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Yogi Rahmayanti[1] **Theara Horn**[2]

Abstract

Government efficiency plays a significant role in the relationship between government expenditure and economic growth. Based on panel data from 63 developing countries 1990 to 2003, we calculate efficiency scores using Data Envelopment Analysis, incorporate them into a simple model of growth with government expenditure. We find that there is a critical level of efficiency required for government expenditure to have positive effect on growth. Further, above a critical level of efficiency, greater efficiency lowers the optimal size of government expenditure required to maximize growth.

Keywords: Fiscal Policy, Government Expenditure, Public Sector Efficiency, Growth

JEL: H50, E6, O4

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Expenditure Efficiency and the Optimal Size of Government in Developing Countries

1. Introduction

IMF fiscal adjustment programs, which affected many developing countries, have created a heating discussion in the fiscal policy field of study. The programs often relied heavily on cuts in public investment that would improve today's government cash flow at the expense of future economic growth (Ley, 2009). Another important issue related to government budget is the efficiency of government expenditure. Small changes in the efficiency with which those resources are used could have major impacts on their GDP and attainment of other government's objectives (World Bank, 2005). In addition, the recent global crisis has once again brought up the debate on the importance of fiscal policy to control macro economy.

Many studies since the 1990s have attempted to explain the relationship between government expenditure and economic growth. At the theoretical level, Barro (1990) has laid a framework for the relationship between government spending and economic growth, where government spending has been added to the set of growth determinants. At the empirical level, the result has been mixed. Both the positive and negative relationships have respective proponents, but the more common findings are of the negative, such as argued in Fölster and Henrekson (2001).

There are so far two separate issues in the relationship between government expenditure and economic growth. One issue that has been explored in a lot of studies is the optimal size of government expenditure. A study by Scully (1994), among many others, discusses an inverted-u-curve to represent the relationship between government expenditure and growth, which indicates the existence of an optimal point for government size. Another issue is efficiency which has been addressed in a fewer number studies[3]. Among them, Angelopoulos et al. (2008) uses data from 64 (both developed and developing) countries in the period from 1980 to 2000 to calculate efficiency scores. With econometric estimations, they find that efficiency explains much of the non-monotonic relationship between fiscal size and economic growth, and the relationship between government size and economic growth changes, depending on the level of efficiency.

[3] Studies on measurement of government efficiency can be found in some previous literatures such as Afonso et al. (2003).

Our study presents a novel contribution in which we combine together both issues of efficiency and optimal size, which were separately considered in previous studies, to explain the relationship between government expenditure and economic growth. First we incorporate the efficiency score into estimation models with government expenditure size to show the role of efficiency in the relationship of government spending and economic growth. Second, we find optimal size of government expenditure by considering not only size of the government expenditure, but also its efficiency.

There are two main differences between our work and that of Angelopoulos et al. (2008). First, although we study the same research question to find the effect of efficiency in the relationship between government size and economic growth, we use different method of efficiency measurement and a different set of data. We use Data Envelopment Analysis (DEA) method to calculate efficiency. Since the specific production function is hard to define for the public sector (Rayp and Sjipe, 2005), employing the DEA method is favorable, as it does not require the specification of the production function. In terms of data, this study takes into account only the developing countries in order to avoid the possibility of unreliable benchmarking due to the different characteristics between developed and developing countries. Second, we extend the research question beyond Angelopoulos et al. (2008) by estimating the effect of efficiency on optimal size of government expenditure to maximize economic growth.

This study comes to two main conclusions. First, supporting the result of Angelopoulos et al. (2008) we find a significant effect of efficiency on the relationship between government size and growth, in this case for developing countries. We conclude a similar pattern that the effect of government size on growth becomes positive only after the efficiency level reaches a certain threshold. Second, we find that efficiency also has a significant role in explaining the relationship between the optimal size of government expenditure and growth. Above a certain efficiency threshold, increasing efficiency will reduce the size of government expenditure required to maximize growth. Based on these conclusions, to maximize the economic growth, governments of developing countries should pay attention on both the size of their government expenditure and the efficiency of their spending.

2. Methodology and Data

2.1. Efficiency Measurement

In this study, efficiency measures how efficient a government is in spending its budget to achieve its objectives. We assume that all governments are in favor of an optimal growth, and consequently spend their budget on expenditures that are expected to have positive impacts on growth. Efficiency is then represented by a score obtained through a calculation involving a set of outputs, which indicate a government's objectives related to economic growth, and an input, which indicate the cost of achieving those objectives.

We use DEA with output orientation and an assumption of variable return to scale (VRS). The use of output orientation is based on the assumption that governments are concerned with the problem of increasing outcome given a pre-determined budget size. Meanwhile, the VRS model originally suggested by Banker et al. (1984) is used to eliminate the scale effect of the budget, which possibly influences the outputs. With the convexity assumption of the VRS model, a country's efficiency score is measured by benchmarking with other countries that are close in size. The efficiency score of each country is determined by the following optimization problem:

$$max_{\theta\lambda}\theta \qquad (1)$$

subject to:

$$x_0 - X\lambda \geq 0$$
$$\theta y_0 - Y\lambda \leq 0$$
$$\lambda_i \geq 0, \quad \sum_i \lambda_i = 1$$

where θ denotes the technical efficiency score, (x_0, y_0) represents a vector of input and output, (X, Y) represents the compared best units of (x_0, y_0) and λ_i is a vector of weights. Here $0 \leq \theta \leq 1$, in which $\theta = 1$ is the efficiency score of the best performing unit located on the efficiency frontier; Smaller θ denotes lower efficiency. The optimal value of λ_i is determined through solving the optimization problem of equation (1) and the sum is restricted to equal one to assure convexity of the efficiency frontier.

2.2. Model Specification

We posit the following growth model with government expenditure, originally developed by Barro (1990):

$$Y_{it} = K_{it}^{\alpha} L_{it}^{\beta} G_{it}^{\gamma} \qquad (2)$$

where Y_{it} is total income or GDP, K_{it} is capital, L_{it} is labor and G_{it} is government expenditure. Subscripts *i* and *t* refer to country and time.

We suppose that the effect of government expenditure G_{it} depends not only on the amount of the money spent, but also on the spending efficiency. Therefore, G_{it} depends on the expenditure amount (E) and the efficiency score:

$$G = G(E, efficiency) \qquad (3)$$

The basic equation can thus be rewritten as $Y_{it} = K_{it}^{\alpha} L_{it}^{\beta} G(E, efficiency)_{it}^{\gamma}$.

By transforming equation (3) into a logarithmic form, we obtain:

$$LnY_{it} = \alpha LnK_{it} + \beta LnL_{it} + \gamma LnG(E, efficiency)_{it} \qquad (4)$$

The basic equation is further developed into some alternative models for statistical estimation based on the possible patterns of the effect of efficiency, as shown below:

Model 1: $LnGDP_{it} = constant + \alpha_1 government_{it} + \gamma X_{it} + \varepsilon_{it}$ (5)

Model2:

$$LnGDP_{it} = constant + \alpha_1 government_{it} + \alpha_2 efficiency * government_{it} + \gamma X_{it} + \varepsilon_{it} \qquad (6)$$

Model 3:

$$LnGDP_{it} = constant + \alpha_1 government_{it} + \beta_1 government_{it}^2 + \gamma X_{it} + \varepsilon_{it} \qquad (7)$$

Model 4:

$$LnGDP_{it} = constant + \alpha_1 government_{it} + \alpha_2 efficiency * government_{it} + +\beta_1 government_{it}^2 + \beta_2 (efficiency * government)_{it}^2 + \gamma X_{it} + \varepsilon_{it} \qquad (8)$$

where *government* is ratio of government spending to GDP, *efficiency* is efficiency score of government spending and X_{it} represents control variables such as labor, capital, and trade openness.

2.3. Critical Value of Efficiency

2.3.1. Critical Value of Efficiency on Relationship of Government Size and Growth

In Model 1, without considering efficiency, the estimation result shows that the coefficient of *Government* is statistically significant and positive (see Table 2), which implies that government size has a positive effect on growth. In Model 2, however, when we include the efficiency variable, i.e. *efficiency**government*, the effect of government size on growth becomes conditional to the efficiency score, i.e. ($\alpha_1+\alpha_2$ e*fficiency*). This demonstrates that the effect of *government* becomes positive only when $\alpha_2 efficiency > -\alpha_1$. Therefore, the critical level of efficiency, which indicates the threshold level of government expenditure to have positive effect on growth, can be obtained:

$$efficiency *= -\alpha_1/\alpha_2$$

The same calculation is also available in Angelopoulos et al. (2008). Unlike in Model 1, we can observe here that greater government size does not always lead to increase growth.

2.3.2. Critical Value of Efficiency on Optimal Size of Government

The optimal size of government can be calculated from Model 3 and Model 4. We start from Model 4 where efficiency is considered. The non-stochastic part of Model 4 is as follows:

$$\begin{aligned} LnGDP_{it} &= constant + \alpha_1 government_{it} + \alpha_2 efficiency * government_{it} + \\ &+\beta_1 government_{it}^2 + \beta_2 (efficiency * government)_{it}^2 + \gamma X_{it} \end{aligned} \qquad (9)$$

which can be rewritten into:

$$\begin{aligned} LnGDP_{it} = & \ (\beta_1 + \beta_2 efficiency^2) government_{it}^2 + \\ & (\alpha_1 + \alpha_2 efficiency) government_{it} + constant + \gamma X_{it} \end{aligned} \qquad (10)$$

As *government* is ratio of government spending to GDP, thus it is in the interval [0, 1]. However, it is not common in reality for ratio of government spending to GDP to equal 0 or 1, therefore the optimal size of government should be $government \in (0,1)$.

Since the quadratic function is in degree two, it exhibits a parabolic form and the vertex of the inverted-U-shaped parabolic curve is the optimal solution. From the equation (10), the condition for the parabolic curve to have an inverted-U shape is:

$$\beta_1 + \beta_2\, efficiency^2 < 0 \text{ or } \beta_1 < -\beta_2\, efficiency^2 .$$

Therefore, the critical value of efficiency can be obtained as follows:

$$efficiency^2 = \beta_1/-\beta_2 \quad \text{or} \quad \text{efficiency}^* = \sqrt{\beta_1/-\beta_2}$$

The optimal size of government to maximize growth is:

$$government^* = \frac{\alpha_1 + \alpha_2 efficiency}{-2(\beta_1 + \beta_2 efficiency^2)} \tag{11}$$

Therefore, we conclude that the existence of an optimal size of government expenditure is conditional to efficiency. Note that when efficiency equals zero, Model 4 equals Model 3 and the optimal size will be: $\alpha_1/-2\beta_1$.

2.4. Data Description

We use a sample of 63 developing countries during the period from 1990 to 2003. Developing countries are defined based on the World Bank classifications, which constitute low-income, lower-middle-income and upper-middle-income countries. We focus on developing countries for several reasons. First, the similarity among sample countries with respect to income makes the comparison more reasonable. Second, in the literature on optimal size of government expenditure, there has been little attention to developing countries. Third, most of the high-income countries have a high literacy rate (e.g. 99%) and life expectancy; thus, for some countries, the figures remain unchanged through the years. This may cause bias in determining the DEA frontier.

We use three output indicators and one input indicator for the DEA calculation. The output indicators are: literacy rate for education sector, life expectancy for health, and electricity usage for infrastructure. Education and health indicators are used as output indicators in many studies measuring government efficiency (Afonso and Aubyn, 2004; Herrera and Pang, 2005). Many other studies find a long-term effect of infrastructure on growth. Moreover, infrastructure development is also an important goal of governments in developing countries. This is in line with the studies of Afonso et al. (2003) and Angelopoulos et al. (2008). The data of literacy rate and life expectancy are taken from the Human Development Index of the United Nations

Development Project, and the data on electricity usage are obtained from the World Development Indicator of the World Bank.

For growth regression, the dependent variable is the natural logarithm of GDP based on the constant US dollar in 2000. Independent variables constitute the share of final consumption of government to GDP, the natural logarithm of labor force, capital share to GDP, and trade openness. Labor force is the number of labor force in persons. Capital share to GDP is the ratio of gross capital formation to GDP. Trade openness is obtained by the ratio of the sum of exports and imports to GDP. All data are taken from the WDI. The summary and definition of variables are also available in Table 1.

3. The Effect of Efficiency on the Growth-maximizing Optimal Size of Government.

The efficiency scores and related results are reported in Appendix. We incorporate these scores into the model to observe the effect of efficiency on the relationship between government expenditure and growth.

Before estimating the models, we conducted a poolability test to determine the appropriateness of the usage of panel regression through the F test and the Hausman test, and the results show that panel fixed effect regression is appropriate (not reported here). This is consistent with the fact that the slope parameters of the independent variables are unlikely similar given the different characteristics among countries. In the panel regression, we took into account autocorrelation and heteroscedasticity of the error component, and the endogeneity of the explanatory variables.

Failing to address the problems of autocorrelation and heteroscedasticity would have resulted in inefficient estimates. We tested for and found autocorrelation and heteroscedasticity in the error component (not reported here). To deal with these problems, we used panel regression with Newey-West standard error for estimation. The problem of endogeneity of the explanatory variables, which is a typical problem in the study of government and growth, may lead to biased estimation of how the public sector impacts growth. This problem takes the form of, among others, omitted variables (Agell et al., 2006). Fixed effect estimation with panel data can be used in the presence of time-constant omitted variables. However, it will not be sufficient in the presence of time-varying omitted variables that are correlated with the explanatory variables. An approach to deal with this endogeneity problem is the use of some instrumental variables. The basic requirement for a variable to be used as an instrument is that it must be exogenous in the equation, that is, it must have no partial effect on the dependent variable and should not be correlated with the unobserved factors, while being related either positively or negatively to the endogenous variable (Wooldridge, 2002).

Table 1: Descriptive statistics of variables

Variable	Definition	Mean	Standard Deviation	Min	Max
DEA Measurement					
Output					
Literacy rate	Percent of Adults (15 years or older) who can read and write (%)	78.7	19.8	28.35	99
Life expectancy	Expected number of years of life remaining at a given age (%)	64.6	8.92	36.29	78.21
Electricity	Power consumption per capita (kwh)	1208	1207.77	20.38	6734
Input	Government share to GDP (%)	13.6	4.90	2.9	43.47
Efficiency	Efficiency obtained from the measurement of DEA	0.89	0.10	0.55	1
GDP	Gross domestic product in constant 2000 US dollars (100 million US$)	766	1620	8.20	16000
Government	Government share to GDP (%)	13.6	4.90	2.9	43.47
Labor	Total labor force (persons)	31.2	99.2	0.51	760
Capital share	Ratio of gross capital formation to GDP (%)	22.3	6.5	1.6	47.1
Openness	Ratio of sum of imports and exports amount to GDP (%)	0.7	0.3	0.1	2.8
Pop	Total Population (million persons)	67.8	193	1.4	1300
ODA	Official Development Assistance (million US$)	534	616	-960	5400

We tested the endogeneity of the explanatory variable of government expenditure relative to GDP by using the Davidson-MacKinnon test. The null hypothesis that any endogeneity among the regressors would not have deleterious effects was rejected, indicating that the endogenous regressor's effect is meaningful. We therefore used an instrumental variable estimation method that takes into account the presence of heteroskedasticity and autocorrelation. The Newey-West estimation can be used in the presence of instrumental variables with heteroskedasticity and autocorrelation problems. However, the Newey-West estimation package does not provide the procedure for testing the appropriateness of the instrumental variables. Therefore, we used the generalized method of moments with heteroscedasticity-and-autocorrelation-consistent standard error (GMM-HAC) estimation method. For instrumental variables, we used logarithm of population and Official Development Assistance as these variables possibly influence the size of government expenditure in each country but not obviously influence economic growth. To test the appropriateness of the instrumental variables, we computed the Kleibergen and Paap rk LM statistic for testing underidentification and Hansen J statistic for testing overidentification. We rejected the null hypothesis in the underidentification test, indicating that the instruments are necessary. The result of the overidentifying restriction test was failure to reject the null hypothesis, implying that the instruments are exogenous. The estimation results are presented in Table 2 and Table 3.

Table 2: The Effect of Efficiency on Growth

Dependent Variable: Ln (GDP)	Model 1 (Newey-West)	Model 2 (Newey-West)		Model 2 GMM (HAC)
		(2a)	(2b)	(2c)
Government	0.021***	-0.270***	-0.287***	-0.684***
	(0.008)	(0.025)	(0.026)	(0.251)
Efficiency*government	-	0.324***	0.344***	0.790***
		(0.026)	(0.027)	(0.292)
Ln(labor)	0.778***	0.857***	0.779***	0.138
	(0.029)	(0.024)	(0.027)	(0.300)
Capital share	0.025***	-	0.019***	0.008**
	(0.006)		(0.006)	(0.004)
Openness	-0.456***	-	-0.702***	-0.114
	(0.160)		(0.159)	(0.139)
Constant	10.93***	9.90***	11.20***	-
	(0.521)	(0.416)	(0.474)	
Hansen J statistic				1.128
				(p-value: 0.22)
Kleibergen-Paap rk LM Statistic				9.543
				(p-value: 0.00)
Instrumented variable				Government
Instrumental variables				Ln(pop), ODA
Critical efficiency score	-	83.3%	83.4%	86.5%
Sample	841	882	841	836

Figures in parentheses are standard error values. Asterisks indicate variables whose coefficients are significant at the 10 %(*), 5 %(**) and 1 %(***) levels.

From our result, the critical efficiency value required for government expenditure to have positive effect on growth is approximately 84.4 percent, which is the average of critical values obtained in Models (2a), (2b) and (2c). This implies that, on average, government expenditure has positive effect on growth when the efficiency of government expenditure is higher than 84.4 percent.

The coefficients of the control variables of *labor* and *capital* are both statistically significant and positive, which is consistent with the economic theory. However, the coefficient of *openness* is statistically significant and negative. We argue that, in the case of developing countries, net importers are more common than net exporters, thus it is acceptable for the degree of openness to be negatively related to growth.

Model 3 and Model 4 are developed to determine the optimal size of government. In Model 3, when we do not consider efficiency, the coefficient of $government^2$ is negative, implying the unconditional existence of an optimal size. From the results of Model (3a) and (3b), the optimal size on average is equal to 22.3 percent. In Model 4, the critical level of efficiency required for the existence of an optimal size of government spending is 0.79 for Model (4a) and 0.86 for Model (4b). The optimal size to maximize growth on the condition of efficiency exists only when efficiency is greater than the critical level, otherwise it applies for the growth minimization condition.

Further, we analyze the result based on Model 4b. Considering the critical efficiency values, we simulate the optimal sizes of government obtained in equation (11) with respect to efficiency and present the result in Figure 1. We observe that the optimal government size decreases when the efficiency of government spending increases.

Out of 63, 47 countries have efficiency scores above the critical value. From the 47 countries depicted in the figure, there are more of developing countries which spend less than their optimal level. Some countries lie very close to the optimal line, such as Tunisia, Panama and Costa Rica. The governments of these countries, given their respective efficiency level, are spending at almost optimal level to maximize their economic growth.

Countries which lie above the optimal level should reduce their spending to achieve more optimality. Reducing spending size is advantageous when such countries are running deficit budget. Countries such as Uzbekistan, Belarus and Ukraine for example, may cut their spending to improve their budget sustainability without risking their growth target. However, if such countries have been utilizing own-source revenue, government spending can be used for other than growth-promoting purposes, such as improving social security and public welfare.

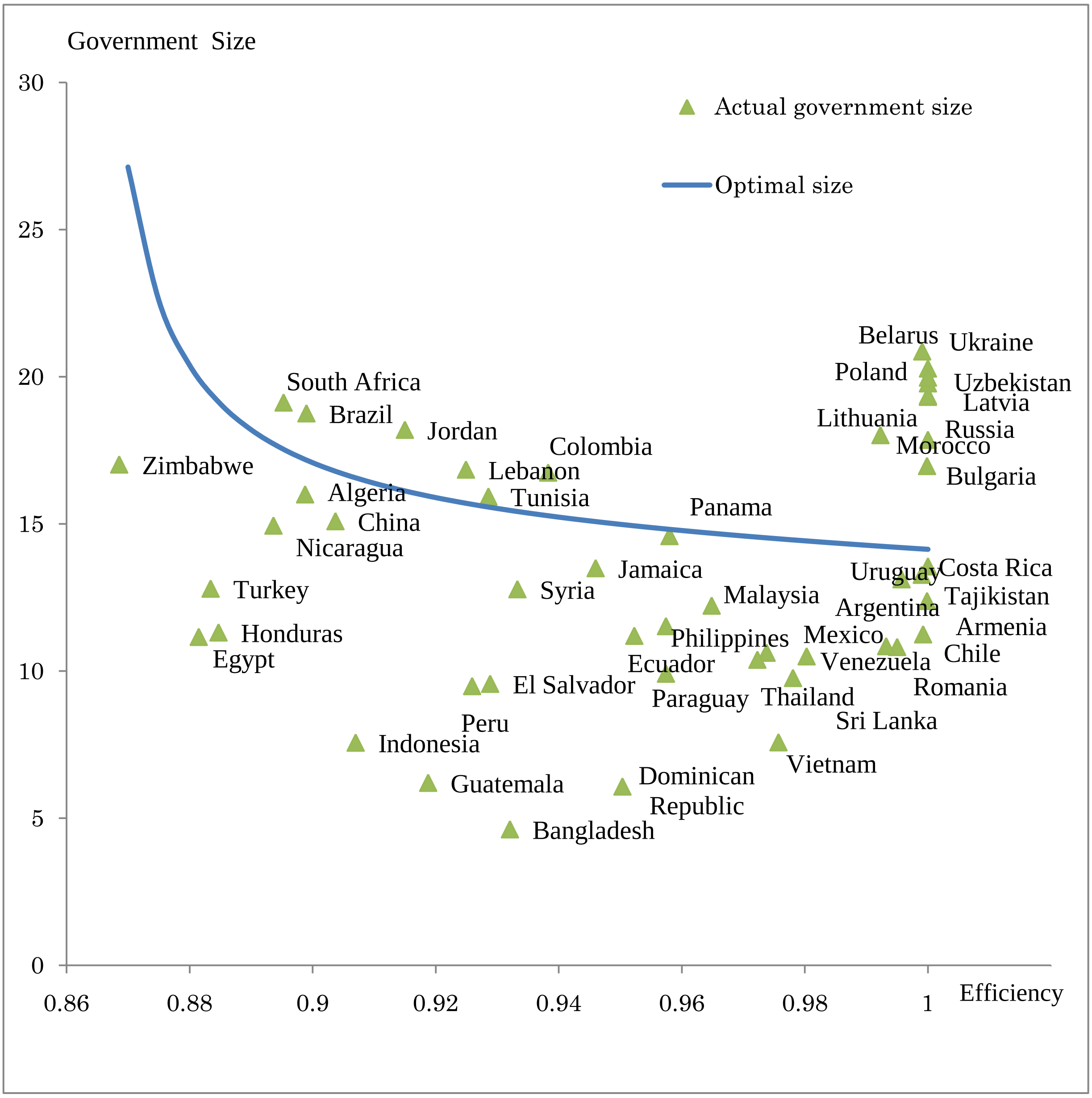
Table 3: The Effect of Efficiency on Optimal Size of Government

Dependent Variable: Ln (GDP)	Model 3 (Newey-West) (3a)	(3b)	Model 4 (Newey-West) (4a)	Model 4 GMM (HAC) (4b)
Government	0.085*** (0.028)	0.067** (0.027)	-0.762*** (0.068)	-1.143*** (0.298)
Efficiency*government	-	-	0.992*** (0.077)	1.341*** (0.353)
Government ^{2}	-0.0019** (0.0007)	-0.0015** (0.0007)	0.014*** (0.002)	0.020*** (0.005)
(Efficiency*government)^2	-	-	-0.022*** (0.002)	-0.027*** (0.007)
Ln(labor)	0.831*** (0.025)	0.775*** (0.029)	0.816*** (0.024)	0.387** (0.151)
Capital share	-	0.025*** (0.006)	0.009*** (0.006)	0.006*** (0.002)
Openness	-	-0.465*** (0.159)	-0.618*** (0.149)	0.077 (0.052)
Constant	9.86*** (0.480)	10.67*** (0.543)	10.11*** (0.463)	-
Hansen J statistic				0.672 (p-value:0.41)
Kleibergen-Paap rk LM Statistic				9.687 (p-value:0.00)
Instrumented variable				Government
Instrumental variables				Ln(pop), ODA
Optimal size without efficiency	22.3%	22.3%	-	-
Optimal size at average efficiency(=0.89)	-	-	17.64%	18.20%
Sample	882	841	841	836

Figures in parentheses are standard error values. Asterisks indicate variables whose coefficients are significant at the 10 percent (*), 5 percent (**) and 1 percent (***) levels.

Countries which lie under the optimal line should increase spending while improving efficiency. Countries which lie far below the optimal line, such as Guatemala, Bangladesh, and Dominican Republic, Indonesia and Vietnam, may simply spend too little, and will reduce their distances to the optimal line significantly by increasing their spending amount. However, by improving efficiency, the amount required to achieve optimality will be less. Increasing government spending achieved through borrowed fund creates interest liability which reduces budget flexibility. Therefore, improving efficiency not only will help achieving optimality, it also supports budget sustainability.

Figure1: Decreasing function of optimal size of government with respect to efficiency score.



Improving efficiency may take form in various measures, such as choosing more productive spending and improving governance of government spending. In other words, improve the "what and how" to spend. Focusing on spending items that have impact on economic growth, such as education, health, and infrastructure will improve the efficiency level. Improvement can also be achieved through better budget disbursement by streamlining the excessive bureaucratic chain and increasing accountability.

4. Concluding Remarks

This study finds a significant role for efficiency in the relationship between government expenditure and economic growth for the developing countries. We find that the effect of government expenditure on growth depends on the level of efficiency. Only when the efficiency exceeds a certain critical level, the effect becomes positive. Furthermore, the optimal size of government can also be achieved only above a certain efficiency level, at which the optimal size is a decreasing function of the efficiency scores.

The finding of this study implies that the improvement of efficiency will result in a smaller optimal government size required to maximize growth. Intuitively, when government spends the resources for the right purposes and in the right manner, the amount required to maximize growth is smaller. Therefore, we suggest that governments of developing countries should pay attention not only to the size of government expenditure but also to the efficiency of their spending. The improvement of the spending efficiency can provide a solution to the shortage of fiscal space that is often the case in developing countries.

However, the result of this study should be interpreted as more indicative than definitive. One basic problem here arises from the method of developing the efficiency score. Using a non-parametrical approach provides little choice in terms of statistical assessment. Furthermore, as it is a relative measurement, the choice of sample may affect the efficiency score.

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Appendix: Performance, Government Size and Optimal Size with Rank Order

Country	Efficiency	Rank	Government Size (%)	Optimal Size (%)	Deviation from optimal size (%)
Armenia	1.00	1	13.12	14.20	-1.08
Belarus	1.00	1	20.28	14.14	6.14
Bulgaria	1.00	1	16.97	14.14	2.82
Chile	1.00	1	11.25	14.15	-2.90
Costa Rica	1.00	1	13.56	14.14	-0.58
Latvia	1.00	1	19.32	14.14	5.18
Lithuania	1.00	1	19.36	14.14	5.21
Poland	1.00	1	19.78	14.14	5.64
Romania	1.00	1	10.82	14.21	-3.39
Russia	1.00	1	17.86	14.14	3.72
Tajikistan	1.00	1	13.27	14.16	-0.88
Ukraine	1.00	1	19.97	14.14	5.83
Uruguay	1.00	1	12.38	14.14	-1.76
Uzbekistan	1.00	1	20.86	14.16	6.71
Argentina	0.99	15	10.85	14.24	-3.39
Morocco	0.99	15	18.02	14.25	3.77
Sri Lanka	0.98	17	9.77	14.46	-4.69
Venezuela	0.98	17	10.50	14.43	-3.92
Vietnam	0.98	17	7.58	14.50	-6.92
Mexico	0.97	20	10.63	14.53	-3.91
Thailand	0.97	20	10.39	14.56	-4.17
Malaysia	0.96	22	12.23	14.69	-2.46
Panama	0.96	22	14.59	14.82	-0.23
Paraguay	0.96	22	9.91	14.83	-4.92
Philippines	0.96	22	11.53	14.83	-3.30
Dominican Rep.	0.95	26	6.08	14.98	-8.90
Ecuador	0.95	26	11.20	14.94	-3.74
Jamaica	0.95	26	13.50	15.08	-1.59
Colombia	0.94	29	16.74	15.28	1.46
Bangladesh	0.93	30	4.63	15.47	-10.84
El Salvador	0.93	30	9.57	15.57	-6.00
Peru	0.93	30	9.49	15.67	-6.18
Syria	0.93	30	12.78	15.43	-2.64
Tunisia	0.93	30	15.93	15.58	0.35
Guatemala	0.92	35	6.21	15.95	-9.75
Jordan	0.92	35	18.20	16.13	2.07
Lebanon	0.92	35	16.85	15.71	1.14
Indonesia	0.91	38	7.57	16.57	-9.00

Country	Efficiency	Rank	Government Size (%)	Optimal Size (%)	Deviation from optimal size (%)
Indonesia	0.91	38	7.57	16.57	-9.00
Brazil	0.90	39	18.76	17.17	1.59
China	0.90	39	15.09	16.79	-1.70
South Africa	0.90	39	19.13	17.54	1.59
Nicaragua	0.89	43	14.95	17.72	-2.78
Egypt	0.88	44	11.16	19.94	-8.78
Honduras	0.88	44	11.31	19.15	-7.83
Turkey	0.88	44	12.80	19.44	-6.64
Zimbabwe	0.87	47	17.02	29.46	-12.44
Bolivia	0.85	48	14.01	-	-
Pakistan	0.82	49	11.41	-	-
Botswana	0.80	50	25.32	-	-
India	0.80	50	11.60	-	-
Kenya	0.80	50	16.08	-	-
Nepal	0.79	53	9.08	-	-
Ghana	0.76	54	11.33	-	-
Togo	0.75	55	11.92	-	-
Yemen, Rep.	0.75	55	16.10	-	-
Zambia	0.75	55	16.15	-	-
Tanzania	0.74	58	12.80	-	-
Senegal	0.71	59	13.27	-	-
Cote d'Ivoire	0.66	60	10.71	-	-
Ethiopia	0.63	61	11.83	-	-
Nigeria	0.63	61	16.07	-	-
Mozambique	0.58	63	10.70	-	-

Note: (-) refers to "not available" for countries whose efficiency score is lower than the critical value (0.86), for which the optimal size does not exist.