The Relation between Government Expenditures and Economic Growth in Thailand

Jiranyakul, Komain

National Institute of Development Administration

January 2007

Working Paper (January 2007)

The Relation between Government Expenditures and Economic Growth in Thailand

Komain Jiranyakul
School of Development Economics
National Institute of Development Administration
Bangkok, 10240, Thailand

Abstract:

The notion that more government expenditures can stimulate growth is controversial. The causation between government expenditures and economic growth in Thailand is examined using the Granger causality test. There is no cointegration between government expenditures and economic growth. A unidirectional causality from government expenditures to economic growth exists. However, the causality from economic growth to government expenditures is not observed. Additionally, estimation results from the least square method with lagged variables of economic growth, government expenditures and money supply show the strong positive impact of government spending on economic growth during the period of investigation.

JEL Classification: H50; N15; O23
Keywords: Economic growth, Government expenditures, Granger causality test, Least Square Estimation

The Relation between Government Expenditures and Economic Growth in Thailand

1. Introduction

According to the macroeconomic literature, budget deficits are expansionary to the economy while budget surpluses are contractionary. However, the notion that more government expenditures can stimulate growth is controversial. When considering the appropriate policy measures that stimulate growth, policymakers are usually interested in demand management policies and supply side policies. Demand management policies concentrate on the management of money supply and government expenditures. Controlling money supply will affect the level of liquidity in the financial market, and thus alters private spending. A change in level of government spending directly affects aggregate demand in the economy.

Besides the role of export on economic growth, the economic success of the Newly Industrialized countries (NICs) in East Asia has been often attributed to the role of government. Thailand has strived to achieve an NIC status. However, that goal is still far reaching. The Thai government has realized that fiscal stimulation is deemed necessary in stabilization policy and economic development. As a result, the chronic budget deficits were observed from the past up to 1987. The policy has been revised in response to the changing economic conditions. From 1988 to 1996, the budget became surplus. The budget deficit occurred in 1997, the year of financial crisis, and continued through 2000. The nominal government expenditures have been steadily increased until present.

In earlier empirical studies, Ram (1986), Holmes and Hutton (1990) and Aschauer (1989) find positive relationship between government expenditures and growth. On the contrary, Grier and Tullock (1989) use pooled regression on five-year averaged data in 113 countries to analyze the relationship between cross-country growth and various macroeconomic variables. They find that the mean growth of government share of GDP generally has a negative impact on economic growth. This finding implies that an increase in the government size as measured by a share of government expenditures to GDP hampers economic growth. Barro (1990) also discovers the negative relationship between the size of government and economic growth. Miller and Russek (1997) indicate that debt-financed increases in government expenditure retarded growth. Using the data from 43 developing countries over 20 years, Devarajan et al. (1996) find the positive relationship between current government expenditure and growth existed. In addition, the negative relationship between capital expenditure and per-capita growth was also observed.

Recent studies employed cointegration and error correction models to study the relationship between government size and growth. Islam and Nazemzadeh (2001) examine the causal relationship between government size and economic growth using long annual data of the United States. They indicated that the causal linkage was running from economic growth to relative government size. However, Dahurah and Sampath (2001) find no common causal relationship between military spending and growth in 62 countries. Abu-Bader and Abu-Qarn (2003) investigate the causal relationship between government expenditures and economic growth for Egypt, Israel, and Syria and find that overall government expenditures and growth exhibit bidirectional causality with a negative long-run relationship in Israel and Syria, and a unidirectional negative short-run causality from economic growth to government spending in Egypt. These findings might stem from military burden in these countries. Kalyoncu and Yucel (2006) using cointegration and casuality test to investigate the relationship between defense and economic growth in Turkey and Greece. The results show that unidirectional causality running from economic growth to defense expenditure in Turkey, but not in Greece. However, cointegration between defense expenditure and growth exist in both countries.

This paper attempts to explore the impact of government expenditures on the growth rate of real GDP in Thailand. Section 2 presents the methodology used in the analysis. Section 3 presents empirical results, and the last section gives conclusions.

2. Methodology

The quarterly data on aggregate real output or real GDP (Y), real government expenditures (G), real money supply by broad definition (M2), which is the sum of M1 and quasi-money, during 1993 to 2004 are retrieved from the International Monetary Fund's International Financial Statistics and Thailand National Economic and Social Development Board. The data are analyzed according to the following estimation procedures:

2.1 Unit Root Test

The unit root test of stationarity of time series data is determined prior to cointegration and causality tests. The unit root test for stationarity of time series called PP test proposed by Phillips and Perron (1988) is employed. This test determines the existence of a unit root of each series. The series are examined whether they are stationary or integrated of the same order. If the two variables are non-stationary in level, but stationary in first differences i.e. I(1), cointegration test can be performed. The theory of cointegration is discussed in details by Engle and Granger (1987). In brief, cointegration determines if the linear combination of these variables is stationary. The series are cointegrated or have a long-run relationship if there exists a linear combination of these series. Davidson and MacKinnon (1993) provide the critical values for unit root and cointegration tests. If there are more than two variables in the equation, Johansen cointegration test proposed by Johansen and Juselius (1990) will be appropriate. In case cointegration does not exist, unit root tests are also helpful in using causality test. Hafer and Kutan (1977) indicate that to suitably perform the standard Granger causality test, the variables that enter into the system should be stationary even though they are integrated of different order. In addition, using the ordinary least square method also require stationary variables in the estimated equation as mentioned by the literature of time series model.

2.2 Granger Causality Test

The Granger causality test is performed by the following two equations:

$$x_t = \alpha_0 + \sum_{i=1}^{k} \alpha_i y_{t-i} + \sum_{i=1}^{k} \beta_i x_{t-i} + \varepsilon_t \quad (1)$$

and

$$y_t = \gamma_0 + \sum_{i=1}^{k} \gamma_i x_{t-i} + \sum_{i=1}^{k} \delta_i y_{t-i} + \nu_t \quad (2)$$

In Eq. (1) $H_O : \alpha_i = 0$ for i = 1, 2, ...k, and $H_a : \alpha_i \neq 0$ for at least one *i*. For Eq. (2) $H_O : \gamma_i = 0$ for i = 1, 2, …., k, and $H_a : \gamma_i \neq 0$ for at least one *i.* The variable *x* Granger causes variable *y* if the null hypothesis (H_o) in Eq. (1) is rejected. Similarly, the variable *y* Granger causes variable *x* if the null hypothesis in Eq. (2) is rejected.

The standard Granger causality test developed by Granger (1969, 1980) is popularly used to test whether past changes in one variable help explain current changes in other variables. Equation (1) is used to test whether *y* Granger causes *x* while equation (2) is used to test whether *x* Granger causes *y*. The bivariate Granger causality test requires that two variables used in the test must be stationary even though they are not integrated of the same order. However, various economic variables are non-stationary in level. The causality test can be applied even when one variable is stationary in level while the other is stationary in different order. For example, *x* is stationary in level while *y* is stationary in first differences. The more sophisticated test of causality is the test within the framework of cointegration and error-correction mechanism. This framework considers the possibility that the long-run relationship of the two variables exists when the lags of one variable affect another variable (see Islam and Nazemzadeh, 2001).

2.3 Least Square Method

The simple lag-adjustment equation with distributed lags of independent variables is used to examine the impacts of government expenditures and money supply on output growth, which is

$$y_t = a_0 + a_1 y_{t-1} + \sum_{i=0}^{k} \alpha_i G_{t-i} + \sum_{i=0}^{k} \beta_i M_{t-i} + e_t \qquad (3)$$

where *y* is the growth rate which is the first difference of log of real GDP, *G* is log of real government expenditures, *M* is log of real money supply by broad definition (M2), and *e* is the error term.

3. Empirical Results

3.1. Results of Unit Root Tests

The PP test for unit root in Table 1 reveals that the null hypothesis of unit root in level, with and without trend, is rejected for government expenditures (*G*) at the 1 percent level of significance. Therefore, the variable *G* is stationary. The probability of accepting the null hypothesis of unit root in Table 1 implies that real GDP (*Y*) is non-stationary in level. Its first difference or the growth rate *(ΔG)* is stationary at the 1 percent level of significance. Real money supply (*M2*) without a linear trend is stationary. However, its first difference or the real money growth *(ΔM2)* with and without linear trend is stationary. As a result, *M2* and *Y* are I(1) while *G* is I(0). Cointegration exists when two variables are I(1). That is they are nonstationary in level but stationary in first difference.

Table 1 Results of Test for Unit Root

Variables	PP Statistic	
	Without Trend	With Trend
Real Government Expenditures (*G*)	-4.357 [2]	-9.267 [28]
	(0.001)	(0.000)
Real Money Supply (*M2*)	-5.513 [17]	-1.015 [46]
	(0.022)	(0.917)
Real GDP (*Y*)	-1.509 [28]	-2.424 [10]
	(0.520)	(0.363)
Growth Rate (*y*)	-6.054 [23]	-5.911 [23]
	(0.000)	(0.000)

Note: The number in bracket is the optimal bandwidth determined by Newey-West using Bartlett Kernel. The number in parenthesis is the probability of accepting the null hypothesis of unit root provided by MacKinnon (1996).

The results from unit root test tell us that the two-step Engle and Granger cointegration test between the two variables, *G* and *Y*, cannot be performed.

3.2 Results of Causality Test

With no long-run relationship between government expenditures (*G*) and economic growth (*y*), the standard Granger causality test is performed using *G* variable at level and first difference of *Y* variable. The optimal lag length for the causality test is determined by a vector autoregressive (VAR) form. When *G* and *y* are endogenous variables in an unrestricted VAR, the optimal lag length using Akaike information criterion (AIC) is four. The standard Granger causality test results between government expenditure and growth rate are reported in Table 2. The null hypothesis of government spending (*G*) does not Granger cause economic growth (*y*) is rejected at the 1 percent level of significance. Thus, unidirectional causality from government expenditures (*G*) to economic growth (*y*) exists. On the contrary, the causality from economic growth to government expenditures is not observed because the null hypothesis of economic growth (y) does not Granger cause government expenditures (G) is accepted. This supports the Keynesian view which stipulates that causation runs from government expenditures to growth.

Table 2 Results of Causality Test

Direction of Causation	F Statistic	P-value
H_o: G does not cause y	4.867	0.004
H_o: y does not cause G	0.244	0.911

Note: The null hypothesis is rejected for G does not cause y (growth rate).

The PP test shows that log of real money supply (M) is stationary without trend (-5.135, p=0.000) with the bandwidth of 17, but is non-stationary with trend (-1.015, p=0.917) with the bandwidth of 46. The variable M is I(0) around its level. Taking into account of stationarity property of y, G and M, cointegration will not exist since the three variables are not integrated of different order (only y is I(1)). Therefore, we perform standard Granger causality test between real money supply and growth. The result from Granger causality test shows that real money supply (M) does not cause economic growth (y) with F=1.107, and the probability of accepting the null hypothesis of no causality, p=0.369. However, economic growth (y) causes real money supply (M) to increase at the 5% level of significance (F=2.696, p=0.047). This implies that economic growth causes the central bank to accommodate the liquidity in the economy.

3.3. Results of Least Square Estimation

Since all variables are stationary, the estimated result from equation (3) is

$$y_t = 0.081 + 0.314^{***}y_{t-1} + 0.143^{***}G_t + 0.264^{***}G_{t-1} + 0.324^{*}M_t - 0.549^{***}M_{t-1}$$

$R^2 = 0.599$, F= 11.934, D-W = 1.853
*** denotes significance at the 1% level.
* denotes significance at the 10% level.

The results show that real output growth is affected by its lag value, real government expenditures and real money supply. However, one period lag of real money supply imposes a strong negative effect on output growth. The significant positive effect of real government expenditures on growth is obvious. Overall net impact is 0.496. This implies that the negative impact of lag real money supply is offset by the positive impact of log output growth and real government expenditures and real money supply itself.

4. Conclusions

The main objective of this study is to examine the relationship between government expenditures and economic growth. Several researchers use Granger causality test to see whether government expenditures cause economic growth or economic growth causes government expenditures. However, empirical results give different conclusions. The main results show that aggregate government expenditures cause economic growth, but economic growth does not cause government expenditures to expand. Therefore, there is a unidirectional causality between government expenditures and economic growth. Further investigation using the least square method shows that government spending and its one-period lag variable impose a highly significant impact on economic growth which confirms the results from causality test.

The limitation of this study is that the disaggregate data, military spending and non-military spending, are not available such that comparison between the impacts of military and non-military expenditures is not possible. However, the results from this study are able to confirm the positive impact of government expenditures on economic growth. The results thus support the Keynesian approach which stipulates that causality runs from government spending to economic growth.

References

Abu-Bader, S. and Abu-Qarn, A. S. (2003), "Government Expenditures, Military Spending and Economic Growth: Causality Evidence from Egypt, Israel, and Syria," **Journal of Policy Modelling**, Vol. 25, pp. 567-583.

Aschauer, D. A., (1989), "Is Public Expenditure Productive?" **Journal of Monetary Economics**, Vol. 23, pp. 177-200.

Barro, R. J., (1990), "Government Spending in a Simple Model of Endogenous Growth," **Journal of Political Economy**, Vol. 98, pp. s103-s125.

Dahurah, D. S., and Sampath, R. (2001), "Defense Spending and Economic Growth in Developing Countries: A Causality Analysis," **Journal of Policy Modeling**, Vol. 23, pp. 651-658.

Davidson, R., and MacKinnon, J. G. (1993), **Estimation and Inference in Econometrics**, Oxford: Oxford University Press.

Devarajan, S., Swaroop, P., and Zou, H. (1996), "The Composition of Public Expenditure and Economic Growth," **Journal of Monetary Economics**, Vol. 37, pp. 313-344.

Engle, R. F. and Granger, C. W. J. (1987), "Cointegration and Error Correction: Representation, Estimation, and Testing." **Econometrica**, Vol. 55, pp. 251-76.

Granger, C. W. J., (1969), "Investigating Causal Relations by Econometric Models and Cross-Spectral Methods," **Econometrica**, Vol. 37, pp. 424-438.

Granger, C. W. J., (1980), "Testing for Causality," **Journal of Economic Dynamic and Control**, Vol. 4, pp. 229-252.

Grier, K. B., and Tullock, G. (1989), "An Empirical Analysis of Cross-National Economic Growth, 1951-1980," **Journal of Monetary Economics**, Vol. 24, 259-276.

Hafer, R. W., and Kutan, A. M. (1997), "More Evidence on Money-Output Relationship," **Economic Inquiry**, Vol. 35, pp. 45-58.

Holms, J. M., and Hutton, P. A. (1990), "On the Causal Relationship Between Government Expenditures and National Income," **Review of Economics and Statistics**, Vol. 72, pp 87-95.

Islam, A., and Nazemzadeh, A. (2001), "Causal Relationship between Government Size and Economic Development: An Empirical Study of the U. S.," **Southwestern Economic Review**, Vol. 28, pp. 75-88.

Johansen, S., and Juselius, K. (1990), "Maximum Likelihood Estimation and Inference on Cointegration with Application to the Demand for Money," **Oxford Bulletin of Economics and Statistics**, Vol. 52, pp. 169-210.

Kalyoncu, H. and Yucel, F. (2006), "An Analytical Approach on Defense Expenditure and Economic Growth: The Case of Turkey and Greece, **Journal of Economic Studies**, Vol. 5, pp. 336-343.

MacKinnon, J. G. (1996), ""Numerical Distribution Functions for Unit Root and Cointegration Test," **Journal of Applied Econometrics**, Vol. 11, pp. 601-618.

Miller, S. M., and Russek, F. S., (1997), "Fiscal Structures and Economic Growth: International Evidence," **Economic Inquiry**, Vol. 35, pp. 603-613.

Newey, W., and West, K. (1987), "A Simple Positive Semi-Definite, Heteroscedasticity and Autocorrelation Consistent Covariance Matrix." **Econometrica**, Vol. 55, pp. 703-708.

Phillips, P. C. B., and Perron, P. (1988), "Testing for a Unit Root in Time Series Regression." **Biometrika**, Vol. 75, pp. 335-346.

Ram, R. (1986), "Government Size and Economic Growth: A New Framework and Some Evidence from Cross-Section and Time Series," **American Economic Review**, Vol. 76, pp. 191-203.