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DOES THE GOVERNMENT SIZE CAUSE ECONOMIC GROWTH? EMPIRICAL EVIDENCE FROM SELECTED ASEAN COUNTRIES

This paper investigates the link between government size and growth in the long run for an unbalanced panel of seven ASEAN-3 countries (N=7) with annual data for the period 1980-2012 (T=33).The relation between government expenditure and economic growth has been extensively investigated by the use of different models. The model used is the pooled mean group, mean group and dynamic fixed effect model. By examining both short run and long run effects, the empirical results demonstrate a positively significant influence of government expenditure on economic growth on the long run. Furthermore, average error-correcting speed is approximately 0.04% per annum, which shows that a country converges to the common steady-state income path extremely slow.
JEL: H59; O11; O53; C23

1. Introduction

Government policy typically plays an essential role in the macroeconomic performance of countries. Apart from defining the legal and regulatory structure for economic activity, governments pursue a number of spending initiatives designed to promote output growth and employment. On the other hand, a lower level of public spending implies that fewer revenues are needed to achieve balanced budgets, which means that lower taxes can be levied, therefore, contributing to stimulate growth and employment. At the same time, government expenditures may interfere with the efficient workings of the economy and thus have a negative impact on economic performance. On the other hand, while higher level of public spending is often associated with higher growth rates, higher government size (measured as GDP's share of government spending) is associated to lower growth rates (Afonso, Furceri 2010). Thus, both the theoretical predictions and empirical findings on the macroeconomic effects of changes in government expenditure are mixed. It

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is of interest therefore to identify the overall impact of government spending on economic performance. In addition, the size of government expenditures relative to the economy may affect the influence those expenditures exert. Expenditures that are effective or ineffective on a very small scale could see that effectiveness or ineffectiveness reversed as they grow relative to the economy. Furthermore, for achieving monetary and economic union in Association of Southeast Asian Nations (ASEAN), convergence agenda also assigned a relevant role to the reform of public finance in order to foster economic growth. For those reasons, a firm control and, where appropriate, reduction of public expenditure is important for the policy makers. This means it is important to investigate the relationship between the size of government expenditure and economic growth.

Consequently, the aim of this paper is to examine the growth–government size relationship in ASEAN-3 the thirty three year 1980-2012 period. The objective is to explore the determinants of the economic growth in ASEAN and specifically to further investigate the impact of government size on economic growth in ASEAN during the period from 1980 through 2012 by using pooled mean group (PMG) estimator introduced by Pesaran, Smith, and Im (1999).

The main contribution of this paper is the identification of the impacts of government spending on economic growth. It also attempts to addresses both the short-,and long-run effects of government expenditures change simultaneously. There is a general perception that excessive government spending is harmful on long-run economic growth, while at the same time, it is generally accepted that expansionary government spending is favorable to business cycle frequencies (Odawara 2011). This is a useful contribution because given limited government resources, it is critical to understand which components of government spending promote growth at different time horizons and adjust resources towards more productive and efficient areas. Useful information for policy-making would also be provided by estimates of the speed at which government expenditure adjusted to their long-term relation with GDP after a shock in economic activity.

The remainder of the paper is structured as follows. In Section 2, we position our paper in the related existing literature. In Section 3, we explain our methodology. In Section 4, presents the estimation of the dynamic relationship between government expenditure and potential output and discusses the results concerning long and short-term elasticities. Section 5, summarizes the paper's main findings.

2. Literature Review

In broad terms, public expenditure denotes the dispensation by the state, on non-market criteria, of economic resources that it has acquired from firms and households (Heald, McLeod 2002). At first sight, this may reflect a simple concept. However, studies have shown the complexity of theorizing on this concept. This is because across states, the level and composition of the concept are subject to an extensive list of influencing factors that differ across countries.

An example to illustrate the complexity of theorizing on public expenditure is the different role's governments can assume. Depending on this, the traditional functions provided by the government vary from providing only the basic needs for preventing its citizens from falling under the survival line to providing goods and services to assure the well-being of its citizens.

Another example is debt servicing and repayment loans. Some countries are constrained to the level of financial aid to finance development projects. These governments are not able to generate enough revenue to finance the needs of the public. Therefore, despite the preferred development investments, investment decisions are highly influenced and restricted by the availability of foreign financial aid.

2.1. Government Expenditure Theories

The analysis of the relation between size of government with respect to the degree of development has received large attention in the academic field. Specifically, analysis on the long run relation between government expenditures and economic growth has resulted in various conclusions. 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. Wagner (1883) contemplates that economic growth, due to the industrialization process, is accompanied by an increase in the share of public expenditures in GNP. In contrast, the Keynesian view assumes that government expenditure is an instrument of the state in exerting fiscal policy and with this instrument influences economic growth.

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 (1883). 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 increase. The theory that 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 the 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 (Bird, 1971). Several studies like Gandhi (1971, Gupta (1967) and Dritsakis and Adamopoulos (2004) confirm this theory.

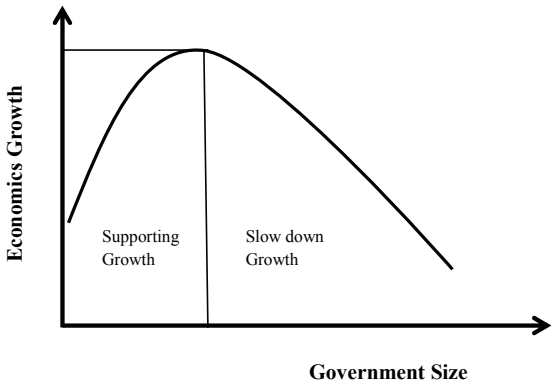
The Keynesian view argues that economic growth occurs as a result of rising public sector expenditure. In this context, government expenditure is treated as an independent exogenous variable and could be used as an efficient policy variable to influence economic growth.

However, some works have an ongoing debate on the effects of government size on economic growth. Landau (1983), Engen and Skinner (1992), Folster and Henrekson (2001), and Dar and AmirKhalkhali (2002) find a negative relationship between government size and economic growth. They believe that expanding government size decreases the return of government expenditure and over-expanding government size will cause a crowded effect to private investment. In addition, government expenditure often goes to inefficient expenditure, which will cause a distorted allocation to the resource. When government size raise, a government needs more taxes to support the expenditure, but expanding taxes will harm the economy (Chen and Lee, 2005). For the inconsistency of the above result, Vedder & Gallaway (1998) and Sheehey (1993) point out that the reason is that government size and economic growth exist under a non-linear relationship.

The Armey (1995) has built Armey curve on foundations of the Laffer curve[3], 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. As illustrated in the graphical representation of the Armey curve Fig. 1, 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.

Figure 1

Armey Curve



[3] Laffer curve explains the relation between tax levels and tax revenue. It postulates that as taxes increase the tax revenue increases until a certain point, optimal point, where workers are discouraged to work because of the high tax level and thus the tax revenue declines.

Additionally, the Armey Curve indicates an optimal size of the government, 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.

However, caution should be devoted on drawing conclusions based on this theory since the Armey Curve merely takes into account the effect of the government size on economic growth. Therefore, the theory excludes elements that could potentially increase the economy, i.e. investments in education, accumulation of capital or technological progress. Furthermore, the theory is rather generalized as it assumes the same model for every country and excludes country characteristic factors.

Government spending is particular interest in this work among the factors that determine the growth of an economy. While the Keynesian approach suggests fiscal policies to boost economic activity in times of recessions, the Classical economists oppose the government intervention. Classical economists believe that market forces quickly bring the economy to long-run equilibrium through adjustment in the market while Keynesians argue that the self-regulating mechanisms in the economy fail to lead the economy back to equilibrium, mainly due to inflexibility in the market. Thus, Keynesians suggest expansionary fiscal policies as a solution for long recessions. Classical and Neoclassical believe fiscal policies ineffective on the grounds of the well-known crowding-out phenomenon, i.e., as public spending increases, public goods are substituted for private goods, thus causing lower private spending on education, health, transportation, and other goods and services. In addition, in a case that governments use heavily borrowing to fund spending, pressures in the credit market result in higher interest rates, which slow down private investment. The subject that government spending enhances economic growth has supported by the introduction of new growth theories. Dissimilar with the neoclassical growth model don't suggest the channels through which fiscal policy may have positively effect on long-run economic growth. The new growth theorists such as Romer (1986) and Lucas (1988) suggest that there is both a temporary effect from government expending and a possible long-run influence from fiscal policy on growth.

By presenting any information about trends in public expenditure in Asia, we try to make background for this area when this study investigates the relationship between the government size and growth in South-East Asia.

When evaluating government expenditure patterns among Asian countries, no clear trend can be recognized from Table 1 it can be acknowledged that on average, North and Central Asian regions show increasing government expenditure patterns. On the contrary, East and North-East Asian countries demonstrate decreasing government expenditure over GDP trend on average. In terms of percentage government expenditure over GDP, the biggest difference is recognized in 2006 where South and South West Asian countries demonstrate 15% of GDP on government expenditure while the pacific region invests 26.3%.

Government expenditure is an important matter in the facilitation of development in developing countries. In contrast to the developed market countries, the objective for developing Asian countries of government expenditure is to expand its economy instead of

insuring the retention of the current level of economic wealth. The key factor to achieve this objective is the availability of resources. This element demonstrates the difference in patterns of government expenditure in Asian developing countries.

Table 1

Fiscal balance per region

Reign	Government Revenue, % of GDP				Government Expenditure, % of GDP				Fiscal Balance, % of GDP			
	1998	2000	2006	2007	1998	2000	2006	2007	1998	2000	2006	2007
East and North East Asia	12.3	13.3	17	16.9	20.3	18.0	17.6	17.4	-8.4	-5.0	-0.7	-0.6
South-East Asia	17.1	18.2	20.0	18.8	19.4	18.6	19.6	20.5	-2.0	-0.7	0.2	-1.7
South and South-West Asia	15.8	10.4	11.3	12.4	22.3	16.1	15.0	15.8	-4.2	-5.6	-3.5	-3.3
North and Central Asia	18.0	18.5	21.7	25.5	21.5	20.3	20.8	25.3	-3.4	-1.72	1	0.5

Source: Asian Development Bank, Key Indicators 2008.

2.2. Empirical Studies on Government Expenditure and Economic Growth

In recent decades, economic researchers have shown interest in verifying and understating the linkage between total government expenditure as fiscal policy and economic growth. A fundamental and conventional wisdom of neoclassical economics in modeling economic growth was developed by Solow (1956). On one hand, it suggests that the fiscal variables such as the level of taxation, and the level of government expenditure can affect the level of income in the short run, but have no effect on the rate of economic growth in the long-run. On the other hand, it also suggests that while some economies may be wealthier than others, in the long-run, however, they should all grow at the same rate.

Unlikely, the effects of government expenditure on economic growth in the long-run have been empirically studied since the early 1980s. These empirical studies have yielded conflicting results. Some of them found a negative relationship between the two which supports the hypothesis that rising government expenditure is associated with a decline in the economic growth (e.g. Gwartney, Holcombe et al. 1998, Landau 1983, Fölster, Henrekson 2001), while others found a positive relationship between the two which supports of the hypothesis that government expenditure is associated positively with economic growth (e.g. Easterly, Rebelo 1993) , and still other studies do not find any evidence of a significant relationship between government expenditure and long- run economic growth (e.g. Kormendi, Meguire 1985). On the other hand, government expenditures are often found to have the positive impact on economic growth in developing countries and at the same time no impact on economic growth in developed countries (e.g. Sattar 1993). Furthermore, some studies of the relationship between government spending and economic performance found a negative yet insignificant impact of non-productive spending is found for industrialized countries but a positive and significant impact of non-productive spending for developing countries (e.g. Lin 1994). Finally, there are also some studies found that there is feedback between GDP and total government expenditure (e.g. Huang, Tang 1992).

Overall, the paper conducted to investigate the linkage between the government expenditure and economic growth by using different kinds of models have yields different results depending on the study as well as the data used in the study. In addition, as we saw previously, some studies that used the same model but used different data such as developed versus developing countries, yield different results. For these reasons it is very difficult to point out or specify which study is more reliable.

3. Methodology

In this section, we introduces the theoretical growth model developed by Romer (1986) and Barro (1990) and the definitions, sources and summary statistics of the variables which are applied in the PMG, MG and DFE empirical analysis.

3.1. Model Specification and Data Description

Many empirical works of growth has used the Solow growth accounting approach as a foundation model (Solow, 1956). The Solow model includes two important subjects about long run growth. First, "exogenous technological change" affects on output, and secondly, nations will converge in terms of income per capita. Accordingly, because all growth sources are exogenous, government policy cannot change long run growth rates. Unlikely, The endogenous growth models provided by Romer (1986) and Barro (1990) indicate that long-run growth is endogenous in the sense of some endogenous variables. Therefore, long-run growth rates can differ across countries, and there is no convergence in income per capita necessarily.

Endogenous growth theory is based on the fundamental that the source of growth of the independent variables in the growth model is tracked down, with a particular emphasis on knowledge. This is done by decomposing the exogenous variables in the neo-classical growth theory, which become endogenous variables in the endogenous growth theory.

The economic growth model assumed in this analysis is a simple version endogenous growth theory. Therefore, the factors influencing economic productivity are tracked down to the source. Public infrastructure is a factor directly contributing to economic productivity. Therefore, the economic production function is extended by including this factor K^G:

$$Y = AF(K, L, H, K^G) \tag{1}$$

where A represents technology, K represents capital and L represents labor H represents human capital. This implies that the government can elicit economic growth in the long run by influencing the factors in the model by i.e. investments in capital, research and development and education. However, the government may also influence economic growth negatively.

This paper uses a generalization model of the commonly used growth-accounting model based on the concept of an aggregate production function. It is developed along the works suggested in Dar & AmirKhalkhali (2002). Accordingly, the standard growth accounting model can be written as:

$$lnY_{it} = \alpha_2 lnK_{it} + \alpha_3 lnL_{it} + A_{it} \quad (2)$$

where Y stands for GDP, K for capital accumulation, L for the labor, and A measures total factor productivity growth. Note that α_2 and α_3 are the partial elasticity of output with respect to capital and labor, respectively. The subscript *i* indexes the countries and the subscript *t* indexes the time in the sample. It has assumed that export and government size enhance total factor productivity growth and, by implication, economic growth. Accordingly, equation (2) has written as:

$$A_{it} = \alpha_1 + \alpha_4 lnX_{it} + \alpha_5 GS_{it} + u_{it} \quad (3)$$

where X stands for export, GS gives the ratio of government expending over GDP, and *u* is the disturbance term. Finally, substituting (3) in (2) yields:

$$lnY_{it} = \alpha_1 + \alpha_2 lnK_{it} + \alpha_3 lnL_{it} + \alpha_4 lnX_{it} + \alpha_5 GS_{it} + u_{it} \quad (4)$$

Real GDP per capita has selected as proxy with economic growth. The explanatory variables are namely K (capital, which is measured as the gross capital formation over GDP), L (labor, which is measured by labor-force participation rate, percentage of total population ages 15-64), X (export is measured by exports of goods and services, percentage of GDP), and GS (government size is measured by ratio general government final consumption expenditure over GDP). The annual data in terms of natural logs for all variables are used. The data used in this study are taken from the World Bank's World Development Indicators (WDI) and Key Indicators of the Labor Market (KILM) from International Labour Organization (ILO).

Table 2 displays the definitions and summary statistics for the variables used in the estimations in logarithm form. Table 2 shows that real GDP per capita is about 7538 per annum. Total government spending amounted to 11.68 % of GDP. Labor force participation was about 70.40% and gross capital formation was 27.29% of GDP respectively. Besides these, share of export in GDP was about 73%. In our sample, both of government consumption and economics growth reached their maximum values of 29.87 % and 34378 US$, respectively, while gross capital formation, labor-force participation rate, exports of goods and services reached its maximum value of 46.95, 85.1 and 233.35 percent in the period of time.

The unbalanced data set, consist of observation for seven countries of ASEAN in the period of 1980-2012. The list of countries is as follows: Brunei Darussalam, Indonesia, Malaysia, the Philippine, Singapore, Thailand and Vietnam with the total of 211 observations. The reasoning behind this country sample is to reveal a pattern of government expenditure in

Asian countries. In addition, a distinction will be made between developing and developed Asian countries. As an aid to fiscal policy, it is also useful to have greater insight into the relation between government expenditure and economic growth. Therefore, this research highlights the importance for governments since it could be used as a competent guide for fiscal policy.

Table 2

Data Description and Sample Statistics

Variable	Symbol	Description	Descriptive Statistics			
			SD[1]	Mean	Min[2]	Max[3]
Economic growth	Y	Real gross domestic product per capita	10070	7538	301	34378
Capital accumulation	K	Gross capital formation over GDP	7.8	27.29	10.44	46.95
Labor force	L	Labor force participation rate, percentage of total population ages 15-64	7.1	70.40	53.54	85.1
Export	X	Exports of goods and services, percentage over GDP	55.1	73.30	19.49	233.35
Government size	GS	General government final consumption expenditure over GDP	4.9	11.68	5.47	29.87

Notes: [1]Standard deviation, [2]Minimum, [3]Maximum.

3.2. PMG, MG and DFE Approach

Analysis on the influence of government expenditure on economic growth will be performed by the unbalance panel analysis by mean group (MG) and pooled mean group (PMG) 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.

For using pooled data methods, we can consider numbering of alternative methods that differ on the point to which method allows for constraining of heterogeneity across individuals. Fully heterogeneity and fully homogeneity are in two extremes of the methods. The simple pooled estimator is at one extreme that models are the fully homogeneous-coefficient and all slope and intercept coefficients be equal across countries. There are some other estimators between the two extremes such as dynamic fixed effects (DFE) estimator contains all slope coefficients to be equal across individuals but different intercepts. The mean group (MG) estimator introduced by Pesaran *et al*.(1995) is at other extreme that models are fully heterogeneous coefficients. The MG estimator estimates the model separately for each group, and takes a simple average of the coefficients. In other words, this estimator produces the intercepts, slope coefficients, and error variances which are all different across groups (Odawara 2011). Moreover, Pesaran *et al* .(1999) introduce pooled mean group (PMG) estimator. In PMG model, the long-run slope coefficients are identical across individuals but the short-run coefficients, and the regression intercept are varied.

Following Pesaran *et al*. (1999), paper bases the panel analysis on the unrestricted error correction ARDL (p, q) representation:

$$Y_{it} = \emptyset_i Y_{i,t-1} + \beta_1 K_{i,t-1} + \beta_2 L_{i,t-1} + \beta_3 X_{i,t-1} + \beta_4 GS_{i,t-1} + \sum_{j=1}^{p-1} \theta_{ij} \Delta Y_{i,t-j} + \sum_{j=0}^{q-1} \delta_{ij} \Delta K_{i,t-j} + \sum_{j=0}^{r-1} \gamma_{ij} \Delta L_{i,t-j} + \sum_{j=0}^{s-1} \varphi_{ij} \Delta X_{i,t-j} + \sum_{j=0}^{v-1} \sigma_{ij} \Delta GS_{i,t-j} + \mu_i + u_{it} \quad (5)$$

where μ_i represents the fixed effects, ϕ_i is a coefficient on the lagged dependent variable, β_1 , β_2, β_3, and β_4 are coefficients on lagged explanatory variables, θ_{ij} is coefficient on lagged first-differences of dependent variable, and δ_{ij} , γ_{ij} , φ_{ij} , and σ_{ij} are coefficients on first-difference of explanatory variables and their lagged values. The model assumes that the disturbances u_{it} in the ARDL model has independently distributed across *i* and across *t* with zero mean and variance is positive ($\sigma^2_i > 0$). Further assuming that coefficients on first-difference of explanatory variables are less than zero therefore, there exists a long-run relationship between dependent and explanatory variables defined by:

$$Y_{it} = \omega_1 K_{it} + \omega_2 L_{it} + \omega_3 X_{it} + \omega_4 GS_{it} + \eta_{it} \quad (6)$$

where ω_1, ω_2, ω_3, and ω_4 as long-run coefficients, and η_{it} are stationary with possibly non-zero means (including fixed effects). Since equation (5) can be rewritten as:

$$\Delta Y_{it} = \emptyset_i \eta_{i,t-1} + \sum_{j=1}^{p-1} \theta_{ij} \Delta Y_{i,t-j} + \sum_{j=0}^{q-1} \delta_{ij} \Delta K_{i,t-j} + \sum_{j=0}^{r-1} \gamma_{ij} \Delta L_{i,t-j} + \sum_{j=0}^{s-1} \varphi_{ij} \Delta X_{i,t-j} + \sum_{j=0}^{v-1} \sigma_{ij} \Delta GS_{i,t-j} + \mu_i + u_{it} \quad (7)$$

where η_{t-1} is the error correction term given by equation (6), hence coefficients on first-difference of explanatory variables are the error correction coefficients for measuring the speed of adjustment towards the long-run equilibrium. As explained above, the PMG estimator allows the intercepts, short-run coefficients and short-run adjustment to be dependent on country/individual characteristics with meaning differ across groups, but the long-run coefficients are homogeneous across countries/individuals. However, the MG allows for heterogeneity of all the coefficients and gives the estimation of short-run and long run coefficients. The MG approach comprises of estimating regressions for all countries/individuals separately and computing averages of the countries/individual-specific coefficients. The comparison of PMG and MG is like a trade-off between consistency and efficiency. If the long-run coefficients are identical across individual/countries the PMG estimator will be consistent and efficient and the MG estimator will only be consistent. If the long-run coefficients are not identical across individual/countries the PMG estimator will be inconsistent and the MG estimator will provide a consistent estimation of the mean of long-run coefficients across individual/countries. The long-run homogeneity restrictions or presence of heterogeneity in

the means of the coefficients can be examined using Hausman test (Hausman, 1978) applied to the difference between the PMG and MG estimators of the long-run coefficients (Demetriades and Law, 2006).

4. Empirical Results

Using a panel of cross-country and time-series observations for a sample of seven countries from 1980-2012, the paper estimates both the short and long-run effects of government size on growth through the PMG estimator, introduced by Pesaran, Shin and Smith (1999).

Furthermore, in the current section, we discuss the estimated results using the PMG estimator and compare them with those using the MG and DFE estimators. In addition, Hausman test is applied to examine the difference between the MG and PMG estimators.

Before proceeding with the panel data analysis, for practical purposes, Pesaran and Shin (1999) recommend a two-step procedure, whereby the lag order of the ARDL is first selected using a consistent information criterion, and then the corresponding error-correction model is estimated and tested by standard methods. So, there are two important specification assumptions are that the regression residuals be serially uncorrelated and that the explanatory variables can be treated as strictly exogenous. We seek to accomplish these requirements by appropriately selecting the optimal lag order of the ARDL process in country sample (Calderon 2001). We use the Schwartz Bayesian Criterion (SBC) and Akaike Information Criterion (AIC) to determine the dynamic specification for each country, subject to a maximum of five lags for each of the four variables in the model. Orders of lags in the ARDL model are chosen ARDL (2,1,1,4) with least AIC and SBS value (1.64 and 1.59). Based on variables introduce in equation 6, government size with 2 lags, capital accumulation with 1 lag, labor force with 1 lag and export with 4 lags are allowed to vary across in ARDL model.

Table 3 presents the estimated results[4] including the long-and short-run parameters of the components of government size and other determinants on the real GDP per capita. Columns [1] through [3] report the estimated coefficients for the pooled error-correction model and their z-value including the four components of government spending: capital accumulation, labor force and export, respectively by mean group (MG), pooled mean group (PMG) and dynamic fixed effects (DFE) estimators. Both MG and PMG are structured as a two-equation model: the first equation encompasses the normalized cointegrating vector while the short-run dynamic coefficients are encapsulated in the second equation; however DFE is based on the assumption that coefficients of the cointegrating vector are the same across all panels (Blackburne III, Frank 2007). As noted earlier, the PMG estimator forces the long-run coefficients to be homogenous across countries in the sample but allows the short-run parameters to vary from country to country.

[4] Econometric software STATA 12.0 was used.

In addition, Hausman test is applied to examine the difference between the PMG and MG estimators. The Hausman test statistic for the entire model is positive under the null hypothesis of no difference between the PMG and MG estimates and thereby no *p*-values are calculated (Odawara 2011). Furthermore, the calculated Hausman test statistic (the null hypothesis of no difference between the PMG and MG estimators are not significantly different and PMG is more efficient) fails to reject the null hypothesis that long-run homogeneous relationship exists among countries in south East Asia. The calculated Hausman statistic is 33.05 and is distributed $\chi^2(2)$. Since both are consistent estimators, and the PMG is also the efficient estimator, we conclude that the PMG estimator under the null hypothesis is preferred and provided better estimates than mean group estimator. In other hand, the result of the test indicates that PMG estimator is more efficient than MG estimator in identifying the long-run relationship between government size and economic growth in the South East Asia group.

The first row of Table 3 reports the average estimates of the speed of adjustment and the short-run parameters. As required for dynamic stability, the coefficient on the error-correction term (i.e., the average of each country speed of adjustment) is negative and significant in all three exercises. The estimated speed of convergence, A, gives the average speed at which a country converges to the common steady-state income path. In addition, the estimated convergence speed indicates how fast the economies are approaching a group of "parallels" long-run growth paths so that the cross-economy income gaps can converge to some constant levels (Yao 2001). In addition, a related issue is how to consistently estimate the convergence parameter because the implied convergence speed has important policy implications.

The significance of the long-run coefficients and the error correction terms confirm the necessity of taking a long-run perspective when modeling economic growth positions and its subcomponents. The average error-correcting speed is surprisingly low: on average every year about 4 percent of the gap between the current and the long-run economics growth position is closed. The estimated speed of convergence, A, gives the average speed at which a country converges to the common steady-state income path. This confirms that the process towards the long-term equilibrium is quite slow to suggest a reasonable speed of adjustment to the long-run. It is also somewhat smaller in magnitude in the PMG than in the MG specification, in accordance with the theoretical prediction that pooling in the presence of heterogeneity tends to increase inertia (Robertson, Symons 1992).

Because of consistency and efficiency, we prefer on estimates of the PMG estimator with different long-run co-efficient restrictions. The results show significant variations depending on the estimation method used, from MG (the least restrictive, but potentially inefficient) to PMG, and to DFE. The sign of the different estimated coefficients does not change from the MG estimator to the PMG estimator (except for labor force and export), but the *z*-ratios are higher for the PMG estimates.

The coefficient of the government size is positive and significant but implies a rather high capital accumulation. In particular, for the ASEAN countries an increase of the share of government expenditure to GDP by 1% will lead economic growth to increase by 0.72%,

while following the same movement, capital formation over GDP will help growth to increase by 0.25%.

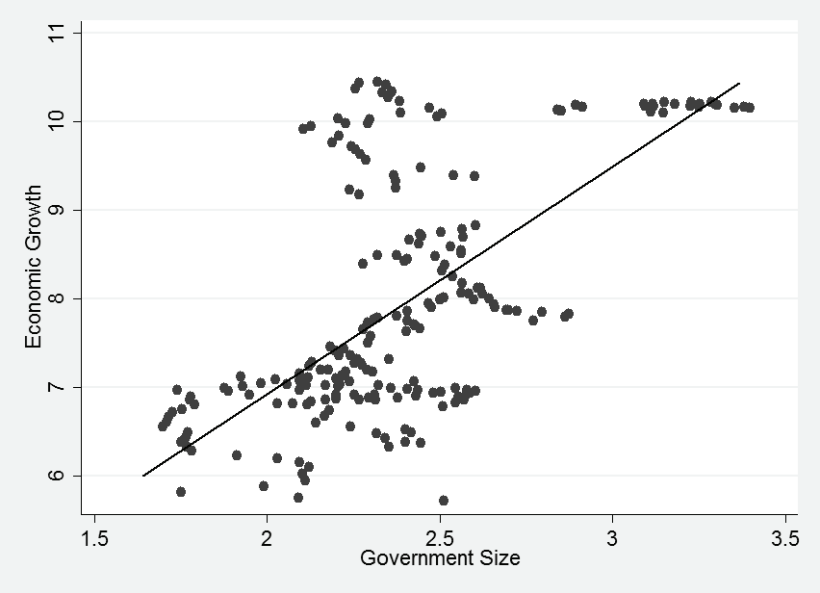
The coefficient of the labor force has the expected positive sign and becomes significant with PMG. However, the results show that capital accumulation and labor force has a strong positive relationship with economic growth (real GDP per capita) in the long-run, and the impacts are statistically significant, while its short-run capital coefficient is 0.09 and highly significant, but labor force become insignificant. It is possible to see that while an increase of one percentage point in labor participation rate increases growth by 2.34 percentage points in the ASEAN countries, an increase of one percentage point in share of export to GDP decreases growth by 2.34%.

However, its short -run effect differs across the components of explanatory variables. The results show that the short-run effect of government size on economic growth is not statistically significant. However, share of export over GDP has a significant impact of economic growth but sign change across the lag order.

In general, when the overall size of government is controlled in the growth model, either the long-run coefficients of spending variables or the error-correction terms are statistically significant, which suggests that there is long-run relationship between the government spending and real GDP per capita (see Fig. 2).

Figure 2

Long run relationship between government size and economic growth



Finally, as we can see from Column 2 and 4 of Table 3, the short and long- run estimates of explanatory variables are not significant (exclude for capital short run coefficient). Hence the MG estimator which produces totally different the intercepts, slope coefficients, and error variances across group and DFE, which impose homogeneity of all slope coefficients, allowing only the intercept to vary across countries are not useful for our empirical purpose.

Table 3

Baseline Estimates, one lag (2, 1, 1, 4)

Dep. Variable: log real GDP per capita	Pooled mean group (PMG)	Mean group(MG)	Hausman test	Dynamic fixed effects (DFE)
Error-correction coefficients:				
Phi	-0.04** (2.17)	-0.13*** (2.63)		-0.035** (2.18)
Long-run coefficient:				
Government size	0.72*** (2.54)	0.25 (1.06)	0.47	0.49 (0.77)
Capital accumulation	0.25** (2.13)	0.47 (1.29)	0.21	0.58 (1.50)
Labor force	2.34** (0.02)	-5.83 (1.40)	8.17	1.87 (0.98)
Export	1.39*** (9.84)	-0.03 (0.05)	1.42	0.58* (1.91)
Short-run coefficients:		Joint Hausman test:	33.05 0.00	
△ Government size (-1)	-0.13 (1.35)	-0.05 (0.57)		-0.14*** (2.88)
△ Government size (-2)	0.04 (0.88)	-0.003 (0.06)		0.015 (0.49)
△ Capital accumulation (-1)	0.09*** (2.84)	0.07*** (3.44)		0.10*** (6.15)
△ Labor force (-1)	-0.45 (1.23)	-1.03 (1.12)		0.003 (0.02)
△ Export (-1)	-0.23*** (2.74)	-0.04 (0.16)		-0.16** (2.32)
△ Export (-2)	0.32*** (2.7)	0.09 (0.35)		0.14 (1.24)
△ Export (-3)	-0.22*** (2.55)	-0.11 (0.71)		-0.09 (1.04)
△ Export (-4)	0.06*** (2.98)	0.04 (1.16)		0.02 (0.92)
No. of observations	183	183		183
No. of Countries	7	7		7

In the regression, all of variables are included as log (variable)
Numbers in brackets are the corresponding robust z statistics.
* significant at 10%; ** significant at 5%; *** significant at 1%

4.1. Robustness Analysis

The robustness of the association between the government size and the economic growth is inspected against the alternative method in this section utilizing the pooled OLS regression, fixed effect, random effect results related to the growth model. It needs to be underscored that consistent and fairly robust estimates related to the long-run structural relationship could be engendered by the PMG methodology.

The simple pooled estimator is at one extreme that models are the fully homogeneous-coefficient and all slope and intercept coefficients be equal across countries. On the other hand, pooled OLS pool all together into one dataset and imposing a common set of parameters across them.

Pooled regression may result in heterogeneity bias. Random effect model (REM) and fixed effect model (FEM) have accommodated such as heterogeneity; error is decomposed into two independent components: individual-specific effect, and it is time invariant. Random effects assume individual-specific effects are drawn independently from some probability distribution but fixed Effects assume individual-specific effects are constants. Table 4 shows the results of the static panel techniques, that is, pooled OLS, fixed effect, and random effect.

There are two basic tests that can help us make the right decision. The first of these tests is the Breuch-Pagan test, and it is used to discriminate between the pooled model and the random effect model. For Breusch and Pagan Lagrangian multiplier test, the calculated value exceeds the tabulated chi-squared value, leading us to conclude that the random effect model is more appropriate than OLS (pooled model). In other words, there are country-specific effects in the data. The first of these tests is the Hausman fixed test. The p-value for the test is > 5%, fail reject the null hypothesis: H_0: Cov (λ_i, x_{it}) = 0.This indicates that the fixed effects model is not appropriate and that the random effects specification is to be preferred. So, random effect regressions provide better estimates than fixed effect regression. Therefore, coefficient estimates of random effect regressions are relied on to elucidate the relationship between government size and economic growth in ASEAN.

An important feature of the result is that not all independent variables have expected signs; however, all variables in each group are statistically significant. The empirical inquiry reveals several noteworthy points. First, there is sufficient evidence indicating that capital accumulation, labor force and trade are vital factors influencing economic growth in the ASEAN. The empirical findings suggest that a 1-percent point increase in Gross capital formation over GDP increases real GDP per capita in South-East Asian countries by 0.16 percent, all else constant. In practical terms, a one percentage point increases in labor-force participation rate increases real GDP per capita by 3.05 percentage points while following the same movement, share of trade over GDP will help growth to increase by 0.82%.

Second, as for the main variable of interest, the empirical analysis reveals that there is negative effect of government size on economic growth in ASEAN. Similarly, a 1-percent point increase in government size reduces real GDP per capita in South-East Asian countries by 0.18 percent. As for the main variable of interest, the empirical analysis reveals that there is negative effect of government size on economic growth in ASEAN.

In addition, this model shows an exceptional explanatory power displayed by R^2 (0.23). This may give hesitation to the credibility of the dataset. However, the high R^2 can be explained by the completeness of the model. The explanatory variables used in the model include most important factors of economic growth theory.

Table 4

Alternative pooled estimates by pooled OLS, random effect, and fixed effect

Variable	Pooled OLS	Random Effect	Fixed Effect
Constant	0.23 (0.11)	-8.38*** (5.25)	-8.57*** (5.72)
Government size	1.83*** (15.25)	-0.18* (1.88)	-0.25*** (2.65)
Capital accumulation	-0.12 (0.90)	0.16*** (2.78)	0.17*** (3.00)
Labor force	-0.44 (1.03)	3.05*** (9.22)	3.15*** (9.98)
Export	1.39*** (22.58)	0.82*** (15.13)	0.79*** (15.37)
Breusch pagan LM test	0.001 Model is not Pooled		
Hausman test		0.68 Model is Random	
R^2(overall)	0.83	0.23	0.18
Wald test (*p*-value)	0.001	0.001	0.001
Countries/ observations	7/211	7/211	7/211

In the regression, all of variables are included as log (variable)
Numbers in brackets are the corresponding robust z statistics.
* significant at 10%; ** significant at 5%; *** significant at 1%

5. Concluding remarks

This paper illustrates the complexity to measure the impact of government expenditure on economic growth and highlights the discord on this concept in the academic field. Besides the extensive research on this concept for ASEAN countries, this study contributes to a greater understanding of government expenditure patterns in Asia. This research topic has important information for anticipating the speed and sustainability of the recovery process, as well as growth path of the economy. Achieving a more efficient allocation of government resources would not only speed the recovery but also improve the economy's long-term performance (Odawara 2011).

The purpose of the paper was to analyze the impact of government expenditure on economic growth for Brunei Darussalam, Indonesia, Malaysia, the Philippine, Singapore, Thailand and Vietnam by covering the period from 1980 to 2012. This is achieved by applying the pooled mean group model. In addition, three other macroeconomic variables are included in the economic growth model; capital accumulation, labor force and export.

The empirical findings demonstrate a significant positive impact of government expenditure on s on real GDP per capita in the long run. In particular, a percentage point

increase in the share of government expenditure over GDP would increase real GDP per capita by 0.72%. The significant positive relation between government expenditure on economic development and GDP is in line with the theory. The evidence in this paper suggests that government expenditure indeed has a significant influence on economic growth in the long run in ASEAN. Therefore, government expenditure is a crucial component of fiscal policy to achieve economic objectives. 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. On the one hand, it could be due to a failure of government spending i.e. lack of prioritization of government projects, weak budget preparation, crowding out effect, and inefficient financial planning processing.

Estimate of the average speed of convergence is approximately 0.04% per annum, which shows that the average error-correcting speed at which a country converges to the common steady-state income path extremely slow.

The results leave some further questions open for future research. First, future research should looking evidence of the existence of a "turning point" in the nonlinear relationship between the level of government spending and real economic activity and that of an optimal size for government. Second, there is also the need to investigate the impacts of different components of government spending on economic activity on a panel dataset including East Asian countries for the 1970-2012 periods. Finally, there is also the need to include in the analysis the quality dimension of human capital investments and technical progress.

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