

# DOES PUBLIC EXPENDITURE PROMOTE ECONOMIC GROWTH IN ASEAN-8? EMPIRICAL EVIDENCE FROM PANEL QUANTILE REGRESSION ANALYSIS

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## ABSTRACT

*Most economists argue that public expenditure is non-productive spending, so an increase in public expenditure can hamper economic growth. Does an increase in public expenditure promote economic growth in Asean countries? To answer this research question, the empirically examines the effect of public expenditure on economic growth for a balanced panel data of 8 Asean countries (Asean-8) over the period 2000 – 2019 by the panel quantile regression analysis. The robustness of estimates is tested by the FE-IV estimator. The estimated results show that public expenditure promotes economic growth in Asean-8. In addition, domestic investment and infrastructure also stimulate economic growth in these countries. The findings in this study provide some crucial policy implications for governments in Asean-8 in managing and supervising public expenditure to serve for economic development and growth.*

**Keywords:** Public Expenditure, Economic Growth, Asean-8, Panel Quantile Regression, Fe-Iv Estimator.

**JEL code:** H50; C22

## INTRODUCTION

Public spending has an important role in the economic development of the country. It will contribute to changing in appearance of the country, attracting foreign attention and transforming the economic structure, therefor promoting economic growth.

However, until now, public spending is still a matter of concern for governments and economists. Therefore, the study analyzes the impact of public spending on economic growth in ASEAN-8 from 2000 to 2019 and will clarify the question of whether public spending in these countries promotes economic growth or not. The research results will be part of the basis for countries to make plans for public spending in the next stages.

To clarify the issue raised, in addition to the introduction, the article includes section 2 which summarizes previous studies, section 3 is research methods and data, section 4 presents research results and section 5 is conclusions and policy implications.

## LITERATURE REVIEW

Ugwuanyi & Ogwunta (2017), “Fiscal Policy and Economic Growth: An Examination of Selected Countries in Sub-Saharan Africa” examined the impact of fiscal policy variables on economic growth in sub-Saharan Africa. Secondary data were collected from sub-Saharan African countries and studied using the FEM estimation method. The results showed that market-adjusted government expenditures had a significant impact on the economic growth of sub-Saharan African countries.

Karagoz & Keskin (2016), “Impact of Fiscal Policy on the Macroeconomic Aggregates in Turkey: Evidence from BVAR Model”, studied to find out the impact of fiscal policy on the overall macroeconomic in Turkey. The authors used Bayesian Vector Autoregression (BVAR) technique. After analyzing the data sample for the period 2003 – 2015, the study found that government spending and revenue had limited impact on macroeconomic variables, including GDP, inflation, stock market indexes, foreign debt and interest rates.

Anthony Igwe, Edeh Chukwudi Emmanuel & Wilfred I. Ukpere (2015), “Impact of fiscal policy variables on economic growth in Nigeria (1970-2012): a managerial economics perspective” has studied the impact of public expenditure on economic growth through the components of public spending. The study was carried out in Nigeria for the period 1970-2012 and used Johansen and VECM co-integrated analytical methods. The results showed that investment spending and recurrent expenditure had a positive impact on economic growth in the long run. A 1% increase in capital expenditure leads to a 3.94% increase in income and a 1% increase in recurrent expenditure leads to a 3.22% increase in income.

Macek & Janků (2015), “The impact of fiscal policy on economic growth depending on institutional conditions”, examined the impact of government spending on economic growth through studying the impact of fiscal policy on economic growth according to each institutional condition in OECD countries in the period 2000-2012. The analysis is based on the methods and tests of the OLS panel regression. The analysis results showed that, in the case of government spending, there were (1) a positive effect on economic growth in countries with less fiscal transparency; (2) negative effects on economic growth in countries with higher levels of fiscal transparency. In underdeveloped countries, the share of spending on growth is higher than in total government spending. In contrast, in developed countries, Wagner's law is valid for the existence of welfare costs. In the case of tax effects on economic growth, it can be seen that (3) negative tax effects are more harmful to economic growth in countries with poorer institutional conditions. This result can be explained by different fiscal transparency and different levels of economic development.

Dimitrios Paparas & Christian Richter (2015), “Fiscal policy and economic growth, empirical evidence in European Union, Turkish economic review”. This study, conducted in 15 countries of the European Union, shows that the components of public spending have different effects on economic growth. Spending on human resources and spending on defense and security negatively affects economic growth, while spending on infrastructure development has a positive impact on economic growth.

Tran Thi Tuan Anh (2015), “Relation between Government spending and economic growth: Empirical evidence in ASEAN” using regression models, FEM, REM, FGLS to test the relationship between Government spending and economic growth in ASEAN countries in the period 1987 - 2013: Indonesia, Cambodia, Malaysia, Philippines, Singapore, Thailand, Vietnam resulted in: Government spending, capital and labor have positive impact, actually contributing to economic growth significantly. The trade balance has a weak impact on GDP.

Dao Thi Bich Thuy (2014), "The impact of government consumption expenditure on economic growth: The case of ASEAN-5 in the period 1990 - 2012", regression analysis on the basis of economic growth model. Ram (1986) for the ASEAN-5 group including Indonesia, Malaysia, the Philippines, Thailand and Vietnam in the period 1990 - 2012 has shown: Government consumption spending has a positive impact on economic growth because goods and services

provided by the government have a significant positive externality on private sector output. The results showed that, in the period 1990 - 2012, the government's consumption expenditure had a positive impact on economic growth and thus contributed to the economic growth rate of the group of countries ASEAN-5 in this period. The model has shown the importance of government spending size as a determinant of the impact of government spending on economic growth.

Cooray (2009), “Government Expenditure, Governance and Economic Growth”. This study evaluated the role of government in economic growth based on classical expansion of the production function by considering two dimensions of government namely the size of public expenditure and the quality of government, or also known as a public institution. The study was conducted with data from 71 countries around the world. Empirical research results showed that both the size of public spending and public institutions have positive effects on economic growth.

Sanjeev Gupta et al., (2005), “Rebuilding fiscal institutions in post conflict countries” show that, in the long term and short term, prudential re-consolidation of public spending is not harmful to the economy in low-income countries. The authors also elucidate the relationship between fiscal reform, state budget expenditure composition and economic growth in low-income countries. This study shows a clear relationship between budget reform and per capita growth, consistent with previous studies in the document on industrial countries. The results show that a decrease in the state budget deficit/GDP leads to an increase in per capita growth of 0.5 percentage both in the long term and the short term. This implies that reducing the average deficit in low-income countries from about 4% of GDP to 2% of GDP could increase per capita income by about 1-2 percentage per year. This study also shows that structural reform of public spending has an impact on promoting growth, it is necessary to focus on high-performing expenditures. Fiscal consolidation achieved through selective spending cuts will stimulate growth rather than relying on tax increases and reductions in all spending. This result is also consistent with the findings of industrialized countries. According to the results of the authors' analysis, it is necessary to maintain investment expenditures because these expenditures will lead to higher growth in the long run. Cutting state budget recurrent expenditures, especially wages, has no effect on economic growth.

Shantayanan Devarajan, Vinaya Swaroop & Heng-fu Zou (1996), “The composition of public expenditure and economic growth, *Journal of Monetary Economics*”, the study took a database from 43 developing countries on the influence of the spending-to-growth structure also offers some notable conclusions. All the standard factors for spending to promote production such as investment spending, transportation and communication spending, health care and education expenditure have negative or insignificant relationship with economic growth. However, these results are not surprising compared with theoretical models. State budget spending on manufacturing industries can be inefficient if spending exceeds a certain threshold. The authors' empirical results show that the governments of developing countries are incorrectly allocating the structure of public spending when investment spending is too much, but recurrent expenditures (maintenance) are too low. While developed countries have been doing the opposite. Therefore, increasing some components of recurrent expenditure such as maintenance and repair expenditures may have a better impact than new investment expenditures.

In general, there have been many domestic and foreign studies on the impact of public spending on economic growth. However, studies still come to many inconsistent results about this effect. Several studies show a positive linear effect of public spending on economic growth. On the other hand, some studies show that public spending has a negative effect on economic growth.

## METHODOLOGY AND RESEARCH DATA

### METHODOLOGY

To examine the effect of public expenditure on economic growth in Asean-8 over the period 2000 – 2019, the study applies the panel quantile regression analysis. This analysis addresses the study to focus on the entire conditional distribution of economic growth and investigate the effect of public expenditure on economic growth. Noticeably, some related research uses panel data models based on conditional mean regression. The heterogeneity in such models is often not paid attention to. Ignoring this heterogeneity in panel data models may result in bias in estimates. The seminal work developed by Koenker & Bassett Jr (1978) suggested the quantile regression analysis. In comparison with the conditional mean regression, this analysis can lead to more robust estimation results (Koenker & Bassett Jr, 1978). So, the empirical equation in this study is defined as follows:

$$GDP_{it} = \beta_0 + \beta_1 EXP_{it} + X_{it}\beta' + \varepsilon_{it} \quad (1)$$

where subscript  $t$  and  $i$  are the time and country index, respectively.  $GDP_{it}$  is economic growth;  $X_{it}$  is a set of control variables such as domestic investment, inflation, and infrastructure;  $\varepsilon_{it}$  is the error term;  $\beta_0$ ,  $\beta_1$ , and  $\beta'$  are estimated coefficients. Based on the literature review, control variables are selected to use in the empirical equation as follows: domestic investment (Olaoye et al., 2020), inflation (Loizides & Vamvoukas, 2005; Olaoye et al., 2020), and infrastructure (Nketiah-Amponsah, 2009).

In regards to the fixed effects panel quantile regression analysis, the econometric model is presented as

$$H_{y_{it}}(\tau|X_{it}) = X'_{it}\beta(\tau), i = \overline{1, n}, t = \overline{1, T} \quad (2)$$

where  $H_{y_{it}}(\tau|X_{it})$  is the conditional  $\tau$ -quantile of  $y_{it}$  given  $X_{it}$ ;  $\alpha_i(\tau)$  and  $\beta(\tau)$  are conditional on  $\tau$ . The main challenge in this analysis is the random parameters problem originated from the substantial amount of fixed effects (Koenker, 2004; Lamarche, 2010; Galvao, 2011). One reason for literature on the panel quantile regression analysis is impossible to deal with unobserved fixed effects in the quantile regression model. Koenker (2004) recommended a suitable solution to handle these problems. Accordingly, the fixed effects estimator is applied to decrease a weighted sum of  $K$  ordinary quantile regression objective functions corresponding to  $K$  values of  $\tau$ . The slope coefficients of objective function and coefficients of fixed effects are assigned to be dependent and independent with  $\tau$  respectively. A penalty term penalizes the coefficients of fixed effects to decrease them to zero. The parameters are estimated as follows

$$\min_{(\alpha, \beta)} \sum_{k=1}^K \sum_{i=1}^N \sum_{t=1}^T \psi_k \chi_{\tau_k} (y_{it} - \alpha_{it} - X_{it}^T \beta(\tau_k)) + \phi \sum_{i=1}^N |\alpha_i| \quad (3)$$

where  $k$ ,  $i$ , and  $t$  are the quantile, country and time index, respectively;  $X$  is the matrix of independent variables,  $\chi_{\tau_k}$  is the quantile loss function, and  $\psi_k$  is the weight corresponding to  $k$ th quantile. In this study, equally-weighted quantiles are applied based on the recommendation by Lamarche (2010). The penalty parameter improves the estimates by decreasing individual effects to zero.

## RESEARCH DATA

The variables are real GDP per capita, public expenditure, domestic investment, inflation, and infrastructure. Except for public expenditure, all remaining variables are taken from the World Bank World Development Indicators (WDI). Public expenditure is extracted from International Monetary Fund (IMF). The research sample contains 8 Asean countries such as Cambodia, Indonesia, Lao, Malaysia, Myanmar, Philippines, Thailand, and Vietnam.

Table 1 and Table 2 present the definition and descriptive statistics of the data. From these data, the variables in the empirical equation are defined as follows:

- Economic growth (GDP): Real GDP per capita (constant 2010 US\$) (logarithm)
- Public expenditure (EXP): General government total expenditure (% GDP)
- Domestic investment (INV): Gross fixed capital formation (% GDP)
- Inflation (INF): Inflation, consumer prices (annual %)
- Infrastructure (TEL): Fixed telephone subscriptions per 100 people (logarithm)

Meanwhile, the matrix of correlation coefficients is shown in Table 3. The correlation coefficients indicate that public expenditure, domestic investment, and infrastructure are positively associated with economic growth while inflation negatively at 1% level of significance. In addition, the correlation coefficients between independent variables are lower than 0.8, which eliminates the collinearity between them. So, the study uses all selected variables in the empirical model.

<b>Table 1 DATA DESCRIPTION</b>		
<b>Variable</b>	<b>Definition</b>	<b>Source</b>
Real GDP per capita	Real GDP per capita (constant 2010 US\$)	World Bank
Public expenditure	General government total expenditure	International Monetary Fund
Domestic investment	Gross fixed capital formation	World Bank
Inflation	Inflation, consumer prices (annual %)	World Bank
Infrastructure	Fixed telephone subscriptions per 100 people	World Bank

<b>Table 2 DESCRIPTIVE STATISTICS</b>					
Variable	Obs	Mean	Std. Dev.	Min	Max
GDP	160	2991.33	2840.318	342.14	12486.68
EXP	160	20.108	3.785	12.332	30.889
INV	160	24.391	5.478	13.415	35.106
INF	160	5.679	7.238	-1.710	57.074
TEL	160	7.157	6.347	0.190	23.566

<b>Table 3 THE MATRIX OF CORRELATION COEFFICIENTS</b>					
	GDP	EXP	INV	INF	TEL
GDP	1				
EXP	0.574***	1			
INV	0.194***	0.210***	1		
INF	-0.389***	-0.374***	-0.219***	1	
TEL	0.754***	0.615***	0.361***	-0.276***	1
<i>Note: ***, **, and * denote significance at 1 percent, 5 percent and 10 percent respectively.</i>					

## EMPIRICAL RESULTS AND DISCUSSION

### MAIN RESULTS

The estimated results by panel quantile regression analysis are shown in Table 4. In the table, 10th, 20th, 30th, 40th, 50th, 60th, 70th, 80th, and 90th percentiles are applied for analysis. The results across all quantiles indicate that public expenditure promotes economic growth. Besides, domestic investment and infrastructure also stimulate economic growth. In particular, the estimated coefficients across the quantiles do not vary much.

The positive effect of public expenditure on economic growth can be found in Kolluri et al., (2000); Loizides & Vamvoukas (2005); Liu et al., (2008); Cooray (2009); Nketiah-Amponsah (2009); Wu et al., (2010); Ono (2014); Odhiambo (2015); Amusa & Oyinlola (2019); Olaoye et al., (2020). An increase in public expenditure in healthcare and education will help improve human capital to serve economic development, so contributing to economic growth. Especially, neoclassical economists argue that increasing government spending during times of economic downturn will increase aggregate demand and domestic consumption, thus helping to prevent economic crises and promote economic development. However, since public spending is largely non-productive expenses, it is necessary to limit spending on salary payments for public officials and national defense and security to save capital for development investment. It also helps the government to limit the budget deficit and avoid increasing public debt.

Meanwhile, an increase in domestic investment will create job opportunities for workers and stimulate consumption, thus contributing to economic growth. Olaoye et al., (2020) indicate that promoting domestic investment through creating favorable conditions such as loans, administrative procedures, ... will encourage businesses to expand production and consumption of domestic products. Similarly, the development of infrastructure in sectors such as bridges, telecommunications, electricity and water, seaports, railways will encourage and promote economic activities of the private sector by reducing transaction costs and increasing the profitability of businesses. The development of infrastructure has facilitated an increase in private sector investment through the expansion of production and product distribution.

**Table 4**  
**PUBLIC EXPENDITURE AND ECONOMIC GROWTH: PANEL QUANTILE REGRESSION ANALYSIS**  
**DEPENDENT VARIABLE: ECONOMIC GROWTH (GDP)**

Variables	Quantiles								
	10th	20th	30th	40th	50th	60th	70th	80th	90th
EXP	2.966*** (1.536)	2.918*** (1.113)	2.891*** (0.936)	2.871*** (0.856)	2.853*** (0.834)	2.825*** (0.901)	2.790*** (1.119)	2.752*** (1.452)	2.742*** (1.729)
INV	3.255*** (0.992)	2.974*** (0.722)	2.9816*** (0.608)	2.698*** (0.555)	2.591*** (0.544)	2.426*** (0.587)	2.220*** (0.728)	1.995*** (0.939)	1.829*** (1.114)
INF	0.213 (0.608)	-0.073 (0.446)	-0.235 (0.377)	-0.355 (0.343)	-0.465 (0.340)	-0.634* (0.366)	-0.844* (0.452)	-1.074* (0.578)	-1.243* (0.682)
TEL	0.142*** (0.052)	0.122*** (0.038)	0.111*** (0.032)	0.102*** (0.029)	0.0952*** (0.029)	0.083*** (0.031)	0.068* (0.038)	0.052 (0.049)	0.040 (0.059)

Note: \*\*\*, \*\*, and \* denote significance at 1 percent, 5 percent and 10 percent respectively.

## ROBUSTNESS CHECK

To check the robustness of estimates, the FE-IV estimator is applied to estimate (1). The FE-IV estimator is the instrumental variable regression for panel data with fixed effects that can handle the endogenous phenomena in the empirical model (Baum et al., 2003). Some variables in and out of the model can be used as instruments. The Sargan test is used to assess the validity of instruments in the FE-IV estimator.

The corresponding results across all models are presented in Table 5. Completely consistent with those in the panel quantile regression analysis, the results by FE-IV show that public expenditure promotes economic growth. Similarly, domestic investment and infrastructure positively affect economic growth. In addition, the estimated results by FE-IV estimator show that inflation has a negative impact on economic growth.

<b>Table 5</b> <b>PUBLIC EXPENDITURE AND ECONOMIC GROWTH: FE-IV ESTIMATOR</b> <b>DEPENDENT VARIABLE: ECONOMIC GROWTH (GDP)</b>	
<b>Variables</b>	<b>Coefficients</b>
EXP	2.738*** (0.787)
INV	2.074*** (0.472)
INF	-1.005*** (0.322)
TEL	0.078*** (0.031)
Observation	152
Sargan test	0.4479
<i>Note: ***, **, and * denote significance at 1 percent, 5 percent and 10 percent respectively</i>	

## CONCLUSION AND POLICY IMPLICATIONS

Motivated from the view of most economists that public expenditure can be detrimental to economic development and growth, the study uses the panel quantile regression analysis to empirically examine the effect of public expenditure on economic growth for a balanced panel data of 8 Asean countries from 2000 to 2019. The robustness of estimates is tested by the FE-IV estimator. The results show that public expenditure stimulates economic growth in these countries. In addition, domestic investment and infrastructure also are positive determinants of economic growth.

The findings in this study provide some important policy implications for governments in Asean-8 in the implementation of policies and regulations relating to public expenditure and economic growth. Accordingly, governments in Asean-8 should implement policies as follows:

1. Increase public expenditure in sectors such as healthcare and education because it significantly contributes to developing the human capital. In particular, public expenditure on salary payments to maintain the bureaucracy should be limited to avoid fiscal deficits.

2. Encourage and promote an increase in domestic investment, especially private sector investment, to create more jobs and contribute to economic growth.
3. Developing infrastructures such as bridges, telecommunications, electricity and water, seaports, railways, ... to facilitate economic activities, contributing to economic growth and development.

Future related research should examine the effects of public expenditure by sector on economic growth. In particular, governance should be introduced into the public expenditure – economic growth because governance plays a crucial role in this relationship.

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