Government Expenditure and GDP: The Case of 12 Asian Developing Countries

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Abstract: The aim of this paper is to examine the causal relationship between government expenditure and economic growth for 12 Asian developing countries over the 1960 to 2009 years. For this purpose, a modified version of the Granger causality test proposed by Toda and Yamamoto (1995) applied to examine a bi-variate model of government expenditure and GDP. The results support causality from government expenditure to economic growth for six countries, and for other countries, results cannot support causality relationship. These findings have the policy implication for policymakers and economists. **Government Expenditure and GDP: The Case of 12 Asian Developing Countries**. *J Am Sci* 2012;8(9):66-69]. (ISSN: 1545-1003). http://www.jofamericanscience.org. 10

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1. Introduction

The relationship between government expenditure and economic growth, and answer to the question of whether economic growth is the cause of government expenditure, or government expenditures are the cause of economic growth has been an interesting issue for decades. Many empirical studies investigated the relationship between government expenditure and GDP for developed and developing countries by using various econometric methods, but the results are mixed. For some countries, government spending on infrastructure, education, laws and other non-military expenditure can be considered as an important factor for economic growth, but for some countries can be a repressive factor for growth.

The study of Gregoriou and Ghosh (2009) attempted to investigate the effect of government expenditure on economic growth for a panel of 15 developing countries over the 1972-1999 periods. The results of GMM method indicate that, for countries such as Brazil's government expenditure plays a major role in long-run growth, whereas for countries like Sudan, government current expenditure has a minor role in economic growth. In other words, impact of government expenditure is varying across the countries.

Loto (2011) analyzed the effect of government expenditure on economic growth in Nigeria over the 1980 to 2008 years by using Error Correction Model. The empirical finding reveals negative relation between expenditure on agriculture and economic growth. Further expenditure on health has positive relation with economic growth.

Iyare and Lorde (2004) examined six versions of Wagner's law for nine Caribbean countries. Empirical finding indicated the existence of long-run relationship between government expenditure and income for Grenada, Guyana and Jamaica for a specific version of Wagner's law. Results of Granger causality test indicate causality from income to government expenditure for Guyana and from government expenditure to income for Grenada and Jamaica. Results of short-run causality are mixed but causality from income to government expenditure is predominant causal relationship.

Chimobi (2009) examined the causality relation between government expenditure and national income for Nigeria over the 1970 to 2005 years. The results of cointegration cannot support the existence of long-run relationship between the variables. The results of Granger causality test indicate causality from government expenditure to national income.

The study of Halicioglu (2003) investigated the relationship between government expenditure and economic activity for Turkey over the 1960 to 2000 years. Empirical finding indicates causality from government expenditure to economic activity and vice versa, which implies that Wagner's law does not hold. However, the empirical results support the augmented version of Wagner's law.

Akitoby et al. (2006) studied the relationship between government spending and economic growth for 51 developing countries by employing an error-correction model. The empirical results support the existence of long-run relationship between government spending and GDP for 70% of countries.

Wu et al. (2010) analyzed the Wagner's law hypothesis for 182 OECD and non-OECD countries by using panel data technique. Empirical results of this study indicate bi-directional causality for the full

sample of countries. Also, the results of sub-sample countries support the bi-directional causality between government expenditure and economic growth.

The work of Kolluri et al. (2000) showed short and long-run effects of economic growth on government expenditure for G7 countries by using annual time series data over the 1960 to 1993 years.

Wahab (2011) examined the effects of aggregate and disaggregate government spending on economic growth by employing cross-section and panel data. The results indicate aggregate government spending have positive effect on economic growth. Government consumption spending has no significant effects, but government investment spending has positive output growth effects. Further productivity of government is higher than productivity of non-government sector when spending is below-trend growth only for non-OECD countries.

Hansson and Henrekson (1994) attempted to answer the question, whether government spending has a positive or negative effect on economic growth. This paper showed that government transfers, consumption and total outlays have negative effects but educational spending has a positive effect and government investment has no effect on private productivity growth.

The results of Landau (1983) indicate negative relationship between government consumption expenditure and the rate of growth of per capita GDP for over 100 countries.

Hsieh and Lai (1994) examined the relationship between government expenditure and economic growth for G7 countries by using Granger causality test and VAR technique. The results show that the relationship between government spending and growth can vary significantly across time as well as across the major industrialized countries.

The study of Loizides and Vamvoukas (2005) employed Granger causality framework to investigate the relationship between size of government and economic growth by examining a bi-variate model and two different tri-varibale models. The empirical results indicate causality from government size to economic growth in all countries in the short run and for Ireland and the UK in the long-run. In addition, causality from economic growth to government size in Greece and, when inflation included, in the UK.

Agell et al. (1997) examined the relation between growth and the public sector for 23 OECD countries over the 1970 to 1990 years. The finding could not illustrate that relation is negative, positive or no relation exists between growth and public sector.

However, in this paper, we examine the relationship between government expenditure and economic growth in 12 Asian developing countries by using Toda-Yamamoto (1995) approach.

The rest of this paper is organized as follows: Section 2 discussed data and methodology. Section 3 present empirical results and finally conclusion presented in Section 4.

2. Data and Methodology

2.1 Data

In this paper, the annual data of government expenditure and real GDP for a sample of 12 Asian developing countries over the 1960 to 2009 years are taken from Penn World Table 7.0. Sample of countries are: Bangladesh, China, India, Indonesia, Iran, Jordan, Malaysia, Pakistan, Philippines, Sri Lanka, Syria, and Thailand. Government expenditure measured as the ratio of government expenditure to GDP, and real GDP measured in constant 2005 dollars, the natural logarithms of variables are denoted as LG and LGDP.

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2.2 Methodology

This paper employed a modified version of Granger causality test proposed by Toda and Yamamoto (1995) for testing the causality between government expenditure and economic growth. Toda and Yamamoto (1995) procedure is based on augmented VAR framework and a Wald test statistic that asymptotically has a chi square distribution. In Toda and Yamamoto (1995) approach, the augmented (k+dmax)th order of VAR estimated where k is the lag length of the system and dmax is the maximum order of integration.

The Toda-Yamamoto model can be specified as following bi-variate VAR system:

$$LG_t = c_0 + \sum_{i=1}^{k} \alpha_{1i} LG_{t-i} + \sum_{j=k+1}^{d\,max} \alpha_{2i} LG_{t-j} + \sum_{i=1}^{k} \gamma_{1i} LGDP_{t-i} + \sum_{j=k+1}^{d\,max} \gamma_{2i} LGDP_{t-j} + \varepsilon_{1t} \quad (1)$$

$$LGDP_t = c_1 + \sum_{i=1}^{k} \beta_{1i} LGDP_{t-i} + \sum_{j=k+1}^{d\,max} \beta_{2i} LGDP_{t-j} + \sum_{i=1}^{k} \varphi_{1i} LG_{t-i} + \sum_{j=k+1}^{d\,max} \varphi_{2i} LG_{t-j} + \varepsilon_{2t} \quad (2)$$

Causality from economic growth to government expenditure can be examined by the null hypothesis of GDP does not Granger cause government expenditure H_0: $\gamma_i = 0\ \forall_i$ In Eq. (3); similarly in Eq. (4), the null hypothesis of GDP does not Granger cause economic growth can be expressed as H_0: $\varphi_i = 0\ \forall_i$.

The Augmented Dickey-Fuller (ADF) test proposed by Dickey and Fuller (1979, 1981) employed to testing stationary properties of data series and determine maximum order of integration. The ADF test with an optimal lag length selected by the Akaike information criteria (AIC) can be specified as equation (3).

$$\Delta X_t = \alpha_0 + \beta Y_{t-1} + \sum_{i=1}^{k} \lambda_i \Delta X_{t-i} + \varepsilon_t \qquad (3)$$

Where Δ is the first difference operator and ε_t is white noise error term. The null hypothesis of containing unit root can be expressed as H_0: $\beta=0$, which means the series is non-stationary.

3. Empirical Results

The Augmented Dickey-Fuller (ADF) test performed to investigate stationary properties of series and finding maximum order of integration. The results of ADF unit root test reported in table 1.

The results of ADF unit root test in levels of series cannot reject the null hypothesis of having unit root for government expenditure and real GDP for all countries except government expenditure for India and real GDP for Pakistan. Which means that LG are stationary in levels only for India and LGDP are stationary in levels only for Pakistan. Government expenditure and real GDP become stationary after first difference for other countries, in other words, data series is integrated of order one I (1) for these countries. The results of unit root test clearly show that maximum order of integration (dmax) is one for all countries.

As mentioned above section, the next step in Toda-Yamamoto (1995) approach is to find the optimal lag length (k). Akaike Information Criteria (AIC), Schwarz information criteria (SC), and Hannan-Quinn Information Criteria (HQ) indicate k=1 for China, India, Iran, Jordan, Malaysia, Pakistan, Sri Lanka, Thailand and k=2 for Bangladesh, Indonesia, Philippines, and Syrian Arab Republic. Finally, the results of Toda-Yamamoto causality test presented in table 2.

The results of causality test reveal causality from government expenditure to economic growth only for five countries: Bangladesh, China, Pakistan, Philippines, Syrian Arab Republic, and weak causality for Iran. Further, the results indicate causality from economic growth to government expenditure for Iran. We cannot find any evidence of causality relationship between government expenditure and economic growth for other countries.

Table 1: ADF Unit Root Test

Country/Variable	*Level*	*1st difference*
Bangladesh		
LG	2.386 (0)	5.967 (0) ***
LGDP	2.438 (1)	3.784 (1) ***
China		
LG	1.298 (5)	3.833 (5) ***
LGDP	1.76 (1)	-6.566 (0) ***
India		
LG	3.322 (1) ***	5.528 (0) ***
LGDP	3.048 (0)	
Indonesia		
LG	1.664 (1)	3.781 (2) ***
LGDP	0.425 (1)	4.854 (0) ***
Iran		
LG	2.455 (3)	2.776 (2) **
LGDP	2.225 (1)	4.521 (0) ***
Jordan		
LG	1.668 (0)	7.660 (0) ***
LGDP	1.925 (0)	7.027 (0) ***
Malaysia		
LG	1.623 (0)	6.878 (0) ***
LGDP	1.504 (0)	5.615 (0) ***
Pakistan		
LG	1.313 (1)	11.506 (0) ***
LGDP	2.508 (0) *	
Philippines		
LG	1.347 (0)	6.489 (0) ***
LGDP	0.909 (0)	5.984 (0) ***
Sri Lanka		
LG	2.216 (0)	6.309 (0) ***
LGDP	0.928 (0)	7.420 (0) ***
Syrian Arab Republic		
LG	1.896 (0)-	7.306 (0) ***
LGDP	1.710 (0)	9.463 (0) ***
Thailand		
LG	2.149 (2)-	3.494 (1) ***
LGDP	1.387 (1)	4.693 (0) ***

Note: ***, ** and * denote statistical significance at the 1, 5 and 10% levels, respectively. Optimal number of lags is in parenthesis.

4. Conclusion

This paper attempts to examine the causality between government expenditure and economic growth for 12 Asian developing countries from 1960 to 2009 years by employing the Toda-Yamamoto (1995) approach. Maximum order of integration determined by investigates stationary properties of series and showed $d_{\max}$ is one for all countries.

Furthermore, optimal lag length selected by AIC, SC and HQ criteria.

Causality test performed in last step and indicates unidirectional causality form government expenditure to economic growth for Bangladesh, China, Pakistan, Philippines, Syrian Arab Republic and bi-directional causality between government expenditure and GDP for Iran but causality from government expenditure to economic growth is weak at Iran. For remaining six countries: India, Indonesia, Jordan, Malaysia, Sri Lanka, and Thailand we cannot find causality in any direction. It's obvious that the nature of causality and relationship is varying across the different countries. This result can be useful for policymakers; in countries with unidirectional causality from government expenditure to economic growth, central government can employ expenditure as a factor for growth.

Table 2: Toda-Yamamoto (1995) Causality Test

Country	*From LG to LGDP*		*From LGDP to LG*	
	χ2 Statistic	***P-Value***	***χ2 Statistic***	***P-Value***
Bangladesh	8.583	0.035 **	3.082	0.379
China	5.101	0.078 *	2.648	0.266
India	0.235	0.857	3.159	0.206
Indonesia	4.275	0.233	1.505	0.680
Iran	4.227	0.120	10.814	0.004 ***
Jordan	1.593	0.450	2.358	0.307
Malaysia	1.250	0.535	0.304	0.858
Pakistan	5.685	0.058 **	3.803	0.149
Philippines	16.536	0.000 ***	4.400	0.221
Sri Lanka	0.227	0.892	3.815	0.148
Syrian Arab Republic	7.488	0.057 **	4.995	0.172
Thailand	0.719	0.698	1.163	0.558

Note: ***, ** and * denote statistical significance at the 1, 5 and 10% levels, respectively.

References

1. Agell, J., T.Lindh, and H.Ohlsson, 1997. Growth and the public sector: A critical review essay. European Journal of Political Economy 13, 33-52.
2. Akitoby, B., B.Clements, S.Gupta, and G.Inchauste, 2006. Public spending, voracity, and Wagner's law in developing countries. European Journal of Political Economy 22, 908-924.
3. Chimobi, O.P., 2009. Government Expenditure and National income: A Causality Test for Nigeria. European Journal of Economic and Political Studies 2(2).
4. Gregoriou, A., and S.Ghosh, 2009. The impact of government expenditure on growth: empirical evidence from a heterogeneous panel. Bulletin of Economic Research 61, 95-102.
5. Halicioglu, F., 2003. Testing Wagner's law for Turkey, 1960–2000. Review of Middle East Economics and Finance 1(2) 129-140.
6. Hansson, P., and M.Henrekson, 1994. A new framework for testing the effect of government spending on growth and productivity. Public Choice 81, 381-401.
7. Hsieh, E., and K.S.Lai, 1994. Government spending and economic growth: the G-7 experience. Applied Economics 26, 535-542.
8. Kolluri, B., M.J.Panik, and M.Wahab, 2000. Government expenditure and economic growth: evidence from G7 countries. Applied Economics 32, 1059-1068.
9. Landau, D., 1983. Government Expenditure and Economic Growth: A Cross-Country Study. Southern Economic Journal 49, 783-792.
10. Loizides, J., and G.Vamvoukas, 2005. Government expenditure and economic growth: evidence from trivariate causality testing. Journal of Applied Economics 8, 125-152.
11. Loto, M.A., 2011. Impact of government sectoral expenditure on economic growth. Journal of Economics and International Finance 3(11), 646-652.
12. Iyare, S.O., and T.Lorde, 2004. Co-integration, causality and Wagner's law: tests for selected Caribbean countries. Applied Economics Letters 11, 815-825.
13. Toda, H.Y., and T. Yamamoto, 1995. Statistical inference in vector autoregressions with possibly integrated process. Journal of Econometrics 66, 225-250.
14. Wahab, M., 2011. Asymmetric output growth effects of government spending: Cross-sectional and panel data evidence. International Review of Economics and Finance 20, 574–590.
15. WU, S.Y., J.H.Tang, and E.S.Lin, 2010. The impact of government expenditure on economic growth: How sensitive to the level of development? Journal of Policy Modeling 32, 804-817.

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