

# The Impact of Government Expenditure on Economic Growth: A Study of Asian Countries

K. P. K. S. Lahirushan, W. G. V. Gunasekara

**Abstract**—Main purpose of this study is to identify the impact of government expenditure on economic growth in Asian Countries. Consequently, main objective is to analyze whether government expenditure causes economic growth in Asian countries vice versa and then scrutinizing long-run equilibrium relationship exists between them. The study completely based on secondary data. The methodology being quantitative that includes econometrical techniques of cointegration, panel fixed effects model and granger causality in the context of panel data of Asian countries; Singapore, Malaysia, Thailand, South Korea, Japan, China, Sri Lanka, India and Bhutan with 44 observations in each country, totaling to 396 observations from 1970 to 2013. The model used is the random effects panel OLS model. As with the above methodology, the study found the fascinating outcome. At first, empirical findings exhibit a momentous positive impact of government expenditure on Gross Domestic Production in Asian region. Secondly, government expenditure and economic growth indicate a long-run relationship in Asian countries. In conclusion, there is a unidirectional causality from economic growth to government expenditure and government expenditure to economic growth in Asian countries. Hence the study is validated that it is in line with the Keynesian theory and Wagner's law as well. Consequently, it can be concluded that role of government would play a vital role in economic growth of Asian Countries. However; if government expenditure did not figure out with the economy's needs it might be considerably inspiration the economy in a negative way so that society bears the costs.

**Keywords**—Asian Countries, Government Expenditure, Keynesian theory, Wagner's theory, Random effects panel OLS model.

## I. INTRODUCTION

THERE has been much debate on the role and the size of government interference in the macroeconomic outlook throughout countries. As a result, governments attempt to stimulate economic growth through different instruments. Public expenditure has traditionally been a component of fiscal policy which is an instrument of the State to influence the economic growth. Economic growth as an indicator of economic performance within a country is considered as an objective that most of the countries would anticipate because of its impact in raising the standards of living, the state benefits, and the employment levels. Hence, the understanding the determinant factors capable of causing economic growth is crucial. Government expenditure is one of the most important factors in economic theory. However, with the present

economic crisis in all over the world occur with the government involvement. It is important to be analyzed to determine government expenditure is indeed a determinant factor on economic growth.

Asian region was the most dynamic economic region throughout the past two decades. There are large differences among the Asian countries in their levels of living and other circumstances, as well as the policies that they have pursued. Larger government size is likely to be an obstacle to efficiency and economic growth because the taxes necessary to support government expenditures distort incentives to work and to invest, absorb funds that otherwise would have been used by the private sector in profitable investment opportunities, generally reduce efficient resource allocation, and hence reduce the level of output. In addition, government operations are often carried out inefficiently, and the regulatory process imposes excessive burdens and costs on the economic system. Thus, countries with greater government expenditure as a proportion of output should experience lower economic growth. Keynesian economics predicts government expenditure should lead to economic growth. In Asian countries; there are developed countries as well as developing countries. Most of times there can be seen increasing trend in the real gross domestic product level in both kinds of countries. Specially, in recently developed countries like Singapore, as well as other countries the government has played vital role in their development process. Since Sri Lanka has welfare economy, the government is crucial thing to Sri Lankan developing process. This study will be focused to measure whether the government involvement to their economy impact to this kind of rapid developing progress in Asian countries.

There are a lot of empirical studies which study the relationship between government expenditure and economic growth in Asian countries. But there is still an unfulfilled gap related to the issue, impact of government expenditure on economic growth in Asian countries as whole. By conducting this study it is expected to cover up this gap by including major member countries in Asia and enhancing the time horizon to 1970 to 2013. Consequently, the main purpose of this study is to scrutinize the impact of government expenditure on economic growth in Asian countries which covering the time period from 1970 to 2013. Then this study will be fulfill the following objectives of assessing the impact of government expenditure on Economic growth in Asian countries, identifying the long run relationship between government expenditure and economic growth in Asian countries, ascertaining the causal relationship between

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government expenditure and economic growth in Asian countries.

## II. LITERATURE REVIEW

This section discusses theoretical and empirical frame work related to the study. In general, different theories on the relation can be roughly divided into two economic schools; The Keynesian and Wagner's school of thought. The fundamental contrast for these theories is the direction of causality. As with [2], Adolph Wagner was the first to recognize a positive correlation between government expenditure and economic growth, which is referred to in the literature as Wagner's Law. In this view, a long-run elasticity larger than unity is assumed for public spending and economic growth. This implies that the role of the government increases because of economic growth. This is explained by the increasing demand for regulatory and protective functions which are needed to sustain the increasing level of economic wealth. In addition, as countries grow wealthier, the demand for public goods like education, healthcare and cultural services increases. The theory that the need for goods and services provided by the government increases with a country's industrialization because of its economic growth lies within the following three reasons, Firstly, as the economy grows the public sector will take over the administrative and protective functions previously performed by the private sector. Secondly, as the economy grows the need for provision of social and cultural goods and services increases as well. Finally, as the economy grows, more government intervention is needed to manage and finance natural monopolies and to maintain the well functional of market forces.

The Keynesian view argues that economic growth occurs as a result of rising public sector expenditure. In this context, government expenditure is treated as an independent exogenous variable and could be used as an efficient policy variable to influence economic growth. Reference [15] carried out a research on growth of public expenditure and concluded that, at the early stages of economic development, the rate of growth of public expenditure will be very high because government provides the basic infrastructural facilities (social overheads) and most of these projects are capital intensive, therefore, the spending of the government will increase steadily. The investment in education, health, roads, electricity, water supply are necessities that can launch the economy from the practitioner stage to the take off stage of economic development, making government to spend and increasing amount with time in order to develop an egalitarian society. Five stages of expenditure growth are; "traditional society, preconditions for take-off, the takeoff; the drive to maturity and the eye of high mass consumption. "What determines the accepted expenditure growth depends critically on the assumption of the type of economy, i.e. whether it is a free market economy, a mixed economy or a command economy. The Armeey Curve builds on the foundations of the Laffer curve, by theorizing on the level of government interference in relation to economic growth. It demonstrates the relation between government expenditure and economic

development and hypothesizes that an optimal size of government expenditure exists. Furthermore, this relation was previously investigated by [1] who stipulated a functional relation between economic growth and the size of the government empirically in the beginning of the 1990s. However, it was US-senator Armeey who vulgarized the theory.

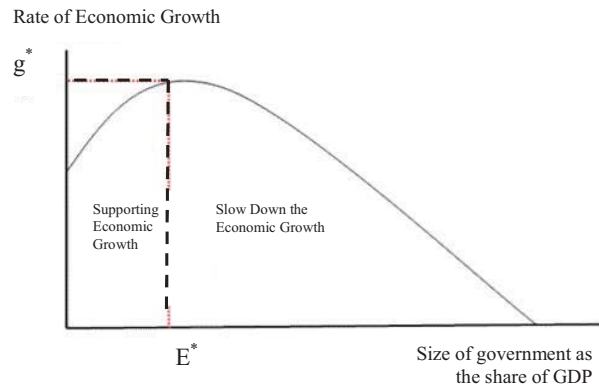


Fig. 1 Armeey Curve

As illustrated in the graphical representation of the Armeey Curve, a State with a non-existent government results in minimum economic development. This is explained by the lack of rule of law and protection of property right. Due to the uncertain economic environment there is no intention to save or invest. However, if the role of the government grows to full ownership of resources and control of economic decision making, economic growth is limited and may decline to zero. Explanations for this trend can be found in the decrease of private investments due to the 'crowding out'-effect, higher tax rates and less free market. Additionally, the Armeey Curve indicates an optimal size of the government  $E^*$ , where maximum economic growth is reached. At this point, an increasing amount of government expenditure leads to a decrease of economic growth. This point differs country by country and may rely on economic factors like openness of the economy as well social factors like family size. There are much more empirical evidences on the impact of government spending on economic growth. Those may be grouped into three main groups. While the first focuses on the empirical findings that support to Keynesian hypothesis, the second focuses on the empirical findings that support to Wagner's Law. Finally there are some empirical finding that showing no relationships between government expenditure and economic growth.

Reference [28] analyzes the impact of government expenditure on GDP growth for China, Hong Kong, Malaysia and Singapore by covering the period from 1990 to 2008. This is achieved by applying the panel fixed effects model. This study has found that there is significant positive relation between government expenditure on economic development and GDP is in line with the theory. Furthermore the evidence in this paper suggests that government expenditure indeed has

a significant influence on GDP growth in the long run in China, Hong Kong, Malaysia and Singapore. Reference [17] examines the relationship between the share of government consumption expenditure in GDP and the rate of growth of real per capita GDP. The data allow a sample of 104 countries and the negative relationship was found for the full sample of countries, un-weighted or weighted by population, for all six time periods examined, and excluding or including the major oil exporters. Reference [11] examined the nature and the direction of causality in Pakistan between public expenditure and national income alongside with various selected components of public expenditure: development expenditures (DE), administration expenditures (AE), debt services (DS), defense services (DF). Reference [24] empirically investigated the relationship between government expenditure and economic growth both at the bivariate (aggregated) and the multivariate (disaggregated) systems. The econometric investigation was based on a cointegration approach and the Toda-Yamamoto Augmented Granger Causality test. The results of Johansen bivariate/multivariate cointegration revealed that there was no long-run relationship among the stationary variables. Reference [25] investigated the direction of causality between Government expenditure (GE) and National Income (NI) in Nigeria using annual data. He employed the co-integration and Granger Causality tests for the period 1970-2005. Reference [12] examined whether the relative size of government (i.e. the share of total expenditure in GNP) can be determined to Granger cause the rate of economic growth, or if the rate of economic growth can be determined to Granger cause the relative size of government. Reference [6] studied the direction of causality between national income and government expenditures for Indonesia, Malaysia, Philippines, Singapore, and Thailand. Granger causality test was used to investigate the causal links between the two variables. Annual time series data from 1960-2002 was made use of support for the hypothesis that causality runs from government expenditures to national income has been found only in the case of Philippines. There was no evidence for this hypothesis and its reverse for the other countries. Reference [4] used the Pedroni Cointegration method [27] to establish a long run relationship between fiscal policy and economic growth. They found a positive and statistically significant impact of health and education expenditure, aggregate of government expenditure and aggregate of fiscal policy on real per capita GDP.

Reference [8] reveals firstly that, indeed economic growth Granger causes government expenditure in South Korea and the results are statistically significant. Hence the hypothesis of Wagner is satisfied. Secondly, the Keynesian stance is not validated in the South Korean context. For instance, government expenditure is negatively and significantly related to economic growth, meaning that government expenditure does not Granger cause economic growth in South Korea. These findings are in conformity with the conclusions of most pro-free market studies and snub the Keynesian paradigm of fiscal stabilization in which government expenditure can be used as a tool. Reference [30] empirically investigates the

nature of the relationship that exists between government expenditure and economic growth in India. This study contributes to the ongoing debate amongst economists in favour of market driven economy rather than government managing and controlling the economic activity. To advocate for privatization or not, the author analyses the causal relationship between government final consumption expenditure and gross national product at market price both in nominal and real terms in India. For this purpose, the test of integration, cointegration and Error correction mechanism are used. The result of study reveals that the uni-directional causality from gross national product to government final consumption expenditure is confirmed when the data is used in nominal terms and, hence satisfying the hypothesis of Wagner. On the level of real terms, the causality is not confirmed. The study suggests that, in the context of an early phase of a growing economy as India, government can not only expand its activities, but initiate new public expenditure. Reference [3] argues on one hand that most empirical studies do not apply the Augmented Dickey-Fuller and KPSS tests of integration. On the other hand, the author notices that most studies apply the two step cointegration procedure proposed by Engle and Granger. Therefore, the author's objective is to apply the ADF and KPSS for testing the order of integration of the series as well as the Johansen cointegration in the context of a bivariate analysis. Six countries, among which three are from the emerging markets (South Korea, Taiwan and Thailand) and the rest from the industrialized world (USA, Japan and the UK) are chosen for testing the Wagner's law. Indeed, [3] concludes that the Wagner's law is satisfied in all countries except for Thailand. Reference [18] estimates the long-run relationship between government expenditure and economic growth using both a bivariate and trivariate analysis. In the bivariate analysis, simple regressions are estimated to establish the relation from government expenditure towards economic growth and vice versa. Whereas, in the trivariate analysis either the unemployment rate or inflation rate is added separately as explanatory variable in order to affirm the validity of either the Keynesian hypothesis or Wagner's law in Greece, UK and Ireland. Reference [18] concludes that in the short run government size Granger causes economic growth in all countries. While, in the long-run, economic growth Granger causes the size of government in Greece, and when inflation is added in the UK. This implies that government expenditure indeed constitutes a stabilization policy tool to affect economic growth in the short term for all the three countries under investigation. Reference [31] presented new specification is in order to disentangle the effect of positive economic growth and negative economic growth on growth of government expenditure in the OECD countries for the period between 1950 and 2000. The general finding of [31] reveals that in times of positive economic growth, government expenditure tends to grow less than proportional to the increase in growth. Reference [2] applies both the Granger and Holmes and Hutton statistical procedures to test the income-expenditure hypothesis for three African countries (Ghana, Kenya and South Africa), from 1957 to 1990. For all these

countries, a long-run relationship between government expenditure and national income cannot be established. In fact, over this period, government expenditure has deviated substantially and persistently from national income. Moreover, in the short run, of these three African countries only Ghana shows evidence of government expenditure being caused by national income, finding support for Wagner's hypothesis. Finally, the authors find no evidence of government expenditure causing national income. In other words, the Keynesian proposition is not supported by the data.

Reference [14] employs the two-step Engle and Granger cointegration method, the Johansen maximum likelihood method and the Granger causality test, in order to investigate the long run and causal relationship between government spending and income. For this purpose, they employ six alternative functional forms, using data for the EU-15 countries over the time period 1949-1998. The results, accruing from this study, are ambiguous accordingly to the method applied. The major points that emerge from the Engle and Granger test are that in most of the EU countries, no long term relationship has been observed, except for some sub-cases in Finland, Italy and the Netherlands. In contrast, the Johansen test supports the existence of Wagner's Law in most EU countries, with the exception of France and Italy. As far as the Granger causality test is concerned, patterns of causality between income and government expenditure display dramatic differences across various countries. Moreover, there is limited support for the pattern of causality; Wagner's Law is completely verified only in two countries – Finland and Italy. Reference [7] analyzes the experience of five economies (USA, UK, France, Germany and Italy) for the period 1870-1990. They observe that the increase in the public expenditure to national income ratio is faster for the period until the mid-20th century and develop a model based on Wagner's Law. Reference [1] Examines the short- and long-term behavior of government spending with respect to output in 51 developing countries using an error-correction model. They find evidence that is consistent with the existence of cyclical ratcheting and voracity in government spending in developing countries, resulting in a tendency for government spending to rise over time. Reference [29] investigates the long-run tendency for government expenditure to grow relative to national income using Greek data from 1833 to 1938. Cointegration analysis validates the existence of long-run relationship between the variables, as expressed by the six most popular versions of the Law. Moreover, Granger causality tests indicate causality running from the variables approximating income to the government expenditure variable. Reference [13] used Bangladesh data from 1976 to 2007 in a bivariate as well as a trivariate framework incorporating population size as a third variable, empirically investigates Wagner's Law. The estimated results provide evidence in favour of the law for Bangladesh, in both the short-run and long-run. There is a long-run cointegration relation among real government expenditure, real GDP and the size of population where government expenditure is positively tied with the real GDP (1.14), per capita GDP (1.51) and population size (0.21). Both

the real GDP and GDP per capita Granger cause total government expenditure to change. Population size also comes up as a significant stimulus for public spending to grow in both the long-run and short-run. Reference, [16] examine the case of New Zealand. Results provide consistent results concerning the impact of income on shares of government spending in output with income elasticities ranging from 0.56 to 0.84. This implies that a 1 percent increase in per capita income leads to a 0.56 to 0.84 percent increase in the share of government expenditure of income. These results imply that per capita income increases by more than the increase in the share of the government spending in income. Reference [20] studies the linkages between public expenditure at a disaggregated level and GDP for Italy. Empirical evidence suggests that only for gross public investment expenditure the hypothesis is satisfied. Instead, Granger-causality exhibits unclear results: the direction of causality from public spending to aggregate income is observed for these categories of public expenditure: final consumption, public wages, gross public investment, and contribution to production. Reference [22] attempts to investigate the validity of Wagner's law and causality between government expenditure and economic growth in SADC countries from 1988 to 2004. In order to determine the existence of the long-run relationship and causality, a univariate analysis is carried out to assess whether panel series are integrated at the same order. Subsequently, this study finds that all panel series under investigation are indeed integrated of the same order. The study finds that economic growth Granger causes government expenditure in both the long and the short-run which is consistent with the Wagner's law than the Keynesian stance. Reference [5] investigates the existence of a long-run relationship between public expenditure and GDP using data for Sri Lanka during 1952-2002. Using the Granger causality test and Sri Lankan time series aggregate data, the study found no empirical support to the Keynesian hypothesis. The study found that both the government expenditure and GDP variables were non-stationary in levels, but stationary in first differences. Accordingly, the data are integrated of order one applied the cointegration test. According to the results, there is no cointegrating relationship between the government expenditure and national income. Accordingly, could not find a long-run relationship between government expenditure and GDP growth. Reference [21] investigated the long-run relationship between public expenditure and GDP for the Turkish economy. The study used the natural log of annual data from 1965-2000. They employed co-integration and Granger Causality tests on the following variables: Gross Domestic Product (GDP), Total Government Consumption (GC), Total Public expenditure (EXP), and Mid-year Annual Population. The data in nominal values were converted to real values using the Wholesale Price Index (WPI). They discovered that neither Wagner's Law nor Keynes' hypothesis was valid in Turkey. Reference [16], investigated the relationship between national income and public expenditures in India. Annual data for total (aggregate) as well as disaggregate expenditure for the period of 1950-1981 were

used. The variables were deflated by using the implicit national income deflator while making use of granger causality test. The study discovered no causal relationship among the variables indicating the failure of both Wagner's law and Keynes hypothesis in explaining the causal relationship between national income and public expenditure in India

There are lots of theories relating to government expenditure as well as relating to economic growth. But this study is based on the Keynesian view of government expenditure. The Keynesian view argues that economic growth occurs as a result of rising public sector expenditure. Empirically, this study is built upon existing literature i.e. [28] and [22] in order to estimate the relationship between government expenditure and economic growth in Asia. This empirical study conducted as quantitative research. Therefore secondary data used to conduct this study. Data was directly drawn from UN data base and World Bank publications. Based on the Keynesian hypothesis, to assess the long-run or equilibrium relationship between government expenditure and economic growth across Asian countries and the direction of causality between these two macroeconomic variables, this study adopts the procedure developed by [28] and [22]. Analysis on the influence of government expenditure on economic growth will be performed by the panel random effects OLS model. This model enables the ability to analyze time series (different periods) and cross-sections (different countries) simultaneously, each with one dependent and possible multiple independent variables. The data is structured to include nine cross-sections: Singapore, Malaysia, Thailand, South Korea, Japan, China Sri Lanka, India and Bhutan Singapore with each 44 observations, totaling to 396 observations. To this end, the dynamic model is erected relating public expenditure to economic growth for the Asian countries for the period 1970-2013. The panel cointegration technique is used in order to determine long run relationship of government expenditure with respect to economic growth on one hand, within the framework of panel data analysis. In addition to that this study applies the Granger causality test in a context of panel data in order to determine the direction of causality between government expenditure and economic growth in a panel of Asian countries.

### III. METHODOLOGY

This empirical analysis is conducting in order to determine the relationship between government expenditure and Economic growth. Since this research is conducted as quantitative research, data collection methods and techniques follow a quantitative research design. When concerning about the population and sample selection, Asia, which consisting 48 countries could be treated as the population for this analysis. Among these Asian Countries, 9 countries are selected as the sample based on the main criteria geographical areas and then by per capita GDP and HDI which differentiate developed and developing countries. Therefore sampling method can be treated as non-random sampling technique.

south Asia			South East Asia		North East Asia	
Sri Lanka			Singapore		South Korea	
India			Malaysia		Japan	
Bhutan			Thailand		China	
Developed Countries			Developing Countries			
Country	Per Capita GDP	HDI	Country	Per Capita GDP	HDI	
Singapore	\$54,007	0.901	Sri Lanka	\$2,922	0.715	
Malaysia	\$10,432	0.773	India	\$1,503	0.586	
Thailand	\$5,480	0.722	Bhutan	\$2,509	0.538	
South Korea	\$24,454	0.928				
Japan	\$46,548	0.956				
China	\$6,093	0.762				

Fig. 2 Asian Countries

According to Fig. 2 main sub regions are selected from Asian region, i.e. South Asia, South East Asia and North East Asia. In south Asian countries Sri Lanka, India and Bhutan are selected while Singapore, Malaysia and Thailand are selected from South East Asia. And also South Korea, Japan and China are selected from North East Asia. Singapore, Malaysia, Thailand, South Korea, Japan and China are the more developed countries since there are comparatively higher GDP per capita value and higher HDI value. Most of south Asian countries like Sri Lanka, India and Bhutan can be treated as developing countries since there are comparatively lower per capita GDP and HDI value. Therefore selected sample is consisting both developed and developing countries. This will help to get better understand of the government role in developing process in both developed as well as developing countries in Asian region considering as a whole.

Since this study is analyzing the macro economic variables, secondary data was the major source of the study. All the variables are expressed in US dollars and estimated to an annual basis. The data is drawn from the UN Database and World Bank publications. These data consists out of nine Asian countries; Singapore, Malaysia, Thailand, South Korea, Japan, China, Sri Lanka, India and Bhutan with each 44 observations, totaling to 396 observations with covering the time period from 1970 to 2013. The data is structured according to the panel least-squares method in which nine cross sections are identified; Singapore, Malaysia, Thailand, South Korea, Japan, China, Sri Lanka, India and Bhutan with 44 observations each, for the years ranging from 1970 to 2013.

The dependent variable GDP is in the form of absolute constant values in US dollar millions (base year 2005). In this analysis GDP is dependent on total government expenditure. Like the dependent variable, the explanatory variable (independent variable i.e. Government expenditure) is also taken from the previously mentioned data base in terms of absolute constant values in US Dollar with the same base year.

#### A. Model Formulation

The Keynesian paradigm treats government expenditure as an exogenous policy determined variable and economic growth as endogenous and explained by the government expenditure. This study is built upon existing literature in the framework of the Keynesian hypothesis i.e. [10], [15], [24] and [23]. Based on the Keynesian hypothesis, to assess the long-run or equilibrium relationship between government

expenditure and economic growth across Asian countries and the direction of causality between these two macroeconomic variables, this study adopts the procedure developed by [22] and [21]. Their approach consists in testing at the same time the Wagner's law and the Keynesian hypothesis in the framework of the panel cointegration and the estimation of a dynamic error correction model. The panel cointegration [19] technique is used in order to determine long run relationship of government expenditure with respect to economic growth on one hand, within the framework of panel data analysis. And also this study attempt to access whether the relationship of government expenditure to economic growth varies across countries in Asian countries or can be considered as having a common for all countries together.

### B. Applied Model

Econometrically, the set up to investigate the relation between government expenditure and economic growth is expressed in:

$$GDP_{it} = \alpha + \beta GE_{it} + u_{it}$$

Ordinary Least Square method begins with the assumption of linearity of the data set. Since the collected data were not showing linear distribution in both GDP and GE data were transformed to log form. Therefore final estimation equation can be build up as:

$$LGDP_{it} = \alpha + \beta LGE_{it} + u_{it}$$

where LE denotes logarithm of government expenditure, LGDP denotes logarithm of gross domestic product. This equation is first used by [26], then by [9] and [22]. This logarithmic equation facilitates to assess the sensibility of economic growth with respect to government expenditure within the region under investigation.

This research is conducted in order to estimate the impact of government expenditure on economic growth, access whether there is a long run relationship between government expenditure and economic growth and finally to detect the causal relationship between these two variables.

According to Fig. 3, in order to estimate the impact of government expenditure on economic growth and access whether there is a long run relationship between these two variables, the data should be integrated of same level. Therefore, first of all the set should be ordered at a same level by conducting Panel unit root tests. Then we can estimate the impact of government expenditure on economic growth within the framework of panel data analysis for a group of Asian countries. There are three models within the frame work of panel data analysis. One model should be selected based on Hausman test and F-test. After that the long run relationship can be measured through conducting panel cointegration tests. Finally the causal relationship between these two variables can be measured through conducting Granger causality test.

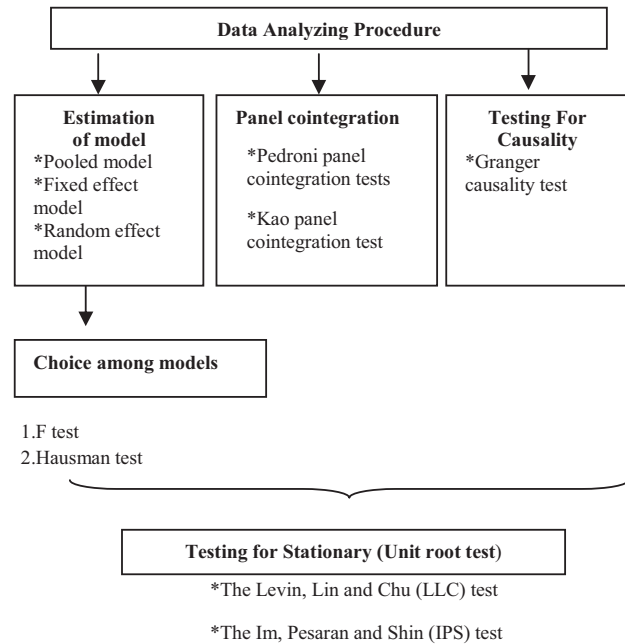


Fig. 3 Data Analyzing Procedure

## IV. DATA PRESENTATION AND ANALYSIS

### A. Data Presentation

This part discusses empirical findings on the relationship and causality between government expenditure and economic growth for Asian countries from 1970 to 2013. When analyzing the data set first of all, panel series must be integrated of same order. Following this, the chapter presents empirical results on panel unit roots, the results on panel cointegration tests, Hausman test results and the reports on estimates according to the random effects estimator. In addition to that the reports on causality between government expenditure and economic growth in the Asian region according to the approach of Granger causality test are presented this section.

In Table I, panel unit root statistics of government expenditure and economic growth are reported according to the LLC and IPS approaches. Following the LLC and IPS tests, panel series of government expenditure and economic growth are both integrated of order 1 at 5 per cent,

TABLE I  
PANEL SERIES UNIT ROOT TESTS

Order	Panel series	Statistics LLC	P-Value LLC	Statistics IPS	P-Value IPS
Level	$LGE_{it}$	-1.6290	0.0527	-1.5429	0.0614
First difference	$LGE_{it}$	-7.8250	0.0000	-8.3887	0.0000
Level	$LGDP_{it}$	-0.0852	0.4660	1.6882	0.9543
First difference	$LGDP_{it}$	-5.8671	0.0000	-8.0638	0.0000

The LLC assumes a homogenous behavior of unit root in across all cross-sections. This is suitable in the context of a pooled regression where cross-sections are considered to have

a common behavior. The IPS offer a test under the assumption that some individual, not necessarily all, series have a unit root. This will be an appropriate procedure to weigh up the order of integration of both government expenditure as well as economic growth taking into consideration the issue of country-specific effects. Following the reports on Table III, the necessary condition for assessing the possibility of long-run co-movement between and is fulfilled as all panel series under investigation are integrated of the same order.

### B. Findings of the Estimation

The quantitative study starts at the determination of the model with the Hausman test. The impact of government expenditure to economic growth is estimated according to random effect approach in this study based on Hausman test results.

#### 1. Hausman Statistic

Table II presents the Hausman test reports on comparison between fixed effects estimator and the random effects estimator. According to the random effect estimator, the null hypothesis of consistency and efficiency of in equations is not rejected at 5 percent level. This implies that, for equation, the random effects estimator is appropriate. This is justified for the following reason. Firstly, the nine countries under investigation constitute the sample data that is drawn from Asian countries. Secondly, the error term is not correlated with the unobservable effects, which render the coefficient slope consistent and efficient.

TABLE II  
HAUSMAN TEST

Dependent variable	Explanatory variable	Fixed effects	Random effects	Variance	P-value
LGDP	LGE	0.9615	0.9620	0.00001	0.6584

#### 2. Random Affects Estimates

Table III shows the reports on the relationship between government expenditure and economic growth according to the random effects approach. The t-statistic, given in between brackets, and the probability values in between square brackets, are corrected using the cross-section SUR (seemingly unrelated regression) for standard errors and covariance. The reason for using SUR is to take into account heteroscedasticity and contemporaneous correlation in the error across cross-sections.

TABLE III  
RANDOM EFFECTS ESTIMATES

	Constant	Slope	R2	Aj.R2	S.E of reg.
Equation	0.0020 [0.5101] (0.6102)	0.9620 [145.9504] (0.0000)	0.97267	0.97260	0.0858

According to test result the estimated equation can be built as:

$$LGDP_{it} = \alpha + \beta LGE_{it} + u_{it}$$

$$LGDP_{it} = 0.0020 + 0.9620 LGE_{it} + u_{it}$$

This logarithmic equation can be present in normal format as:

$$GDP_{it} = 1.002 GE_{it}^{0.9620}$$

Following the random effects estimates, the sign of the slope coefficient is positive and complies with the theory. This means that government expenditure and economic growth are positively related in the Asian countries under the period of investigation. Moreover, the size of the cointegrating parameter is significantly less than the one in equation at 5 percent level. This implies that a positive change of 1 percent in government expenditure, ceteris paribus, will result in 0.962 percent increase of economic growth for Asian countries. But, the method of random effects acknowledges the unobserved heterogeneity, which is treated as any random error rather than a parameter to be estimated.

In addition, this model shows an exceptional explanatory power displayed by (0.9726). This may represent higher credibility of the dataset and completeness of the model. In addition to that the standard error of the regression represents relatively low value (0.0858) which indicating that is an acceptable model.

#### 3. Panel Cointegration Results

This study uses the residual based panel cointegration tests according to the Pedroni approach and the Kao cointegration test. Table IV presents the Pedroni cointegration test results between government expenditure and economic growth. According to the Panel ADF- stat, there is cointegration between government expenditure and economic growth at 5 per cent. The probability value is less than 0.05; hence, the null hypothesis of no cointegration is rejected. At the same time, the Group ADF-stat result also suggests that there is a cointegration between government expenditure and economic growth at 5 per cent level.

TABLE IV  
PEDRONI PANEL COINTEGRATION TEST

Test	Statistic	Probability	Weighted Stat.	Weighted Prob.
Panel ADF-Statistic	-9.1846	0.0000	-7.8831	0.0000
Group ADF-Statistic	-9.0602	0.0000	-	-

In general, the Pedroni panel cointegration procedure reveals that, the long-run relationship between government expenditure and economic growth in a panel of 9 countries when the within dimension is considered (Panel ADF test) of Asian holds according to the Keynesian hypothesis of government size. When taking into consideration the between dimension (Group ADF test), cointegration is proved to exist between GE and GDP also. The next section presents results on Kao cointegration test in order to reach a conclusion on whether indeed there is cointegration for panel series above mentioned.

#### 4. Kao Panel Cointegration Test

Reports on the Kao panel cointegration test (Table V) reveal that indeed there is cointegration at 5% level of significance between government expenditure and economic growth as the probability value is less than 0.05. Therefore, the null hypothesis of no cointegration is rejected.

TABLE V  
KAO PANEL COINTEGRATION TEST

	$GE_{it}$ and $GDP_{it}$
ADF t-statistic	-17.1834
ADF p-value	0.0000

Following the results from both the Pedroni and Kao panel cointegration tests, this study finds that government expenditure and economic growth are related and move together in the long-run for the sample of Asian countries. This implies, the regression based on two stationary panel series is true and hence the validity of Keynesian hypothesis could be assessed.

#### 5. Granger Causality Test Results

These empirical results analyze the relationship between government expenditure and in order to investigate the validity of either the Wagnerian approach or the Keynesian stance or both concerning the direction of causality. Therefore, this study applies the Granger causality test in a context of panel data in order to determine the direction of causality between government expenditure and economic growth in a panel of Asian countries. The test results represent in Table VI, reveals that causality goes from public expenditure to economic growth and causality goes from economic growth to public expenditure as well, since both null hypotheses can be rejected at 5 percent level of significance.

TABLE VI  
GRANGER CAUSALITY TEST

Null Hypothesis	F-Statistic	P-value
GE does not Granger Cause GDP	68.5069	0.0000
GDP does not Granger Cause GE	35.37	0.0000

#### V. DISCUSSION AND CONCLUSION

This study was focused on testing the validity of the Keynesian hypothesis of long-run relationship between government expenditure and economic growth using econometrical techniques of cointegration, panel fixed effects model and Granger causality in the context of panel data for Asian countries; Singapore, Malaysia, Thailand, South Korea, Japan, China, Sri Lanka, India and Bhutan with each 44 observations, totaling to 396 observations with covering the time period from 1970 to 2013. Following this, the approach of panel data was used in this research in order to examine the cointegration, measure the impact and causality between government expenditure and economic growth in Asian countries. Prior to determining whether government expenditure and economic growth in Asian countries are cointegrated, and measure the impact of government expenditure on economic growth panel unit root tests were

carried out in order to assess the level of integration of each panel series. The rationale for this procedure is in the compliance with cointegration theory which states that series must be integrated of same level. Consequently, the study found that the panel series under investigation are all integrated at order one; hence, the next step consisted of testing whether cointegration exists by applying the Pedroni as well as the Kao panel cointegration tests and the panel random effect model used to measure the impact.

After applying the described methodology this study found interesting results. Firstly, the empirical findings demonstrate a significant positive impact of government expenditure on economic growth in Asian region. Secondly, indeed government expenditure and economic growth have a long-run relationship in Asian countries. Finally, there is a unidirectional causality from economic growth to government expenditure and vice versa for the Asian countries which indicating that this study in line with the Keynesian theory and Wagner's law as well. Therefore, Asian countries should increase their government involvement in order to enhance the economic growth. However, if government expenditure patterns are not well designed to fit the economy's needs it could significantly influence the economy in a negative way and the society bears the costs.

#### ACKNOWLEDGMENT

K. P. K. S., Lahirushan thanks the research supervisor Senior Lecturer, W G V Gunasekara. The authors thank Department of Business Economics, Faculty of Management Studies and Commerce, University of Sri Jayewardenepura for providing the opportunity to carry on research as a partial fulfillment of the degree program.

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