related market. There is no guidelines or operational rules in their decision making about the spending that need to be cut in public sector.

Wagner suggests that public expenditure has impact on economic growth where public spending expands faster than national income. The causality runs from income to government spending. However, according to Keynesian macroeconomic viewpoint, the causality runs from public spending to income. Keynesian theory views the government spending as an instrument policy to increase economic growth (Menyah, 2013).

The Keynesian viewpoint believes that governments should spend more and reduce tax to stimulate economy downturn. As the economy slows down, the unemployment rate and economic dislocation is high. In that case, governments should increase certain public sector programmes (Wahab, 2004).

1.1.2. ASEAN Overview

The Association of Southeast Asian Nations (ASEAN) countries were held their first meeting in Bangkok, Thailand on 8 August 1967. There were five countries joining ASEAN; Thailand, Singapore, Philippines, Indonesia and Malaysia. The first ASEAN meeting was called ASEAN declaration or Bangkok declaration. Then, another five countries joined ASEAN. Brunei Darussalam was being part of ASEAN on 7 January 1984, Vietnam on 28 July 1995, Lao PDR and Myanmar on 23 July 1997 and Cambodia on 30 April 1999). Today there are 10 Member States of ASEAN.

ASEAN countries share three visions. They are ASEAN Political-Security Community (APSC), ASEAN Economic Community (AEC) and ASEAN Socio-Cultural Community (ASCC). The objectives of these communities are outward looking, living in peace, stability and prosperity, bonded together in partnership in dynamic development and in a community of caring societies (ASEAN 50 Philippines, 2017).

An important community in economy for ASEAN countries is ASEAN Economic Community (AEC). AEC was established in year 2015 to give opportunities of large market of US$2.6 trillion to over 622 million people. This is the third largest economy in Asia and the seventh largest in the world in year 2014.

During 27th ASEAN Summit held in Kuala Lumpur on 22 November 2015, ASEAN Leaders launched the AEC Blueprint 2025. This is the continuation of AEC Blueprint 2008 to 2015. AEC Blueprint 2025 provides clear visions and strategic measures for the AEC from year 2016 to 2025.

The AEC Blueprint 2025 provides five characteristics:

i. A highly Integrated and Cohesive Economy;

ii. A competitive, innovative and dynamic ASEAN;

iii. Enhanced connectivity and sectoral cooperation;

iv. A resilient, inclusive and people-oriented, people-centred ASEAN community; and

v. A global ASEAN economy.

AEC Blueprint is a platform for ASEAN countries to cooperate through work plans of various sectoral bodies. These work plans are revised and updated to throughout the year. The collaboration includes partnership arrangements with the private sector, industry associations regionally and at national levels. The Blueprint is closely monitored to ensure the effectiveness of its implementation (Association of Southeast Asian Nation, 2017).

1.2. Problem Statement

The issue of government spending and economic growth is crucial for developing countries. The public sector usually uses a relatively large share of society's economic resources (Dogan & Tang, 2006). As mentioned by Wagner's Law, public spending will increase as per capita income increases. A growing economy will cause administrative and protective functions of the state to expand. Higher public spending is required to maintain law and order as well as socio-economic regulation. As complexity of economic life and urbanization increases, the government need to spend more on regulations.

Furthermore, public spending on cultural and welfare services are also increased during industrialization. This is due to high demand or high income elasticity for cultural and welfare services, and usually these services are provided by government. Public expenditure for these services will increase rapidly as the demand of these services increase. In addition, technological needs require larger amounts of capital. The government has to provide the capital funds to finance large-scale capital expenditures since the private sector does not have the capacity to provide the funds; as stated by Dogan & Tang, 2006 and Adamopoulos & Dritsakis, 2004.

Government spending is increasing over the years. There is a need to test the relationship between government expenditure and economic development of a country. Alexiou (2009), Dritsakis and Adamopoulos (2004) and Kolluri et al. (2000) agree that government expenditure has a positive impact on economic growth. In some cases, government expenditure does not have a significant relationship with economic growth as suggested by Sinha (1998), Landau (1997) and Grier and Tullock

(1989). Devarajan, et al. (1996) conclude that productive public expenditures may become unproductive if misallocating and using it in excess.

Wagner's Law suggests that the causality direction runs from income to government expenditure. However, according to Keynesian macroeconomic viewpoint, the causality runs from government expenditure to income. Figure 1.1. shows the increasing trend of government spending across ASEAN-5 countries from year 1990 to 2014.

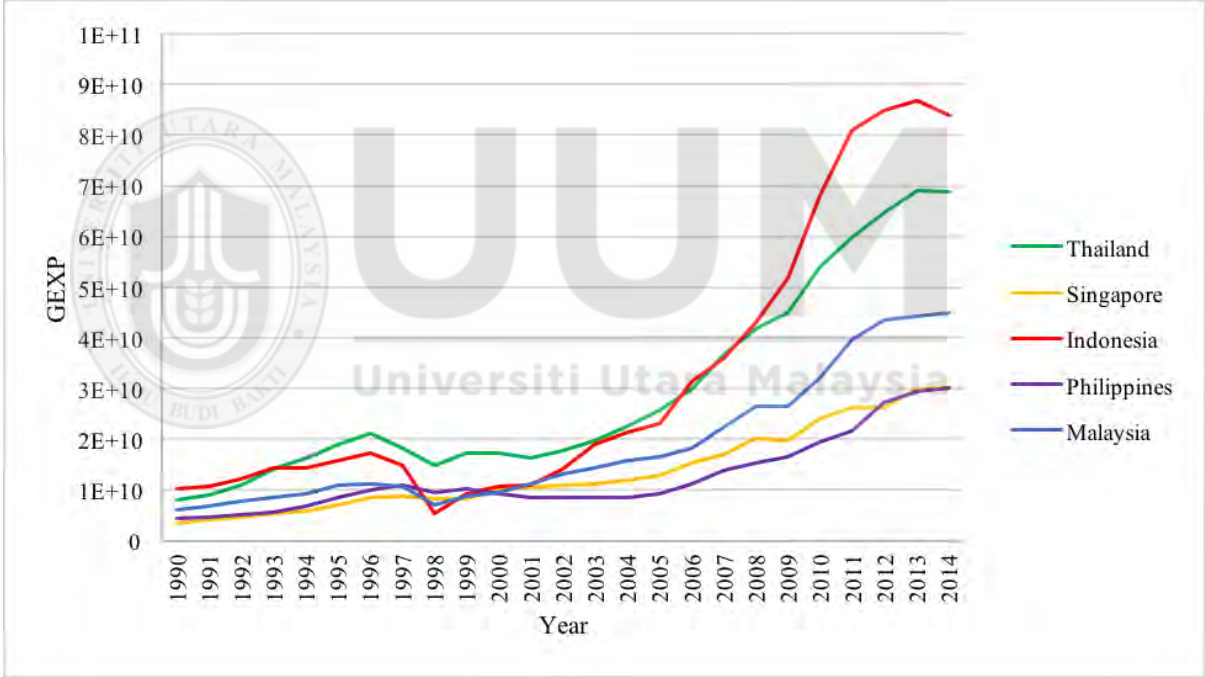

Figure 1.1.
Government spending across ASEAN-5 countries from year 1990 to 2014

Figure 1.2. shows that the GDP of ASEAN-5 countries were affected from financial crisis in year 1998 and 2009. The global financial crisis harmed the GDP of Thailand, Singapore, Indonesia, Philippines and Malaysia. After the crisis, the GDP of these countries was decreased. Financial crisis in year 2008 weakened the fiscal balance of ASEAN-5 countries by approximately 3% of the following year (Budina & Tuladhar, 2010).

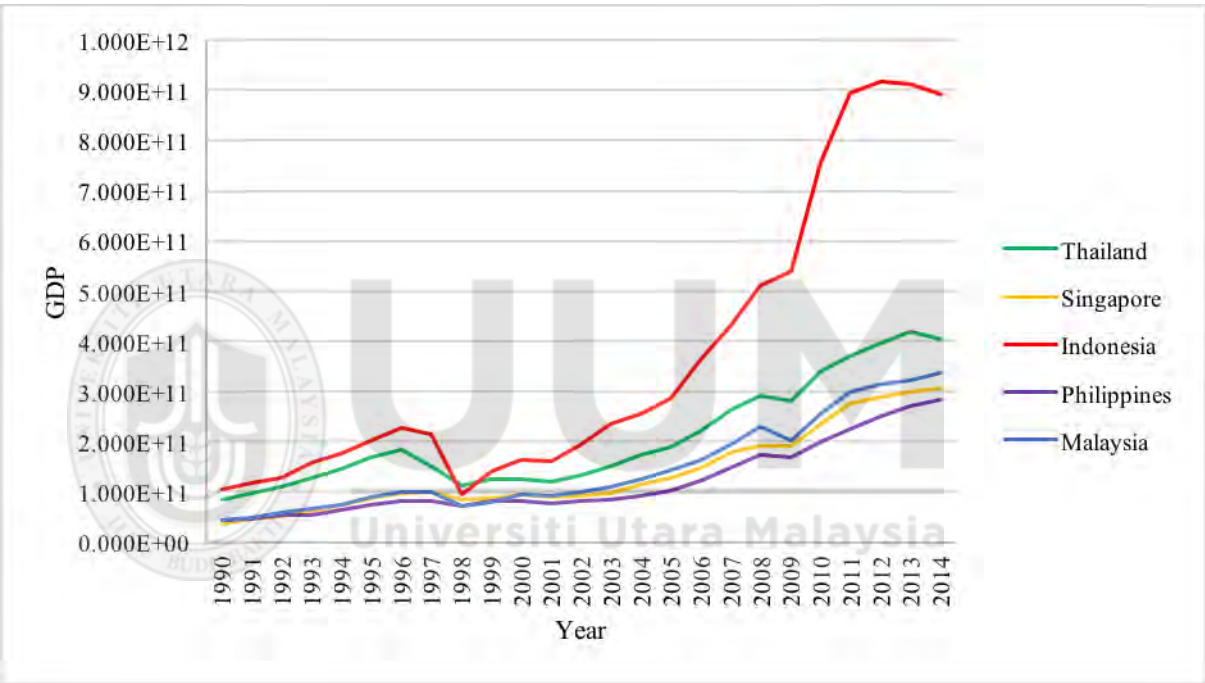

Figure 1.2.
GDP across ASEAN-5 countries from year 1990 to 2014

According to Budina & Tuladhar (2010), fiscal stimulus contributes rapid economy recovery in the ASEAN-5 countries after the financial crisis in 2008. The fiscal policy helps to strengthen and stimulate economic growth for Thailand, Singapore, Indonesia, Philippines and Malaysia. The government spending of ASEAN-5 countries on infrastructure is the major contribution to increase the overall investment and economic growth.

After the financial crisis, the ASEAN Leaders adopted the ASEAN Economic Community (AEC) Blueprint 2008-2015 in year 2007. The AEC Blueprint 2008-2015 was succeeded in integrating the regional economic agenda for ASEAN countries. Therefore, ASEAN countries implement the AEC Blueprint 2025. The AEC Blueprint 2025 provides clear visions and strategic measures for the AEC from year 2016 to 2025.

ASEAN countries need to ensure that the AEC Blueprint 2025 meet its objectives. The AEC Blueprint 2025 is designed to increase regional economy for ASEAN countries within time frame of year 2016 to 2025. ASEAN governments are expected to spend productively with closely monitored implementation of AEC Blueprint 2025 towards a healthy economic development. As suggested by Devarajan, et al. (1996), productive public expenditures may become unproductive if misallocating and using it in excess. Therefore, this study is performed to investigate whether government spending does contribute to economic growth for ASEAN-5 countries.

1.3. Research Questions

1. Does government expenditure affect economic growth for ASEAN-5 countries?
2. What is the impact of other macroeconomic variables on economic growth for ASEAN countries?

1.4. Research Objectives

The objectives of this study are as follows:

1. To determine the impact of government expenditure on economic growth for ASEAN-5 countries; and
2. To investigate the impact of other macroeconomic variables on economic growth for ASEAN-5 countries.

1.5. Significance of the Study

This paper examines the impact of public spending on ASEAN-5 countries economic development. The purpose of this study is to provide evidence, reference and contribute to the knowledge about government spending and economic growth. It is expected to clarify the importance of fiscal policy and other macroeconomic variables in strengthening the economy for ASEAN-5 countries.

A clear understanding about inter-linkages between government spending and economic growth will help the government in making better decision for the country. As ASEAN countries have responsibility for ASEAN Economic Community (AEC) Blueprint 2025 to meet its objectives, ASEAN governments are expected to effectively monitor the public spending as fiscal instrument in stimulating economic growth. Government expenditure may become unproductive if misallocating and using it in excess, as suggested by Devarajan, et al. (1996).

1.6. Scope of the Study

This study involves ASEAN-5 countries. The countries are Thailand, Singapore, Indonesia, Philippines and Malaysia. The countries are chosen because there is a lack of study of government expenditure for ASEAN-5 countries using panel data. The data covers from year 1990 to 2014. The data is retrieved from the World Development Indicators (World Bank). The dependent variable is gross domestic product (GDP). GDP is used to measure economic growth. The main independent variable is government expenditure. The other independent variables are gross capital formation, portfolio investment, labor, trade, total reserve and gross savings.

1.7. Organization of Study

This study consists of five chapters. Chapter one explains background of the study, problem statement, research questions, research objectives, significance of the study and scope of the study. Chapter two provides theoretical review, evidence and extensive literature review from the previous study. Chapter three is about data description, theoretical framework and research methodology used in this paper. The empirical findings and discussion are presented in chapter four. Chapter five summarizes the findings of the paper, policy implication, limitation of the study and recommendations or suggestions for further studies.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

This chapter discuss about theories of government expenditure and economic growth, evidence and extensive previous empirical findings from other scholars. The explanation includes the relationship between dependent variable (economic growth or GDP) and independent variables (government expenditure, gross capital formation, portfolio investment, labor force, trade, total reserve and gross savings). The end of this chapter concludes the entire chapter.

2.2. Theories of Government Expenditure and Economic Growth

2.2.1 Wagner's Law

Wagner's Law suggests that there is causal relationship between national income and government expenditure. Wagner's Law is also called the 'law of the expanding state role'. (Al-Faris, 2002).

Adolf Wagner was the first person who investigate about the positive relationship between economic growth and government activities. Wagner introduced three main reason for increasing the role of a government:

i. The industrialization and modernization lead to increase in private sectors. Spending on enforcement, and spending on law and orders increase due to this reason;

ii. Real income has positive impact on income elastic 'cultural and welfare' expenditures. Wagner explains that government is a better provider for

education and culture. Public sector expands towards activities of basic needs such as education and culture; and

iii. Infrastructure development such as railroads project should be done by the government because private companies are unable to raise a huge finance for the development (Sinha, 1998).

Tang (2010) explained empirically both Wagnerian and Keynesian hypothesis in his study of government spending and economic growth in Malaysia. Wagner's Law is a classical approach. Government spending is considered as an endogenous factor or a result of economic progress.

Wagner's Law suggests that economic growth leads to an increase in government spending. In this case, public expenditure is considered as outcome of economic activities (Liu et al., 2008).

Salih (2012), Chang (2002) and Kolluri et al. (2000) used time series techniques to determine the relationship between government expenditure and economic growth. Salih (2012) examines the effect of government spending on Sudan economic growth from year 1970 to 2010; Chang (2002) investigate South Korea, Taiwan, Thailand, Japan, USA and the United Kingdom from year 1951 to 1996; and Kolluri et al. (2000) examine the long-run relationship between government expenditure growth and national income growth for OECD countries (the G7): Canada, France, Italy, Japan, United Kingdom, United States and Germany from year 1960 to 1993. The findings of their studies support Wagner's Law.

2.2.2. Keynesian Hypothesis

According to Keynesian macroeconomic viewpoint, government expenditure does Granger cause economic growth. The causality direction runs from government expenditure to economic activities. In Keynesian hypothesis, economic growth is the outcome of government expenditure. His viewpoint is contrast to Wagner's Law.

Keynes states that government expenditure is an exogenous factor. Government expenditure is a tool of policy instrument to stimulate the economic growth (Liu et al., 2008). From his perspective, public expenditure will contribute positively to economic growth. If a government spend more, it will give multiplier effects on aggregate demand.

Keynes suggests that government could increase the economy during economic downturns by lending money from the private sector. The money is returned to the private sector through various spending programs. High government consumption will increase the employment, profitability and investment (Patricia &Izuchukwu, 2013).

Few scholars found that Keynesian hypothesis explained the impact of government spending and economic growth. For example, Jiranyakul (2007) and Liu et al. (2008). Jiranyakul (2007) examines the impact of real government expenditure and real money supply on Thailand aggregate real output or real GDP from year 1993 to 2006. Using Granger causality test, the result shows that aggregate government expenditures cause economic growth.

On the other hand, Liu et al. (2008) tests the US federal government data to find a clear result about the impact of government spending on economic growth. The sample of the data is from year 1947 to 2002. The data includes human resources, national defense, physical resources and other expenses, and also net interest payment. The outcome shows no causal relationship between GDP and national defense expenditure. National security does not affect the economy activities. There is also two-way direction causality between physical resources, net interest payment and economic growth. However, unidirectional causality occurs between human resources and other expenditure and economic growth. The causality runs from human resources expenditure to GDP and GDP to other expenditure. The results more consistent to support Keynesian's theory.

Tang (2010) investigates the impact of government expenditure on economic growth in Malaysia by comparing two hypotheses; The Wagner's Law and Keynesian hypothesis. The data of real GDP and real government expenditure are obtained from World Development Indicators (World Bank) from year 1960 to 2005. Using time series technique, the result shows that Granger's non-causality tests have two-way causal relationship between government expenditure and economic growth. His study also supports both Wagner's Law and Keynesian law in Malaysia.

2.3. Previous Empirical Findings

Different methods are used by researchers to explain the impact of government spending on economic growth. Saez & Alvarez-Garcia (2017) investigate the relationship by using fixed and random effect approach in the 15 European Union countries. The findings show that government spending of Portugal and United

Kingdom have positive impact on economic growth. Government spending of Austria, Finland, Italy and Sweden have negative relationship with their economic growth. There is no significant relationship for other countries.

Ayinde, et al. (2015) perform unit root test, cointegration, error correction mechanism and combined estimators' analysis to investigate the relationship between capital expenditure, recurrent expenditure and various sources of government revenue and Nigeria's economic growth from year 1981 to 2011. This study shows that capital expenditure, recurrent expenditure, oil revenue and federal retained revenue have positive impact on economic growth.

Alexiou (2009) tests the relationship between economic growth and government spending by using panel data for seven South Eastern Europe (SEE) countries from year 1995 to 2005. The countries are Bulgaria, Serbia, FYROM, Croatia, Bosnia, Albania and Romania. The result shows that government spending on capital formation, development assistance, private investment and trade-openness have positive impact on economic growth. Population growth does not have significant relationship with economic growth.

Using time series approach, Dritsakis and Adamopoulos (2004), Patricia & Izuchukwu (2013), Dogan & Tang (2006) and Devarajan, et al. (1996) found the same result for the relationship between government expenditure and economic growth. Dritsakis and Adamopoulos (2004) investigate the relationship in Greek from year 1960 to 2001, Patricia & Izuchukwu (2013) performed their study in Nigeria from year 1977 to 2012 and Dogan & Tang (2006) test the relationship for ASEAN-5

countries from year 1960 to 2002. They agree that there is a long-run positive impact of government spending on economy of these countries.

Dritsakis and Adamopoulos (2004) tested income elasticity by using gross national product and per capita gross national product as independent variable; and total and partial public spending as dependent variable. The result confirms Wagner's Law and Granger-causality test shows bi-directional relationship between public spending and economic growth.

The study of Patricia & Izuchukwu (2013) shows that government expenditure on education is the most crucial spending in Nigeria. They suggest that the government should be focus more on education expenditure for the country. Dogan & Tang (2006) confirms that only Philippines has unidirectional causality from government expenditure to national income.

Devarajan, et al. (1996) in their study used the data of 43 developing countries from year 1970 to 1990. Using a pooled, cross-section/time-series data set, the data include total central government expenditures (current and capital), expenditures for defense, education, health, transport and communication as independent variables. The dependent variable is the five-year forward moving average of per-capita real GDP growth. The findings show that the share of current expenditure has positive significant relationship with economic growth.

Some researchers agree that government spending does not contribute to economic growth. Landau (1997), Ghali (1997) and Sinha (1998) are among the researchers. Landau (1997) examines the impact of government expenditure for human capital – education and health – on economic growth, and the actual human capital creation. He tested for a cross section of 84 non-Communist developing countries. He concluded that differences in government spending on human capital (as a share of GNP) does not has significant relationship with the growth of the countries' economy. He also agreed that the impact of government expenditure on the actual level of education and health is limited.

Ghali (1997) also reported a similar finding with Landau (1997). He tested the Granger causality between the share of total government spending in GDP and the growth of rate of real per capita GDP using time series analysis. Using vector autoregressive (VAR) analysis, he found out that there is no impact of government spending on per capita real output growth. He suggests that Saudi Arabia overcomes the deficit by reducing the size of the government and its role in the economy.

In Malaysia, a study by Sinha (1998) is also consistent with Landau (1997) and Ghali (1997) findings. He evaluates the long-run relationship between GDP and government spending using time series techniques and tests augmented Granger causality. He used Penn World Table annual data from year 1950 to 1992. As a result, he agrees that the government expenditure has no impact on economic growth in Malaysia. The causality tests also show that government expenditure growth does not cause GDP growth.

In contrast, Barro (1991) and Grier & Tullock (1989) found that there is a negative relationship between government expenditure and economic growth. Barro (1991) examines 98 countries from year 1960 to 1985 The results also show that there is a positive significant relationship between economic growth and political stability and negative relationship between economic development and a proxy for market distortions.

Grier & Tullock (1989) investigate empirical regularities in post-war economic growth using pooled cross-section/time-series data on 113 countries. They reported that government consumption growth had a negative significant relationship with economic growth. The political repression is also negatively correlated with economic development in Africa and Central and South America.

Regarding the impact of other macroeconomic variables on economic growth, Khan & Reinhart (1990) performed a study to compare the relationship between private investment and public investment on economic growth. The study obtained a cross-section sample of 24 developing countries from year 1970 to 1979. The result shows that private investment has larger impacts on economic growth than public investment. However, public investment does have positive indirect effect on economic growth. Public investment in infrastructure such as schools, electricity, roads and telecommunications does have strong impact on private capital formation.

Using Granger causality test, Abu & Abd. Karim (2016) and Sekantsi & Kalebe (2015) found causal relationship between investment, capital formation, savings and economic growth. Abu & Abd. Karim (2016) investigate the relationship between

foreign direct investment, domestic investment or capital formation, savings and economic growth in 16 Sub-Saharan African (SSA) countries from year 1981 to 2011. Using VAR estimation and Granger causality test, the result shows that a unidirectional causality from foreign investment to growth and domestic investment, savings to growth and a bidirectional causality between growth and domestic investment as well as savings and domestic investment.

They conclude that foreign investment influence more on growth. Savings are more important to explain domestic investment, growth is more important to explain foreign investment and domestic investment is more important to explain savings.

Sekantsi & Kalebe (2015) test the causality relationship in Lesotho from year 1970 to 2012. They used autoregressive distributed lag (ARDL), vector error correction model (VECM) and Granger causality test. The study confirms that there is short-run causal flow from economic growth to savings. However, in the long-run, savings does Granger cause economic growth. Savings also does Granger cause investment and investment does Granger cause economic growth.

Hundie (2014) and Awan et al. (2012) used time series data in their studies. Hundie (2014) performed a study in Ethiopia from year 1969 to 2011. He confirms that there is existence of cointegration among gross domestic savings, gross domestic investment, real gross domestic product, labor force and human capital. Real gross domestic product is the independent variable. The result also shows that labor and investment have a positive impact on economic growth in the short and long run. Granger causality analysis shows that bidirectional causality exists between gross

domestic investment and economic growth, and between gross domestic savings and gross domestic investment.

Awan et al. (2012) in their study shows that there is bidirectional causality between FDI and trade openness. They also agree that no causality effect occurs from imports to GDP and trade openness to GDP. The study was performed for Bangladesh, India, Pakistan and Sri Lanka economy from year 1973 to 2010.

Waty (2014) interested to investigate the impact of monetary policy instruments on economic growth from year 2000 to 2011 in Indonesia. Using Structural Vector Autoregression and Impulse Response Function, the result shows that all monetary variables have negative relationship with economic growth. The variables are open market operation, reserve requirement and discount rate. The intermediary macroeconomic variables include exchange rate, exports, imports, investment, balance of payment, unemployment and inflation.

Using different techniques, researchers agree that trade does a positive significant influence with economic growth. Hussain & Haque (2016) performed their study using Vector Error Correction Model (VECM) analysis to investigate the relationship between foreign direct investment (FDI), trade and economic growth or per capita GDP. The data was obtained for Bangladesh from year 1973 to 2014. The result shows that FDI and trade does have positive relationship with economic growth.

Awokuse (2008) used Granger causality test to find the relationship between trade and economic growth of Argentina, Colombia and Peru. The result for import-led growth is relatively stronger than export-led growth hypothesis. There is also one-way causality runs from GDP to exports and imports or trade.

Yanikkaya (2003) performed a study using panel data approach to test the impact of trade on economic progress. He studied 100 developed and developing countries. The data sample is obtained from year 1970 to 1997. The findings show that trade barriers have positive significant impact on economic growth especially for developing countries.

Using multivariate causality tests in the VECM framework, Liu et al. (2005) evaluate the impact of foreign direct investment (FDI), exports and imports on GDP for nine Asian countries. The countries are Hong Kong, India, Indonesia, South Korea, Malaysia, Philippines, Singapore, Thailand and Taiwan. They conclude that there is two-way causality between trade, FDI and growth for most of the sample countries. The study suggests that FDI, trade and growth should be designed with development strategies simultaneously.

Frankel & Romer (1999) examines the relationship between trade and economic growth. The data sample of 63 countries was obtained from IFS Direction of Trade statistic. The findings show no evidence that ordinary least-squares estimates overstate trade effects. They also suggest that trade has a moderately positive relationship with income or economic growth.

In Cambodia, Sothan (2014) reported that domestic savings does not Granger cause economic growth. Economic growth also does not have causality runs from economic growth to savings. The data was obtained from year 1989 to 2012. Unit root test and Granger causality test are used in this study.

Baharumshah et al. (2003) in their study examines the impact of savings on economic growth. There are five countries of fast growing Asian economies involved in this study. The countries are Singapore, South Korea, Malaysia, Thailand and Philippines. The sample of the data is from year 1960 to 1997. Using time series techniques, the findings are savings does not Granger cause economic growth. There is also a long run causality runs from foreign savings to domestic savings.

Abu (2010) investigates the impact of savings on economic growth in Nigeria from year 1970 to 2007. Using Johansen cointegration test, the result shows that savings and economic growth are cointegrated. There is also one-way causality runs from economic growth to savings. Thus, high economic growth will increase savings.

Evidence from Morocco and Tunisia regarding the relationship between savings and economic growth was reported by AbuAl-Foul (2010). Using annual data for Morocco and Tunisia from year 1965 to 2007 and 1961 to 2007 respectively, he performed Autoregressive Distributed Lag (ARDL) approach. He suggests that savings does have long-run relationship with Morocco economic growth. There is also two-way causality exists between economic growth and savings in Morocco. The result shows Tunisia has one-way Granger causality runs from savings to GDP.

Tang & Chua (2009) investigate the relationship between savings and economic growth in Malaysia from year 1991 to 2006. Nonparametric cointegration test, multiple rank F-test and dynamic OLS test were performed in this study. They conclude that there is a long-run positive relationship and two-way causality direction between savings and economic growth.

2.4. Concluding Remarks

Wagner's Law was first introduced more than a century ago. Many researchers agree with Wagner's Law. However, there are scholars who support Keynesian theory. Tang (2010) has both empirical support of Wagner's Law and Keynesian view in Malaysia. Findings about the relationship between government expenditure and economic growth is also different among scholars due to data selection, methodological differences and estimating procedures. Since many researchers used time-series technique, this study provides panel data approach to give more understanding about the significant relationship between public spending and economic development for ASEAN-5 countries. Previous studies also show different findings about the impact of other macroeconomic variables such as capital formation, portfolio investment, labor force, trade, total reserve and savings on economic growth.

CHAPTER THREE

DATA AND EMPIRICAL METHODOLOGY

3.1. Introduction

This chapter presents empirical methodology used in this paper. Chapter three provides data description, the definition of all variables, theoretical framework, hypothesis statement and econometric model. The discussion of this chapter explain the model to relate government expenditure and economic growth for ASEAN-5 countries.

3.2. Data Description

The empirical analysis of this study uses annual data on ASEAN-5 countries from year 1990 to 2014. The countries are Thailand, Singapore, Indonesia, Philippines and Malaysia. The basic data source of this study is World Development Indicators from the official website of the World Bank. By using balanced panel data, the dependent variable of the study is gross domestic product (GDP). GDP is used to measure the economic growth. This study provides three models of the research. All models use GDP as dependent variable. For Model 1, there are seven independent variables; government expenditure, gross capital formation, portfolio investment, labor, trade, total reserve and gross savings. Model 2 and Model 3 have five independent variables; government expenditure, gross capital formation, labor, total reserve and gross savings.

Table 3.1.
Data sampling of the countries

Country	Range (Year)	Total (Year)
Thailand	1990 - 2014	25
Singapore	1990 - 2014	25
Indonesia	1990 - 2014	25
Philippines	1990 - 2014	25
Malaysia	1990 - 2014	25
		125

3.3. Dependent Variable

Gross Domestic Product (GDP)

This paper uses gross domestic product (GDP) to measure economic growth. GDP is the total market of all final goods and services produced within a given time period by factors of production located within a country. GDP does not include intermediate goods but only new products and services. This is to avoid double counting (Landerfeld, Seskin & Fraumeni, 2008). GDP is also the monetary value of all the finished goods and services produced within a country borders in a specific time period. GDP actually calculated on annual basis, it can be calculated on quarterly basis as well.

According to World Bank national accounts data and OECD National Accounts data files (2017), GDP which is measured in US Dollar at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Dollar figures for GDP are converted from domestic currencies using single year official exchange rates. For a few countries where the

official exchange rate does not reflect the rate effectively applied to actual foreign exchange transactions, an alternative conversion factor is used.

3.4. Independent Variables

3.4.1. Government Expenditure

This paper uses general government final consumption in US Dollar to measure government spending. General government final consumption expenditure, which was formerly known as general government consumption, includes all government current spending for purchases of goods and services (including compensation of employees). It also includes most expenditures on national defense and security, but excludes government military expenditures (World Bank national accounts data, and OECD National Accounts data files, 2017). This study is conducted to find the relationship between government expenditure and economic growth. It is either positive significant relationship (Saez & Alvarez-Garcia, 2017), negative significant relationship (Barro, 1991) or they do not have any significant relationship (Sinha, 1998).

3.4.2. Gross Capital Formation

Gross capital formation, formerly known as gross domestic investment, consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. Fixed assets include land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. Inventories are stocks of goods held by firms to meet temporary or unexpected fluctuations in production or sales, and "work in

progress." According to the 1993 SNA, net acquisitions of valuables are also considered as capital formation. (World Bank national accounts data, and OECD National Accounts data files, 2017). Gross capital formation is expected to have a positive impact on economic growth, as reported by Hundie (2014).

3.4.3. Portfolio Investment

Portfolio investment is used in this study, which includes transactions in equity securities and debt securities. It is measured in current US Dollar. The expected relationship between portfolio investment and economic growth is positive.

3.4.4. Labor Force

Total labor force is defined as people ages 15 and older who meet the International Labour Organization definition of the economically active population: all people who supply labor for the production of goods and services during a specified period. It includes both the employed and the unemployed. While national practices vary in the treatment of such groups as the armed forces and seasonal or part-time workers, in general the labor force includes the armed forces, the unemployed, and first-time job-seekers, but excludes homemakers and other unpaid caregivers and workers in the informal sector (International Labour Organization, using World Bank population estimates, 2017). Hundie (2014) suggests that there is a positive relationship between labor force and economic growth.

3.4.5. Trade

Trade is the sum of exports and imports of goods and services. It is measured as a share of gross domestic product (World Bank national accounts data, and OECD National Accounts data files, 2017). If trade balance of a country is positive or surplus, it means that the exports value is more than its imports value. A negative trade balance or deficit, it shows that its imports value is more than exports value (Focus Economics, 2017). According to Hussain & Haque (2016), trade has positive impact on economic growth.

3.4.6. Total Reserves

Total reserves are important because reserves accumulation has been preferred policy recently adopted by developing economics to achieve financial stability. The aim of this policy is to increase liquidity and thus reduce the risk of suffering a speculative attack (Cruz and Walters, 2008).

Total reserves comprise holdings of monetary gold, special drawing rights, reserves of IMF members held by the IMF, and holdings of foreign exchange under the control of monetary authorities. The gold component of these reserves is valued at year-end (December 31) London prices (International Monetary Fund, International Financial Statistics and data files, 2017). It is expected that to have a negative relationship between total reserves and economic growth, as suggested by Waty (2014).

3.4.7. Gross Savings

Gross savings are calculated as gross national income less total consumption, plus net transfers (World Bank national accounts data, and OECD National Accounts data files, 2017). Higher gross savings will contribute to economic development. The expected relationship is positive, which is in line with Abu (2010).

3.5. Theoretical Framework

The theoretical framework is based on previous studies of other researchers. It shows the effect of government expenditure and other macroeconomic variables on economic growth. The dependent variable is GDP (LNGDP). Independent variables for Model 1 are government expenditure (LNGEXP), gross capital formation (LNGCF), portfolio investment (LNPI), labor force (LNLBR), trade (LNTRD), total reserves (LNTRSV) and gross savings (LNGSV). Theoretical framework for Model 1 is presented as Figure 3.1.

The dependent variable for Model 2 is GDP (LNGDP). Independent variables are government expenditure (LNGEXP), gross capital formation (LNGCF), labor force (LNLBR), total reserves (LNTRSV) and gross savings (LNGSV). Model 1 and 2 use natural logarithms (ln) for dependent and independent variables. Theoretical framework for Model 2 is presented as Figure 3.2.

For Model 3, the dependent variable is GDP. Independent variables are government expenditure (GEXP), gross capital formation (GCF), labor force (LBR), total reserves (TRSV) and gross savings (GSV). Model 3 use data without natural logarithms (ln)

for dependent and independent variables. Theoretical framework for Model 3 is presented as Figure 3.3.

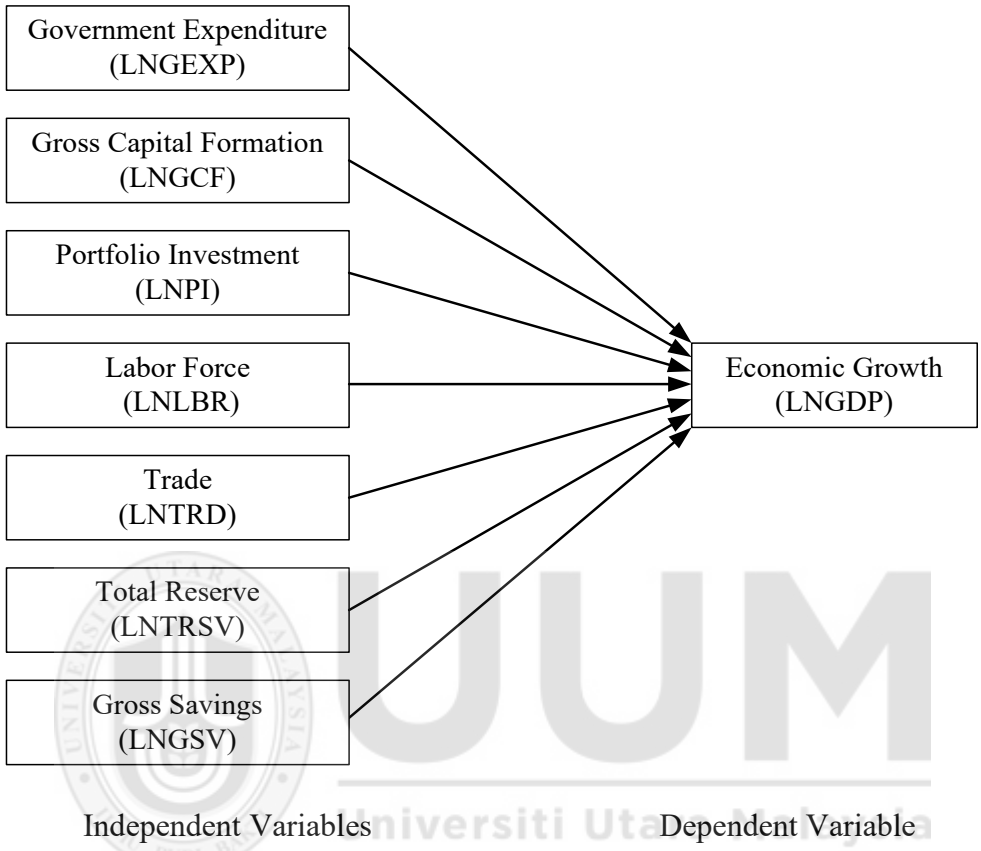

Figure 3.1.
Theoretical Framework for Model 1 (Log-log Model)

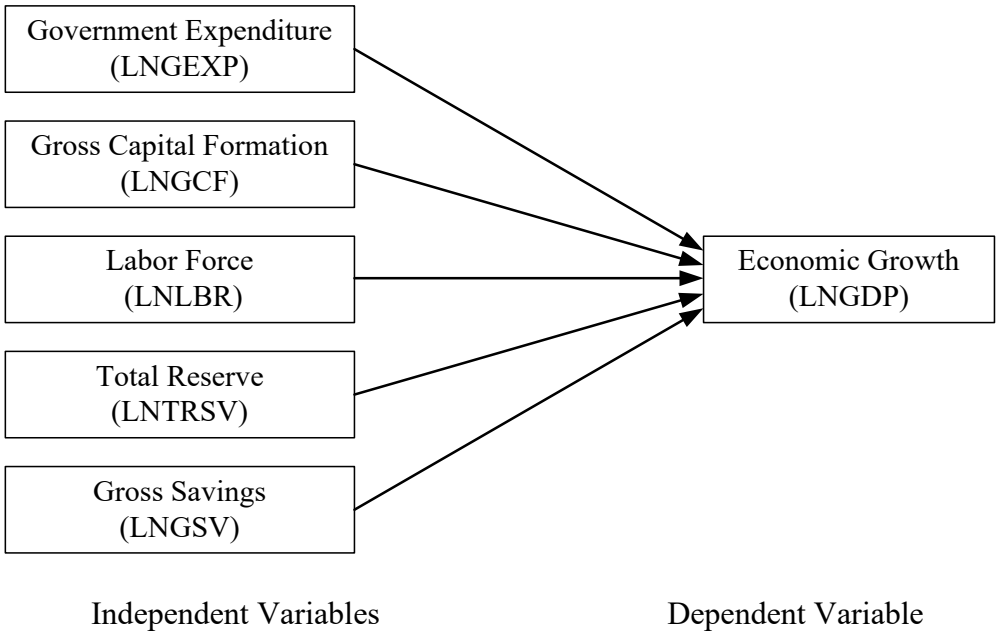

Figure 3.2.
Theoretical Framework for Model 2 (Log-log Model)

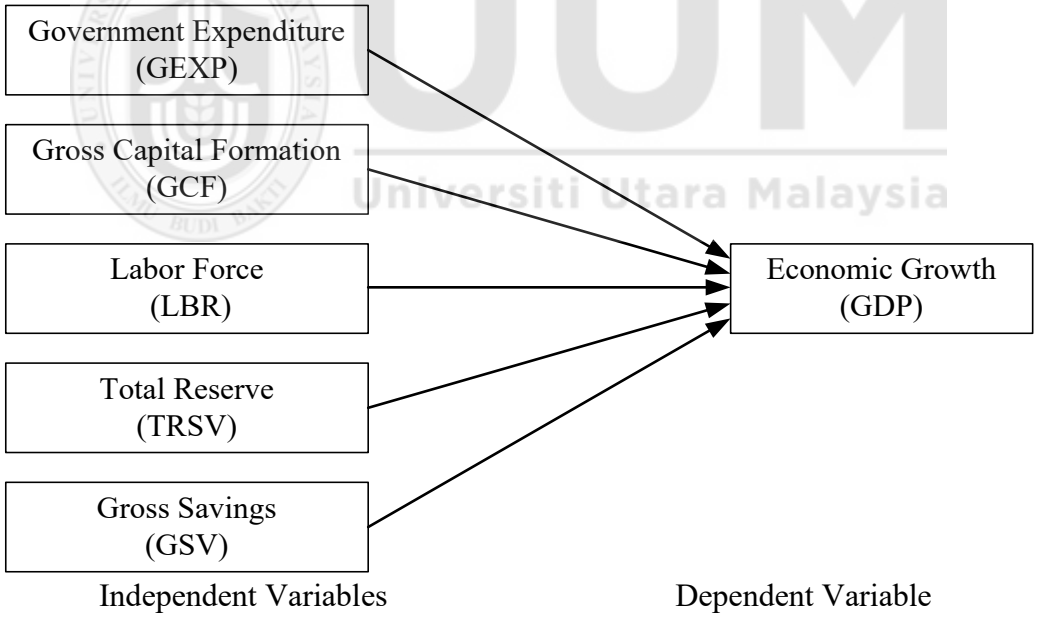

Figure 3.3.
Theoretical Framework for Model 3 (Level-level Model)

3.6. Hypotheses Statement

The hypotheses statement of this study are as follows:

H_0: There is no significant relationship between government expenditure and GDP

H_1: There is a significant relationship between government expenditure and GDP

H_0: There is no significant relationship between gross capital formation and GDP

H_2: There is a significant relationship between gross capital formation and GDP

H_0: There is no significant relationship between portfolio investment and GDP

H_3: There is a significant relationship between portfolio investment and GDP

H_0: There is no significant relationship between labor force and GDP

H_4: There is a significant relationship between labor force and GDP

H_0: There is no significant relationship between trade and GDP

H_5: There is a significant relationship between trade and GDP

H_0: There is no significant relationship between total reserves and GDP

H_6: There is a significant relationship between total reserves and GDP

H_0: There is no significant relationship between gross savings and GDP

H_7: There is a significant relationship between gross savings and GDP.

3.7. Econometric Model

The following model is used to investigate the impact of government expenditure, gross capital formation, portfolio investment, labor force, trade, total reserve and gross savings on gross domestic products. The equation is presented as follows:

$$GDP = f\ (GEXP, GCF, PI, LBR, TRD, TRSV, GSV)$$

where, GDP is Gross Domestic Products, GEXP is Government Expenditure, GCF is Gross Capital Formation, PI is Portfolio Investment, LBR is Labor Force, TRD is Trade, TRSV is Total Reserves and GSV is Gross Savings.

GDP is the dependent variable and other variables are independent variables. The econometric models of GDP function are shown as follows:

$$Y = \beta_o + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 \ln X_{4it} + \beta_5 X_{5it} + \beta_6 X_{6it} + \beta_7 X_{7it} + \varepsilon it$$

For Model 1, the econometric model is:

$$LGDP = \beta_o + \beta_1 \ln (GEXP) + \beta_2 \ln (GCF) + \beta_3 \ln (PI) + \beta_4 \ln (LBR) + \beta_5 \ln (TRD) + \beta_6 \ln (TRSV) + \beta_7 \ln (GSV) + \varepsilon it$$

where, GDP is Gross Domestic Products, GEXP is Government Expenditure, GCF is Gross Capital Formation, PI is Portfolio Investment, LBR is Labor Force, TRD is Trade, TRSV is Total Reserves, GSV is Gross Savings, εit is the error term and ln is the natural logarithms.

For Model 2, the econometric model is:

$$LGDP = \beta_o + \beta_1 \ln (GEXP) + \beta_2 \ln (GCF) + \beta_3 \ln (LBR) + \beta_4 \ln (TRSV) + \beta_5 \ln (GSV) + \varepsilon_{it}$$

where, GDP is Gross Domestic Products, GEXP is Government Expenditure, GCF is Gross Capital Formation, LBR is Labor Force, TRSV is Total Reserves, GSV is Gross Savings, ε_{it} is the error term and ln is the natural logarithms.

For Model 3, the econometric model is:

$$GDP = \beta_o + \beta_1 (GEXP) + \beta_2 (GCF) + \beta_3 (LBR) + \beta_4 (TRSV) + \beta_5 (GSV) + \varepsilon_{it}$$

where, GDP is Gross Domestic Products, GEXP is Government Expenditure, GCF is Gross Capital Formation, LBR is Labor Force, TRSV is Total Reserves, GSV is Gross Savings and ε_{it} is the error term.

3.8. Empirical Method

This study involves ASEAN-5 countries. The countries are Thailand, Singapore, Indonesia, Philippines and Malaysia. The balanced panel data is analyzed by using EViews Version 9.0 to determine the relationship between dependent and independent variables. Eviews software is very essential in producing various analysis. Several methods are employed for this study as follows:

3.8.1. Correlation Analysis

Correlation analysis is used to determine the correlation between dependent variable and independent variables. The value of correlation is between +1 and -1. The value of 0.5 and above is considered as strong correlation. The value below 0.5 indicates as weak correlation. The value of +1 means a perfect positive relationship and the value of -1 is the perfect negative relationship between variables.

3.8.2. Regression Analysis

This study uses panel ordinary least squares (POLS) regression analysis. POLS is one of the simplest method of linear regression. This technique helps to find the function that approximates the data. The analysis is based on balanced panel data. It predicts how much of the changes in dependent variable or GDP could be explained by independent variables; government expenditure, gross capital formation, portfolio investment, labor force, trade, total reserves and gross savings.

3.8.3. Residual Normality Test

Several diagnostic tests are involved in this study. Diagnostic tests such as residual normality test and heteroscedasticity test are performed before conducting the regression analysis. Residual normality test is observed through descriptive statistics data including the Jarque-Bera statistics and the graph. If the data are normally distributed and the probability is greater than 0.05, the Jarque-Bera statistics is not significant.

3.8.4. Heteroscedasticity Test

Heteroscedasticity occurs when there is a non-constant variance of the model. Heteroscedasticity is the variability of a variable which is not equal across to the range of values of a second variable that predicts it. The ARCH Test is used in this study to detect if there is heteroscedasticity problem in the model.

3.8.5. Multicollinearity Test

Gujarati (2003) defined multicollinearity as linear relationship between two or more independent variables in a regression model. Variance inflation factor (VIF) is used to detect multicollinearity problems. The value of VIF should not exceed 10, or else it shows that there is multicollinearity problem in the regression.

3.8.6. Generalised Least Squares

Generalised least squares is ordinary least squares (OLS) on the transformed variables that satisfy the standard least-squares assumptions. This procedure is transforming the original variables to transformed variables and satisfy the assumptions of classical model and applying OLS to them (Gujarati, 2003).

3.8.7. Granger Causality Test

Granger causality test is performed to ensure that an endogenous variable can be treated as exogenous. The test is used to determine if there is a causal relationship between GDP, government expenditure, gross capital formation, portfolio investment, labor force, trade, total reserve and gross savings.

CHAPTER FOUR

EMPIRICAL FINDINGS AND DISCUSSION

4.1. Introduction

This chapter provides discussion of the empirical findings from the data analysis. The findings are presented and discussed to examine the dynamic relationship between government expenditure, gross capital formation, portfolio investment, labor force, trade, total reserve, gross savings and economic growth.

4.2. Descriptive Statistics

The summary of descriptive statistics for this paper is presented in Table 4.1. The findings include standard deviation, mean, median, minimum and maximum values. The dependent variable is GDP. For Model 1, independent variables are government expenditure, gross capital formation, portfolio investment, labor force, trade, total reserve and gross savings. Independent variables for Model 2 and 3 are government expenditure, gross capital formation, labor force, total reserve and gross savings. Model 3 presents data without natural logarithm values.

Table 4.1.
Descriptive Statistics for Model 1

	LNGDP	LNGEXP	LNGCF	LNPI	LNLBR	LNTRD	LNTRSV	LNGSV
Mean	25.735	23.490	24.412	21.492	16.764	4.836	24.476	24.658
Median	25.690	23.415	24.333	21.702	17.270	4.778	24.384	24.577
Maximum	27.545	25.188	26.498	25.083	18.636	6.086	26.350	26.413
Minimum	24.311	21.958	22.941	16.300	14.256	3.818	21.434	22.817
Std. Dev.	0.698	0.733	0.734	1.764	1.325	0.670	0.989	0.744

The mean measures the average of the values in each of the series. As may be observed from the table, the mean value of LNGDP, for instance, gives the average of all the values of LNGDP as 25.735 (in Table 4.1) for the years under consideration. LNGDP are the highest mean values and the lowest mean values are LNTRD (4.836) for Model 1. The standard deviation and variance (the square of the standard deviation), measures the spread or dispersion of each observation from the mean observation. The findings show that the highest and the lowest standard deviation values are 1.764 for LNPI and 0.670 for LNTRD, respectively. The minimum and maximum values describe each variable as it appears, in terms of the lowest and highest values in each series.

For Model 2, the dependent variable is GDP. Independent variables are government expenditure, gross capital formation, labor force, total reserve and gross savings. The highest mean values are LNGDP (25.735) and the lowest mean values are LNLBR (16.764). The highest standard deviation values are 1.325 for LNLBR and the lowest standard deviation values are 0.698 for LNGDP.

Table 4.2.
Descriptive Statistics of Model 3

	GDP	GEXP	GCF	LBR	TRSV	GSV
Mean	1.96E+11	2.12E+10	5.46E+10	36476111	6.55E+10	6.72E+10
Median	1.44E+11	1.48E+10	3.69E+10	31642226	3.89E+10	4.72E+10
Maximum	9.18E+11	8.69E+10	3.22E+11	1.24E+08	2.78E+11	2.96E+11
Minimum	3.62E+10	3.44E+09	9.18E+09	1553141.	2.04E+09	8.12E+09
Std. Dev.	1.73E+11	1.85E+10	5.73E+10	35604103	6.08E+10	5.60E+10

The descriptive statistics for Model 3 is presented in Table 4.2. The dependent variable for Model 3 is GDP. Independent variables are government expenditure, gross capital formation, labor force, total reserve and gross savings. Model 3 presents data without natural logarithm values.

4.3. Correlation Analysis

Table 4.3.
Correlation Analysis for Model 1

Correlation	LNGDP	LNGEXP	LNGCF	LNPI	LNLBR	LNTRD	LNTRSV	LNGSV
LNGDP	1.000							
LNGEXP	0.958	1.000						
LNGCF	0.939	0.899	1.000					
LNPI	0.473	0.435	0.458	1.000				
LNLBR	0.450	0.388	0.357	0.208	1.000			
LNTRD	-0.304	-0.222	-0.247	0.385	-0.942	1.000		
LNTRSV	0.647	0.677	0.608	0.712	-0.321	0.482	1.000	
LNGSV	0.921	0.877	0.883	0.591	0.208	-0.083	0.770	1.000

For the correlation analysis of the model (presented in Table 4.3.), the results show that there exists (strong) positive relationship between LNGEXP and LNGDP; LNGCF and LNGDP; LNTRSV and LNGDP; and LNGSV and LNGDP. This is because the coefficient of each is positive and greater than 0.5. The findings are both for Model 1 and 2.

However, LNLBR and LNGDP; LNPI and LNGDP have positive and weak degrees of relationship each, since each of the coefficients is less than 0.05. For the correlation between LNTRD and LNGDP for Model 1, there is evidence of negative and weak relationship. There is no evidence of negative relationship in Model 2.

Table 4.4.
Correlation Analysis for Model 3

Correlation	GDP	GEXP	GCF	LBR	TRSV	GSV
GDP	1.000					
GEXP	0.939	1.000				
GCF	0.976	0.892	1.000			
LBR	0.605	0.447	0.583	1.000		
TRSV	0.447	0.542	0.381	-0.213	1.000	
GSV	0.953	0.877	0.928	0.459	0.565	1.000

Table 4.4. represents correlation analysis for Model 3. There are strong positive relationships between GEXP and GDP (0.939), GCF and GDP (0.976), LBR and GDP (0.605); and GSV and GDP (0.953). TRSV shows a weak positive relationship with GDP (0.447).

4.4. Regression Analysis

Table 4.5.
Panel Ordinary Least Squares for Model 1

DV=LNGDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGEXP	0.259	0.040	6.413	0.000
LNGCF	0.249	0.032	7.694	0.000
LNPI	0.025	0.007	3.346	0.001
LNLBR	0.109	0.024	4.479	0.000
LNTRD	-0.123	0.054	-2.300	0.023
LNTRSV	0.182	0.033	5.444	0.000
LNGSV	0.154	0.037	4.103	0.000
C	3.574	0.615	5.813	0.000

R-squared	0.982	Mean dependent var	25.735
Adjusted R-squared	0.981	S.D. dependent var	0.698
S.E. of regression	0.097	Akaike info criterion	-1.771
Sum squared resid	1.096	Schwarz criterion	-1.590
Log likelihood	118.660	Hannan-Quinn criter.	-1.697
F-statistic	905.380	Durbin-Watson stat	0.411
Prob(F-statistic)	0.000		

The results of the panel ordinary least squares are presented in Table 4.5, to explain the empirical relationship between GDP and each of the explanatory variables.

To confirm the validity of the results, residual tests are conducted. These are explained by the Figure 4.1. below;

4.5. Residual Normality Test

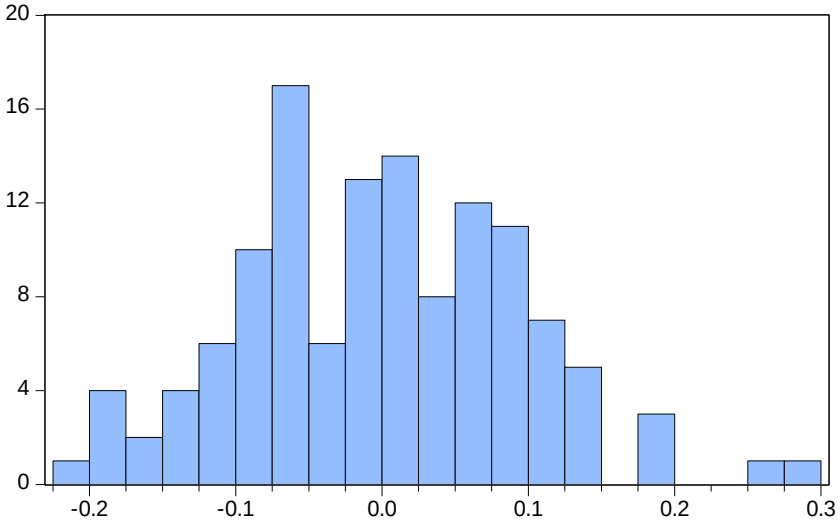

Figure 4.1
Residual Normality Test for Model 1

The result of the residual normality test (Figure 4.1) shows that the probability value of the Jarque-Bera statistic is greater than 0.05. Hence, null hypothesis may not be rejected. In other words, it may be concluded that the series are normally distributed.

Table 4.6.
Panel Ordinary Least Squares for Model 2

DV=LNGDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGEXP	0.238	0.042	5.633	0.000
LNGCF	0.268	0.034	7.928	0.000
LNLBR	0.148	0.016	9.480	0.000
LNTRSV	0.161	0.030	5.441	0.000
LNGSV	0.206	0.037	5.639	0.000
C	2.108	0.319	6.600	0.000

R-squared	0.979	Mean dependent var	25.735
Adjusted R-squared	0.979	S.D. dependent var	0.698
S.E. of regression	0.102	Akaike info criterion	-1.674
Sum squared resid	1.246	Schwarz criterion	-1.539
Log likelihood	110.655	Hannan-Quinn criter.	-1.619
F-statistic	1131.354	Durbin-Watson stat	0.295
Prob(F-statistic)	0.000		

Table 4.6. represents the results of panel ordinary least squares for Model 2. To confirm the validity of the results, residual tests are conducted. These are explained by the Figure 4.2. below;

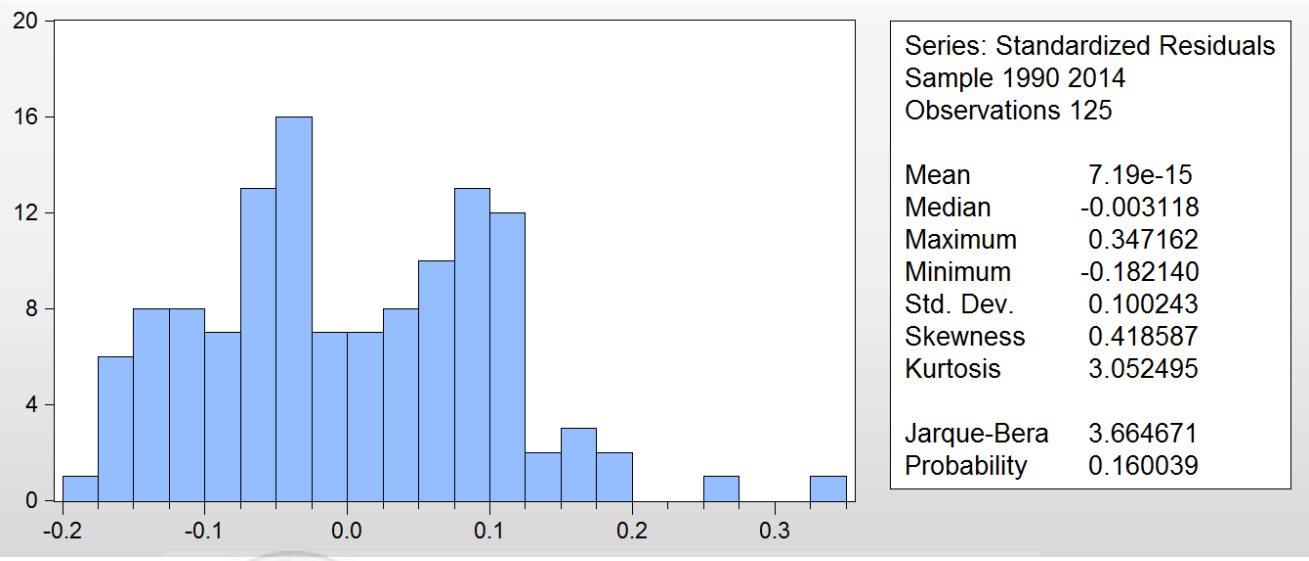

Figure 4.2.
Residual Normality Test for Model 2

The result of the residual normality test (Figure 4.2) shows that the probability value of the Jarque-Bera statistic is greater than 0.05. Hence, null hypothesis may not be rejected. In other words, it may be concluded that the series are normally distributed.

Table 4.7.
Panel Ordinary Least Squares for Model 3

DV=GDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GEXP	2.833	0.181	15.638	0.000
GCF	1.047	0.085	12.288	0.000
LBR	644.537	56.724	11.363	0.000
TRSV	0.024	0.039	0.633	0.528
GSV	0.937	0.081	11.587	0.000
C	-9.47E+09	2.70E+09	-3.505	0.001

R-squared	0.993	Mean dependent var	1.96E+11
Adjusted R-squared	0.993	S.D. dependent var	1.73E+11
S.E. of regression	1.47E+10	Akaike info criterion	49.704
Sum squared resid	2.56E+22	Schwarz criterion	49.839
Log likelihood	-3100.469	Hannan-Quinn criter.	49.759
F-statistic	3441.522	Durbin-Watson stat	0.518
Prob(F-statistic)	0.000		

Table 4.7. represents the results of panel ordinary least squares for Model 3. To confirm the validity of the results, residual tests are conducted. These are explained by the Figure 4.3. below;

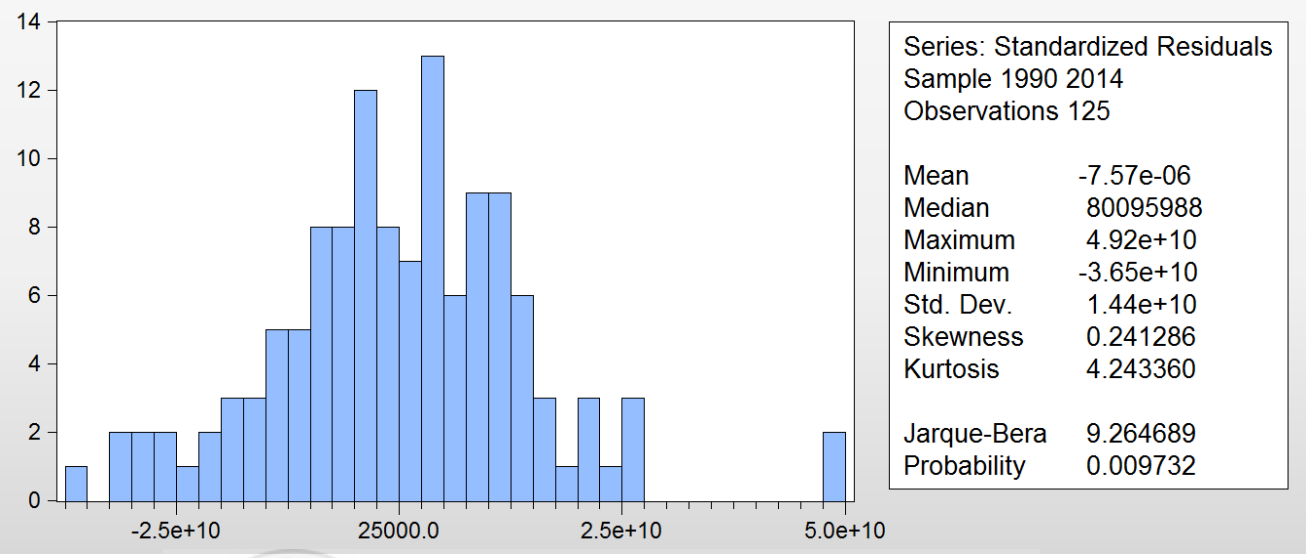

Figure 4.3.
Residual Normality Test for Model 3

The result of the residual normality test (Figure 4.2) shows that the probability value of the Jarque-Bera statistic is greater than 0.05. Hence, null hypothesis may not be rejected. In other words, it may be concluded that the series are normally distributed.

4.6. Heteroscedasticity Test

Table 4.8.
Heteroscedasticity Test

Heteroscedasticity Test: Breusch-Pagan-Godfrey		
Model 1	P-value	0.002
Model 2	P-value	0.103
Model 3	P-value	0.009

The results of the heteroscedasticity test are as shown (Table 4.8.) above. Since the p-values of Model 1 and 3 are each less than 0.05, the null hypothesis may can be rejected. In other words, it can be confirmed that Model 1 and 3 have heteroscedasticity problem.

4.7. Multicollinearity Test

Table 4.9.
Variance Inflation Factor for Model 1

Variable	VIF	1/VIF
LNGEXP	7.458	0.134
LNGCF	11.576	0.086
LNPI	10.313	0.097
LNLBR	13.822	0.072
LNTRD	2.251	0.444
LNTRSV	17.038	0.059
LNGSV	14.403	0.069
Mean VIF:	**10.980**	

Table 4.9. represents the findings of multicollinearity test using Variance Inflation Factor (VIF) for Model 1. Since the VIF value is greater than 10, which is against the required maximum value, there is evidence of multicollinearity problem among variables of this model.

Table 4.10.
Variance Inflation Factor for Model 2

Variable	VIF	1/VIF
LNGEXP	11.370	0.088
LNGCF	7.280	0.137
LNLBR	5.040	0.198
LNTRSV	10.130	0.099
LNGSV	8.760	0.114
Mean VIF:	**8.516**	

Table 4.10. is the findings of multicollinearity test using Variance Inflation Factor (VIF) for Model 2. Since the VIF value is less than 10, there is no evidence of multicollinearity problem among variables of this model.

Table 4.11.
Variance Inflation Factor for Model 3

Variable	VIF	1/VIF
LNGEXP	6.460	0.155
LNGCF	13.710	0.073
LNLBR	2.350	0.426
LNTRSV	3.180	0.315
LNGSV	11.810	0.085
Mean VIF:	**7.502**	

Table 4.11. is the findings of multicollinearity test using Variance Inflation Factor (VIF) for Model 3. The VIF value is also less than 10. It shows that there is no evidence of multicollinearity problem among variables of this model.

4.8. Generalised Least Squares

Table 4.12.
Generalised Least Squares for Model 1
DV=LNGDP

Variable	Coefficient	Std. Error	z-Statistic	Prob.
LNGEXP	0.259	0.040	6.413	0.000
LNGCF	0.249	0.032	7.694	0.000
LNPI	0.025	0.007	3.346	0.001
LNLBR	0.109	0.024	4.479	0.000
LNTRD	-0.123	0.054	-2.300	0.021
LNTRSV	0.182	0.033	5.444	0.000
LNGSV	0.154	0.037	4.103	0.000
C	3.574	0.615	5.813	0.000

From Table 4.5., the panel ordinary least squares regression for Model 1 has the problems of heteroscedasticity and multicollinearity (as presented in Tables 4.8. and 4.9.). The findings of generalized least squares regression are shown in Table 4.12. to correct the observed problems.

Given the estimated coefficients of the explanatory variables in Table 4.12., the coefficients of each of LNGEXP, LNGCF, LNPI, LNLBR, LNTRSV and LNGSV, are positive and significant at 1% level; while the coefficient of LNTRD is negative and significant at 5% level.

These explain that 1% increase in each of LNGEXP, LNGCF, LNPI, LNLBR, LNTRSV and LNGSV, these explanatory variables increase the LNGDP by 0.259%, 0.249%, 0.025%, 0.109%, 0.182%, and 0.154% respectively. In the case of LNTRD, however, a 1% rise in trade reduces LNGDP by 0.123%.

Table 4.13.
Generalised Least Squares for Model 2
DV=LNGDP

Variable	Coefficient	Std. Error	z-Statistic	Prob.
LNGEXP	0.238	0.042	5.630	0.000
LNGCF	0.268	0.034	7.930	0.000
LNLBR	0.148	0.016	9.480	0.000
LNTRSV	0.161	0.030	5.440	0.000
LNGSV	0.206	0.037	5.640	0.000
C	2.108	0.319	6.600	0.000

The findings of generalized least squares regression for Model 2 are shown in Table 4.13. The coefficients of all independent variables of LNGEXP, LNGCF, LNLBR, LNTRSV and LNGSV, are positive and significant at 1% level. These explain that 1% increase in each of LNGEXP, LNGCF, LNLBR, LNTRSV and LNGSV, these explanatory variables increase the GDP by 0.238%, 0.268%, 0.148%, 0.161% and 0.206% respectively.

From Table 4.7., the panel ordinary least squares regression for Model 3 has heteroscedasticity problem (as presented in Tables 4.8.). The findings of generalized least squares regression are shown in Table 4.13. to correct the observed problem.

Table 4.13.
Generalised Least Squares for Model 3
DV=GDP

Variable	Coefficient	Std. Error	z-Statistic	Prob.
GEXP	0.283	0.178	15.900	0.000
GCF	1.047	0.084	12.490	0.000
LBR	644.536	55.794	11.550	0.000
TRSV	0.024	0.038	0.640	0.000
GSV	0.937	0.080	11.780	0.000
C	-9.47E+09	2.66E+09	-3.560	0.000

From Table 4.13., the coefficients of all independent variables of GEXP, GCF, LBR, TRSV and GSV are positive and significant at 1% level. These explain that 1% increase in each of GEXP, GCF, LNLBR, LNTRSV and LNGSV, these explanatory variables increase the GDP by 0.283%, 1.047%, 644.536%, 0.024% and 0.937% respectively.

4.9. Granger Causality Test

Granger causality test is performed to investigate if an endogenous variable can be explained as exogenous. The test is used to determine if there is a causal relationship between GDP, government expenditure, gross capital formation, portfolio investment, labor force, trade, total reserve and gross savings. Results of Granger causality test are shown in Table 4.14.

Table 4.14.
Pairwise Granger Causality Test

Hypothesis	F-Statistic	Probability	Results
Gross capital formation does Granger cause GDP	5.33044	0.006	Two-way causality
GDP does Granger cause gross capital formation	17.892	2.E-07	
Total reserve does Granger cause GDP	14.673	2.E-06	One-way causality
GDP does Granger cause gross savings	10.512	7.E-05	One-way causality
Government expenditure does Granger cause gross capital formation	13.824	4.E-06	One-way causality
Government expenditure does Granger cause trade	2.966	0.056	One-way causality
Total reserve does Granger cause government expenditure	9.848	0.000	One-way causality
Government expenditure does Granger cause gross savings	11.299	3.E-05	One-way causality
Labor force does Granger cause gross capital formation	5.462	0.006	One-way causality
Total reserves does Granger cause gross capital formation	13.451	6.E-06	One-way causality
Total reserves does Granger cause portfolio investment	7.503	0.001	One-way causality
Labor force does Granger cause trade	5.841	0.004	Two-way causality
Trade does Granger cause labor force	4.873	0.009	
Labor force does Granger cause gross savings	11.233	4.E-05	One-way causality

The result of Pairwise Granger causality test shows that there is two-way causality relationship between gross capital formation, trade and GDP at 10 and 1 percent level of significance, respectively.

There is only one-way causality relationship between total reserve and GDP at 1 percent of significant level. The direction of causality runs from total reserve to GDP.

There is also a unidirectional causality relationship between GDP and gross savings. The significant level is at 1 percent and the causality runs from GDP to gross savings.

Pairwise Granger causality test in this study shows that GDP does not Granger cause government expenditure, portfolio investment, labor force and trade.

4.10. Concluding Remarks

From the empirical findings, all independent variables show significant impacts on economic growth for Model 1. Government expenditure, gross capital formation, portfolio investment, labor force, total reserves and gross savings have positive relationships with GDP. Only trade has negative significant relationship with GDP. For Model 2, government expenditure, gross capital formation, labor force, total reserves and gross savings give positive significant relationships with GDP. Both Model 1 and 2 use data with natural logarithms (ln). Model 3 shows that all independent variables of government expenditure, gross capital formation, labor force, total reserves and gross savings also have positive significant effects on GDP. Model 3 uses data without natural logarithms (ln).

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1. Introduction

This chapter summarizes the overall of this study. The first section provides the empirical findings of the study. Then, the policy implications of the study are discussed. The next section explains limitations of this study. The last section highlights recommendations of the future research.

5.2. Summary of the Findings

The main objective of the study is to determine the impact of government expenditure on economic growth for ASEAN-5 countries. The countries involved are Thailand, Singapore, Indonesia, Philippines and Malaysia. It also investigates the impact of other macroeconomic variables on economic growth for ASEAN-5 countries. The variables are gross capital formation, portfolio investment, labor force, trade, total reserve and gross savings. The data was obtained from year 1990 to 2014. This study shows that government expenditure does have positive significant impact on economic growth. All macroeconomic variables, such as gross capital formation, portfolio investment, labor force, total reserves and gross savings also have positive relationship with economic growth. Only trade has negative significant impact on GDP. The findings are parallel with previous empirical studies of Saez & Garcia (2017), Ayinde et al. (2015) and Menyah & Wolde-Rufael (2013).

5.3. Policy Implications

The issue of government spending and economic growth is crucial for developing countries. As mentioned by Dogan & Tang (2006) the public sector usually uses a relatively large share of society's economic resources. The government of a country need to spend more on regulations as the urbanization and economic development increase. The allocation of government spending is also important on certain services such as cultural and welfare. These services are considered as high income elasticity. The government spending may contribute positively to economic growth through its interaction with the private sector. The government provides large-scale capital expenditures since the private sector does not have the capacity to provide the funds; as stated by Adamopoulos & Dritsakis, 2004. Increase in government consumption may increase in employment, profitability and investment of a country.

Government spending is increasing over the years. Devarajan, et al. (1996) conclude that productive public expenditures may become unproductive if misallocating and using it in excess. Evidence from Budina & Tuladhar (2010) shows that fiscal stimulus does contribute to rapid economy recovery in the ASEAN-5 countries after the financial crisis in 2008. The government spending of ASEAN-5 countries on infrastructure is the major contribution to increase the overall investment and economic growth. Thus, ASEAN Blueprint 2025 is implemented to integrate the regional economic agenda for ASEAN countries. ASEAN governments are expected to spend productively with closely monitored implementation of AEC Blueprint 2025 towards a healthy economic development.

5.4. Limitations of the Study

This study provides evidence about the relationship between government expenditure and economic growth for ASEAN-5 countries. The limitation of this study is data availability. It is quite challenging to find the reliable and sufficient data. Most variables have limited data before year 1990. Most observations only cover 25 years that range from year 1990 to 2014. It is also time and money consuming if this study used primary data. Therefore, secondary data is the best option for this study.

5.5. Recommendations of the Future Research

This paper examines the impact of public spending on ASEAN-5 countries economic development. The purpose of this study is to provide evidence, reference and contribute to the knowledge about government spending and economic growth. It is expected to clarify the importance of fiscal policy and other macroeconomic variables in strengthening the economy for ASEAN-5 countries.

A clear understanding about inter-linkages between government spending and economic growth will help the government in making better decision for the country. As ASEAN countries have responsibility for ASEAN Economic Community (AEC) Blueprint 2025 to meet its objectives, ASEAN governments are expected to effectively monitor the public spending as fiscal instrument in stimulating economic growth. Government expenditure may become unproductive if misallocating and using it in excess, as suggested by Devarajan, et al. (1996).

Findings about the relationship between government expenditure and economic growth is also different among scholars due to data selection, methodological differences and estimating procedures. This study uses panel data approach from year 1990 to 2014 for ASEAN-5 countries. The findings are discussed in chapter four. The future research is expected to explore different methods to confirm the reliability of the model. From this study, there is evidence that government expenditure does have impact on economic growth. Future research is expected to expand the investigation to other composition of government spending such as education, defense and infrastructure expenditures instead of using general government final consumption expenditures.

References

Abu, N. (2010). Saving-Economic Growth Nexus in Nigeria, 1970-2007: Granger Causality and Cointegration Analyses. *Review of Economic and Business Studies*, 3(1), 93-104.

Abu, N. & Abd. Karim, M.Z. (2016). The Relationship between Foreign Direct Investment, Domestic Savings, Domestic Investment and Economic Growth. *Society and Economy*, 38(2), 193-217.

AbuAl-Foul, B. (2010). The Causal Relation between Savings and Economic Growth: Some Evidence from MENA Countries. Topics in Middle Eastern and African Economies, Retrieved May 11, 2017, from http://ecommons.luc.edu/meea/127/

Alexiou, C. (2009). Government Spending and Economic Growth: Econometric Evidence from the South Eastern Europe (SEE). *Journal of Economic and Social Research*, 11(1), 1-16.

Al-Faris, A.F. (2002). Public Expenditure and Economic Growth in the Gulf Cooperation Council Countries. *Applied Economics*, 34(9), 1187-1193.

ASEAN 50 Philippines. (2017). ASEAN 50 Philippines, Retrieved April 30, 2017 from http://www.asean2017.ph

Association of Southeast Asian Nation. (2017). Association of Southeast Asian Nation. Retrieved April 30, 2017, from http://asean.org/asean-economic-community/

Awan, R.U., Javed, K. & Sher, F. (2012). Foreign Direct Investment, Economic Growth, Trade and Domestic Investment Relationship: An Econometric Analysis of Selected South Asian Countries. *Interdisciplinary Journal of Contemporary Research in Business*, 3(9), 925-942.

Awokuse, T.O. (2008). Trade Openness and Economic Growth: is Growth Export-led or Import-led? *Applied Economics*, 40(2), 161-173.

Ayinde, K., Kuranga, J. & Lukman, A.F. (2015). Modeling Nigerian Government Expenditure, Revenue and Economic Growth: Co-integration, Error Correction Mechanism and Combined Estimators Analysis Approach. *Asian Economic and Financial Review*, 5(6), 858-867.

Baharumshah, A.Z., Thanoon, M.A. & Rashid, S. (2003). Saving Dynamics in the Asian Countries. *Journal of Asian Economics*, 13(6), 827-845.

Barro, R.J. (1991). Economic Growth in a Cross Section of Countries. *The Quarterly Journal of Economics*, 106(2), 407-443.

Bouzanis, A. (2017). Economic Snapshot for ASEAN. Retrieved May 11, 2017, from http://www.focus-economics.com/regions/asean.

Budina, N. & Tuladhar, A. (2010). Post-Crisis Fiscal Policy Priorities for the ASEAN-5. *IMF Working Paper*, 252 (November).

Chang, T. (2002). An Econometric Test of Wagner's Law for Six Countries Based on Cointegration and Error-correction Modelling Technique. *Applied Economics*, 34(9), 1157-1169.

Cruz, M. & Walters, B. (2008). Is the Accumulation if International Reserves Good for Development? *Cambridge Journal of Economics*, 32(5), 665-681.

Devarajan, S., Swaroop, V. & Zou, H.F. (1996). The Composition of Public Expenditure and Economic Growth. *Journal of Monetary Economics*, 37(2), 313-344.

Dogan, E. & Tang, T.C. (2006). Government Expenditure and National Income: Causality Tests for Five South East Asian Countries. *International Business & Economics Research Journal*, 5(10), 49-58.

Dominguez, K.M.E., Hashimoto, Y. & Ito, T. (2011). International Reserves and the Global Financial Crisis, Retrieved May 11, 2017, from http://www.nber.org/papers/w17362.

Dritsakis, N. & Adamopoulos, A. (2004). A Causal Relationship between Government Spending and Economic Development: An Empirical Examination of the Greek Economy. *Applied Economics*, 36(5), 457-464.

Frankel, J.A. & Romer, D. (1999). Does Trade Cause Growth? *The American Economic Review*, 89(3), 379-399.

Ghali, K.H. (1997). Government Spending and Economic Growth. *Journal of Economic Development*, 22(2), 165-172.

Grier, K.B. & Tullock, G. (1989). An Empirical Analysis of Cross-National Economic Growth, 1951-80. *Journal of Monetary Economics*, 24(2), 259-276.

Hok, L., Jariyapan, P., Buddhawongsa, P. & Tansuchat, R. (2014). Optimal Size of Government Spending: Empirical Evidence from Eight Countries in Southeast Asia. *The Empirical Econometrics and Quantitative Economics Letters*, 3(4), 31-44.

Hundie, S.K. (2014). Savings, Investment and Economic Growth in Ethiopia: Evidence from ARDL Approach to Cointegration and TYDL Granger-causality Tests. *Journal of Economics and International Finance*, 6(10), 232-248.

Hussain, M.E. & Haque, M. (2016). Foreign Direct Investment, Trade and Economic Growth: An Empirical Analysis of Bangladesh. Economies, 4(7), Retrieved May 11, 2017, from http://www.mdpi.com/2227-7099/4/2/7.

Jiranyakul, K. (2007). The Relationship between Government Expenditures and Economic Growth in Thailand. *Journal of Economics and Economic Education Research*, 8(1), 93-103.

Khan, M.S. & Reinhart, C.M. (1990). Private Investment and Economic Growth in Developing Countries. *World Development*, 18(1), 19-27.

Kolluri, B.R., Panik, M.J. & Wahab, M. (2000). Government Expenditure and Economic Growth: Evidence from G7 Countries. *Applied Economics*, 32(8), 1059-1068.

Landau, D.L. (1997). Government Expenditure, Human Capital Creation and Economic Growth. *Journal of Public Budgeting, Accounting and Financial Management*, 9(3), 467-487.

Landerfeld, J.S., Seskin, E.P. & Fraumeni, B.M. (2008). Taking the Pulse of the Economy: Measuring GDP. *Journal of Economic Perspectives*, 22(2), 193-216.

Liu, L.C., Hsu, C.E. & Younis, M.Z. (2008). The Association between Government Expenditure and Economic Growth: Granger Causality Test of US Data, 1947-2002. *Journal of Public Budgeting, Accounting and Financial Management*, 20(4), 439-452.

Liu, X., Shu, C. & Sinclair, P. (2005). Trade, Foreign Direct Investment and Economic Growth in Asian Economies. *Applied Economics*, 41(13), 1603-1612.

Loizides, J. & Vamvoukas, G. (2005). Government Expenditure and Economic Growth: Evidence from Trivariate Casuality Testing. *Journal of Applied Economics*, 8(1), 125-152.

Magazzino, C. (2012). Wagner versus Keynes: Public Spending and National Income in Italy. *Journal of Policy Modeling*, 34(6), 890-905.

Menyah, K. & Wolde-Rufael, Y. (2013). Government Expenditure and Economic Growth: The Ethiopian Experience, 1950-2007. *The Journal of Developing Areas*, 47(1), 263-280.

Patricia, C.N. & Izuchukwu, C.D. (2013). Impact of Government Expenditure on Economic Growth in Nigeria. *International Journal of Business and Management Review*, 1(4), 64-71.

Saez, M.P. & Alvarez-Garcia, S. (2017). Government Expenditure and Economic Growth in the European Union Countries: New Evidence. *Bulletin of Geography. Socio-Economic Series*, 36 (June), 127-133.

Salih, M.A.R. (2012). The Relationship between Economic Growth and Government Expenditure: Evidence from Sudan. *International Business Research*, 5(8), 40-46.

Sekantsi, L.P. & Kalebe, K.M. (2015). Savings, Investment and Economic Growth in Lesotho: An Empirical Analysis. *Journal of Economics and International Finance*, 7(10), 213-221.

Sinha, D. (1998). Government Expenditure and Economic Growth in Malaysia. *Journal of Economic Development*, 23(2), 71-80.

Sothan, S. (2014). Causal Relationship between Domestic Saving and Economic Growth: Evidence from Cambodia. *International Journal of Economics and Finance*, 6(9), 213-220.

Tang, C.F. & Chua, S.Y. (2009). The Savings-Growth Nexus in Malaysia: Evidence from Nonparametric Analysis. *The IUP Journal of Financial Economics*, 7(3), 83-94.

Tang, T.C. (2010). Wagner's Law Versus Keynesian Hypothesis in Malaysia: An Impressionistic View. *International Journal of Business and Society*, 2(2), 87-96.

Wahab, M. (2004). Economic Growth and Government Expenditure: Evidence from a New Test Specification. *Applied Economics*, 36(19), 2125-2135.

Waty, F. (2014). Interdependency between Monetary Policy Instruments and Indonesian Economic Growth. *Journal of Economics and International Finance*, 6(9), 203-210.

Wu, S.Y., Tang, J.H. & Lin, E.S. (2010). The Impact of Government Expenditure on Economic Growth: How Sensitive to the Level of Development? *Journal of Policy Modeling*, 32(6), 804-817.

Yanikkaya, H. (2003). Trade Openness and Economic Growth: A Cross-country Empirical Investigation. *Journal of Development Economics*, 72(1), 57-89.

Appendices

Appendix 1: Descriptive Statistics for Model 1

	GDP	GEXP	GCF	PI	TRD	LBR	TRSV	GSV
Mean	25.73480	23.48988	24.41243	21.49153	16.76390	4.835544	24.47562	24.65809
Median	25.68984	23.41541	24.33247	21.70214	17.27000	4.778091	24.38435	24.57710
Maximum	27.54532	25.18747	26.49754	25.08269	18.63628	6.085994	26.35016	26.41282
Minimum	24.31100	21.95805	22.94058	16.30042	14.25579	3.817979	21.43437	22.81710
Std. Dev.	0.698368	0.732923	0.734018	1.764179	1.324902	0.669805	0.988567	0.744440
Skewness	0.461463	0.428903	0.634866	-0.460657	-0.501342	0.332283	-0.278746	-0.021252
Kurtosis	2.952862	2.648413	3.421008	2.911193	2.104525	1.921523	2.703353	3.004727
Jarque-Bera	4.447987	4.476268	9.320142	4.462016	9.412762	8.358129	2.077065	0.009526
Probability	0.108176	0.106657	0.009466	0.107420	0.009037	0.015313	0.353974	0.995248
Sum	3216.850	2936.235	3051.554	2686.441	2095.488	604.4430	3059.453	3082.262
Sum Sq. Dev.	60.47696	66.60978	66.80901	385.9286	217.6654	55.63127	121.1808	68.71967
Observations	125	125	125	125	125	125	125	125

Appendix 2: Descriptive Statistics for Model 3

	GDP	GEXP	GCF	LBR	TRSV	GSV
Mean	1.96E+11	2.12E+10	5.46E+10	36476111	6.55E+10	6.72E+10
Median	1.44E+11	1.48E+10	3.69E+10	31642226	3.89E+10	4.72E+10
Maximum	9.18E+11	8.69E+10	3.22E+11	1.24E+08	2.78E+08	2.96E+11
Minimum	3.62E+10	3.44E+09	9.18E+09	1553141	2.04E+09	8.12E+09
Std. Dev.	1.73E+11	1.85E+10	5.73E+10	35604103	6.08E+10	5.60E+10
Skewness	2.554759	1.913858	3.177350	1.115787	1.530260	2.241458
Kurtosis	10.32833	6.263100	13.92809	3.082026	5.056685	8.944014
Jarque-Bera	415.6857	131.7668	832.3192	25.97216	70.81632	288.6866
Probability	0.000000	0.000000	0.000000	0.000002	0.000000	0.000000
Sum	2.45E+13	2.65E+12	6.83E+12	4.56E+09	8.19E+12	8.40E+12
Sum Sq. Dev.	3.73E+24	4.24E+22	4.073E+23	1.57E+17	4.59E+23	3.89E+23
Observations	125	125	125	125	125	125

Appendix 3: Regression Analysis for Model 1

Dependent Variable: LNGDP
Method: Panel Least Squares
Date: 04/16/17 Time: 23:30
Sample: 1990 2014
Periods included: 25
Cross-sections included: 5
Total panel (balanced) observations: 125

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.574114	0.614855	5.812939	0.0000
LNGEXP	0.258789	0.040353	6.413111	0.0000
LNGCF	0.248820	0.032341	7.693634	0.0000
LNPI	0.024738	0.007393	3.346173	0.0011
LNLBR	0.109245	0.024392	4.478748	0.0000
LNTRD	-0.123229	0.053568	-2.300411	0.0232
LNTRSV	0.181679	0.033371	5.444189	0.0000
LNGSV	0.153849	0.037498	4.102851	0.0001

R-squared	0.981874	Mean dependent var	25.73480
Adjusted R-squared	0.980789	S.D. dependent var	0.698368
S.E. of regression	0.096796	Akaike info criterion	-1.770558
Sum squared resid	1.096232	Schwarz criterion	-1.589546
Log likelihood	118.6599	Hannan-Quinn criter.	-1.697023
F-statistic	905.3804	Durbin-Watson stat	0.469747
Prob(F-statistic)	0.000000		

Appendix 4: Regression Analysis for Model 2

Dependent Variable: LNGDP
Method: Panel Least Squares
Date: 06/15/17 Time: 23:08
Sample: 1990 2014
Periods included: 25
Cross-sections included: 5
Total panel (balanced) observations: 125

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGEXP	0.238147	0.042279	5.632797	0.0000
LNGCF	0.267766	0.033774	7.928205	0.0000
LNLBR	0.147677	0.015577	9.480297	0.0000
LNTRSV	0.160976	0.029583	5.441479	0.0000
LNGSV	0.206018	0.036535	5.638984	0.0000
C	2.108316	0.319438	6.600073	0.0000

R-squared	0.979397	Mean dependent var	25.73480
Adjusted R-squared	0.978531	S.D. dependent var	0.698368
S.E. of regression	0.102327	Akaike info criterion	-1.674477
Sum squared resid	1.246026	Schwarz criterion	-1.538718
Log likelihood	110.6548	Hannan-Quinn criter.	-1.619326
F-statistic	1131.354	Durbin-Watson stat	0.294814
Prob(F-statistic)	0.000000		

Appendix 5: Regression Analysis for Model 3

Dependent Variable: GDP
Method: Panel Least Squares
Date: 06/15/17 Time: 23:16
Sample: 1990 2014
Periods included: 25
Cross-sections included: 5
Total panel (balanced) observations: 125

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GEXP	2.833276	0.181182	15.63772	0.0000
GCF	1.046659	0.085175	12.28839	0.0000
LBR	644.5372	56.72413	11.36266	0.0000
TRSV	0.024430	0.038617	0.632632	0.5282
GSV	0.936904	0.080861	11.58661	0.0000
C	-9.47E+09	2.70E+09	-3.505102	0.0006

R-squared	0.993132	Mean dependent var	1.96E+11
Adjusted R-squared	0.992843	S.D. dependent var	1.73E+11
S.E. of regression	1.47E+10	Akaike info criterion	49.70351
Sum squared resid	2.56E+22	Schwarz criterion	49.83926
Log likelihood	-3100.469	Hannan-Quinn criter.	49.75866
F-statistic	3441.522	Durbin-Watson stat	0.517647
Prob(F-statistic)	0.000000		

Appendix 6: Granger Causality Test

Pairwise Granger Causality Tests
Date: 05/07/17 Time: 23:56
Sample: 1990 2014
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GEXP does not Granger Cause GDP	115	0.51901	0.5966
GDP does not Granger Cause GEXP		0.61401	0.5430
GCF does not Granger Cause GDP	115	5.33044	0.0062
GDP does not Granger Cause GCF		17.8924	2.E-07
PI does not Granger Cause GDP	115	1.30244	0.2760
GDP does not Granger Cause PI		1.16121	0.3169
TRD does not Granger Cause GDP	115	0.07734	0.9256
GDP does not Granger Cause TRD		1.00831	0.3682
LBR does not Granger Cause GDP	115	0.34903	0.7062
GDP does not Granger Cause LBR		2.74690	0.0685
TRSV does not Granger Cause GDP	115	14.6734	2.E-06
GDP does not Granger Cause TRSV		0.09202	0.9122
GSV does not Granger Cause GDP	115	0.60198	0.5495
GDP does not Granger Cause GSV		10.5116	7.E-05
GCF does not Granger Cause GEXP	115	2.32589	0.1025
GEXP does not Granger Cause GCF		13.8237	4.E-06
PI does not Granger Cause GEXP	115	1.23159	0.2958

GEXP does not Granger Cause PI		1.00809	0.3683
TRD does not Granger Cause GEXP	115	0.13182	0.8766
GEXP does not Granger Cause TRD		2.96616	0.0556
LBR does not Granger Cause GEXP	115	0.02019	0.9800
GEXP does not Granger Cause LBR		1.30609	0.2750
TRSV does not Granger Cause GEXP	115	9.84807	0.0001
GEXP does not Granger Cause TRSV		0.04410	0.9569
GSV does not Granger Cause GEXP	115	1.27061	0.2847
GEXP does not Granger Cause GSV		11.2990	3.E-05
PI does not Granger Cause GCF	115	0.51221	0.6006
GCF does not Granger Cause PI		1.87500	0.1582
TRD does not Granger Cause GCF	115	0.86951	0.4220
GCF does not Granger Cause TRD		1.40574	0.2496
LBR does not Granger Cause GCF	115	5.46163	0.0055
GCF does not Granger Cause LBR		0.99152	0.3743
TRSV does not Granger Cause GCF	115	13.4571	6.E-06
GCF does not Granger Cause TRSV		0.48951	0.6143
GSV does not Granger Cause GCF	115	1.31417	0.2729
GCF does not Granger Cause GSV		0.47249	0.6247
TRD does not Granger Cause PI	115	1.30980	0.2740
PI does not Granger Cause TRD		0.87215	0.4209
LBR does not Granger Cause PI	115	2.31481	0.1036
PI does not Granger Cause LBR		0.86576	0.4236
TRSV does not Granger Cause PI	115	7.50349	0.0009
PI does not Granger Cause TRSV		0.04960	0.9516
GSV does not Granger Cause PI	115	3.34109	0.0390
PI does not Granger Cause GSV		0.52967	0.5903
LBR does not Granger Cause TRD	115	5.84091	0.0039
TRD does not Granger Cause LBR		4.87255	0.0094
TRSV does not Granger Cause TRD	115	1.45919	0.2369
TRD does not Granger Cause TRSV		0.82300	0.4418
GSV does not Granger Cause TRD	115	0.44118	0.6444
TRD does not Granger Cause GSV		0.53540	0.5870
TRSV does not Granger Cause LBR	115	2.01875	0.1377
LBR does not Granger Cause TRSV		0.74773	0.4758
GSV does not Granger Cause LBR	115	4.78153	0.0102
LBR does not Granger Cause GSV		11.2333	4.E-05
GSV does not Granger Cause TRSV	115	0.01758	0.9826
TRSV does not Granger Cause GSV		4.97796	0.0085