

Fiscal Policy, Investment and Long-Run Economic Growth: Evidence from Indonesia

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Abstract

This paper reviews the impact of fiscal policy on investment and economic growth in Indonesia. Investment accelerates physical capital accumulation. In turn, physical capital contributes to economic growth. Using vector error correction approach, we find significant relationships between fiscal policy variables and investment. Government revenue and current expenditure influence investment negatively. On the other hand, government development expenditure increases investment and economic growth. The implication is development expenditure may be utilized to enhance economic growth. Moreover, budget deficits might serve the objective of long-run economic growth as far as fiscal sustainability and resilience can be maintained.

Keywords: Fiscal policy, Investment, Economic growth, Growth accounting, Cointegration, VECM

1. Introduction

Developing countries need to achieve high and sustainable economic growth. In 2008 average GNI per capita of the world was \$8,654 (World Bank, 2010). The average per capita income of low income and lower middle income countries were \$524 and \$2,073 respectively. The population of these countries constitutes 70% of the world's population. The low income countries have to quadruple its per capita income to be in the same position as the lower middle income countries. In the same way, the lower middle income countries also have to quadruple its per capita income to achieve the world's average. The only way to attain these objectives is to achieve high and long-run economic growth.

There are three views regarding the role of government in the economy: Neoclassical, Keynesian and Ricardian (Bernheim, 1989). First, Neoclassical paradigm believes that government economic activity may crowd out private sector economic activity (Buiter, 1977). Therefore, government should limit the intervention. Secondly, Keynesian view advocates the active role of government because of its multiplier effects (Fazzari, 1994). Finally, Ricardian Equivalence proposition argues for the neutrality of government deficits (Barro, 1989).

Empirical literatures also provide differing results. Ram (1986) finds the positive impacts of government on economic performance and growth in the majority of 115 countries. Bahmani-Oskooee (1999) and Ang (2009) also find that public investment stimulates private investment in the long-run. On the other hand, Mitra (2006) and Ghali (1998) find a crowding out effect of government investment on private investment. Moreover, Koray and McMillin (1987) provide empirical evidence on the Ricardian Equivalence. Therefore, the impact of government activity has become a crucial issue.

The role of government may differ between developed and developing countries (Bose, Haque, & Osborn, 2007). Limited capital and infrastructure may affect the capacity to grow. Unless government builds the infrastructure, private sector will not start to invest. The externalities of government investment may be larger in developing countries than in developed countries.

This paper reviews the impacts of fiscal policy in Indonesia as one of developing countries. The high economic growth during 1969-2008 serves the purpose of this paper. The high growth was mainly contributed by investment. Kim and Lau (1996) and Van der Eng (2010) estimate that the largest proportion of economic growth came from the growth of physical capital. Therefore, this paper focuses on the investment channel of economic growth.

This paper is organized as follows. Section 2 elaborates the methodology. Section 3 presents the results and discussion. Finally, section 4 concludes.

2. Methodology

2.1 Literature Review

The analysis of economic growth starts with the Cobb-Douglas production function. Output depends on the levels of capital, labor and technology (Sarel, 1997).

$$Y_t = A_t \cdot K_t^\beta \cdot L_t^{1-\beta} \quad (1)$$

where Y denotes output, A is technology, K and L are the amount of capital and labor used as input. The value of β is between 0 and 1. Although the real and accurate figure of physical capital is unobtainable in some countries, the amount of investment as additional capital is usually available. Based on Eq. (1), economic growth can be enhanced by accumulating physical capital, increasing labor and improving productivity.

There are many literatures on growth accounting that estimated the contribution of physical capital, labor and total factor productivity to economic growth. Several studies have estimated the contributions of these factors in Indonesia (Bosworth, Collins, & Chen, 1995; Collins & Bosworth, 1996; Sarel, 1997; World Bank, 2005; Van der Eng, 2010). This paper uses the results of these studies because another estimation may only provide little value added.

Public capital stock and investment play important role in determining productivity (Aschauer, 1989). In general, fiscal policy can influence economic growth by enhancing the productivity of physical capital, improving the skill of the labor force and increasing total factor productivity. Gerson (1998) suggests three principles. First, government should invest in physical and human capital only to compensate for externalities and market imperfection. Secondly, government should provide infrastructure to facilitate private sector activities. Finally, the financing should limit distortions to the supply and demand of capital and labor.

Tanzi and Zee (1996) argue that the overall budget policy, tax policy and public expenditure policy could affect long-run economic growth, especially in the perspective of the endogenous growth theory. The impact of the overall budget policy depends on the neutrality of the financing. If households perceive budget deficits as delayed tax, private saving will neutralize the change in public saving. Tax structure may change the capital allocation that in turn could affect economic growth. Moreover, the externality of public expenditure may have a larger impact than the crowding-out effect.

Furthermore, different expenditure type may have differing impacts on the economy. For example, public investment might be more productive than public consumption. Ahmed and Miller (2000) find both crowd in and crowd out effects of government expenditure. Expenditure on transportation and communication stimulates private investment. On the other hand, expenditure on social security and welfare crowds out private investment.

2.2 Economic Growth and Investment

First, we review the economic growth in Indonesia. During its development stage (1969-2008), Indonesia's average annual economic growth was 5.8%. Figure 1 shows the economic growth in Indonesia. Indonesian economy underwent several structural changes since 1969 (Thee, 2002). The first phase was stabilization period in 1969-1973. High economic growth achieved in the early development stage because of productivity recovery from the previous period. In the oil boom period, when the international price of oil soared (1974-1982), Indonesia as an oil exporter country gained much revenue as a source of economic growth. Declining oil price in the subsequent period changed the focus of the development to non-oil sources. Financial reforms and structural adjustment during the period of 1983-1996 were able to maintain annual economic growth around 7%. The Asian crisis hampered economic growth in 1997-1999. After the Asian crisis, economic growth has been increasing gradually.

The next is the analysis on the source of the economic growth using the growth accounting framework. Table 1 presents the contribution of physical capital, human capital and TFP to economic growth from the previous studies. It can be seen that physical capital was the largest contributor to the economic growth. From 3.4% of output growth for the period of 1967-2003, physical capital contribution was about 2%. Human capital and productivity contributed for 0.5% and 0.9% respectively. It is interesting that physical capital contributed around 60% of economic growth.

Among these three factors, physical capital is probably the most visible and directly measurable. Human capital in terms of quantity of worker can be estimated through census, but the level of labor skill is unobservable

directly. Total factor productivity is also difficult to measure. The growth accounting literatures usually calculate this figure from the residual of the physical capital and labor. In addition, efforts to improve human capital and productivity may take a longer time and are hard to quantify. In developing countries in which production level are below the optimal capacity, capital accumulation might be essential than the issue of decreasing marginal product of capital. Investment would have short-run and long-run impact on the production function.

2.3 Fiscal Policy and Investment

In developing countries, government expenditure to build infrastructure may be more valuable than in the developed countries. The lack of infrastructure in developing countries makes the expenditure on the infrastructure provides higher return and externalities than in developed countries. For example, the impact of building a new road in the rural area would increase further because new industry or business may emerge in the otherwise isolated area. On the other hand, government expenditure for its operation may substitute private sector expenditure. Therefore, it is necessary to distinguish between government expenditure on infrastructure and consumption. For this reason, we distinguish government expenditure into two groups. The first is development expenditure, which mostly comprises capital expenditure or projects to build infrastructure. The second one is current expenditure for government operation.

Government plays a crucial role in Indonesian economy. This paper focuses on the development expenditure because of its impact on investment. Figure 2 shows the amount of development expenditure as a percentage of GDP. In the early development stage, development expenditure was around 4% of GDP. Government increased the development expenditure starting from the oil boom period. The large amount of development expenditure could be maintained even after oil export revenue decline because of the successful policy adjustment (Usui, 1997). Increasing private sector activity in the mid 1990s reduced the role of the government. The development expenditure decreases even further because of the limited government budget capacity after the Asian financial crisis.

2.4 Data Source and Empirical Framework

The main data source in this paper is national accounts data from Statistics Indonesia. We use fix capital formation as investment. The analytical period is 1969-2008. Using quarterly GDP data, we build annual observation that match with the fiscal period. The fiscal year began on April 1 until 1999. The 2000 fiscal period was only for nine months, started from April to December. Since 2001, fiscal year coincides with calendar year. Government revenue and expenditure data are taken from the Ministry of Finance. The fiscal data are adjusted to constant 2000 price using GDP deflator. We also include openness as an indicator of international trade. Openness is defined as the sum of export and import. Population, interest rate and inflation data are taken from the World Development Indicators (World Bank, 2010).

We follow the framework of Bahmani-Oskooee (1999) and Ahmed and Miller (2000) to estimate the relationship between investment and fiscal variables. We test the long-run equilibrium relationship among investment (*inv*), income (*gdp*), real interest rate (*r*), openness (*opn*) and fiscal variables. The fiscal variables included in this analysis are government development expenditure (*gsd*), government current expenditure (*gsc*) and government revenue (*rev*). The relationship can be stated as follow:

$$inv = f(gdp, gsd, gsc, rev, r, opn) \quad (2)$$

Theory predicts that income should be positively correlated with investment. Higher income means higher consumption. Increase in consumption needs additional production capacity provided by investment. Current expenditure and government revenue may negatively affect investment because of the crowding out effects. On the other hand, development expenditure may affect investment positively because the externalities are high. Interest rate represents the cost of capital of the investment. Higher interest rate means higher cost of capital that discourages investment. Openness may be positively correlated with investment because of the additional economic activity and investment from abroad.

Empirical procedure to estimate the relationship depends on the time-series characteristic of the data. First, we conduct unit root tests. Table 2 presents the results of unit root test using Augmented Dickey-Fuller (ADF) and Philips-Perron (PP) methods. We use Schwarz information criterion to determine the lag length in ADF tests and Newey-West bandwidth selection with Bartlett kernel in PP tests. It is clear that all variable, except real interest rate, are I(1). In this case, regression in level may produce spurious results. On the other hand, regression in the first differences may cause a loss of long-run information. Therefore, we apply cointegration procedure.

3. Results and Discussion

In the cointegration test, we carry out the analysis using one lag on the VAR as indicated by Schwarz information criterion. Although Akaike information criterion selects more lags, the power of cointegration test would significantly decrease because of the limited sample. In addition, the relationship becomes unstable with the inclusion of more than one lags. The endogenous variables included in the cointegration analysis are investment, income, government development expenditure, government current expenditure, government revenue and openness. To control for the impact of the Asian crisis, we employ dummy variable for crisis as exogenous variable.

Real interest rate is excluded in the final model for several reasons. First, it is stationary at the level or $I(0)$. Secondly, the coefficients of real interest rate are not significant in both cointegrating vector and loading factor matrices. Moreover, the model without real interest rate provides better result in terms of Schwarz and Akaike information criterion than the model which includes real interest rate.

The result of Johansen (1988) cointegration test is presented in Table 3. It is obvious that both cointegration tests reject the null hypothesis at 5% level of confidence only for $r = 0$. Therefore, we may safely conclude that there is one cointegration relationship among the variables.

The vector is normalized to form investment function based on the theoretical framework and finding of one long-run relationship. Table 4 reports the estimates of normalized long-run cointegrating vectors (β') and loading factors (α) matrices. We can see from the upper part of Table 4 that the estimated parameters have the correct signs and almost all are highly significant. Income, development expenditure and openness are positively related to investment. On the other hand, government revenue and current expenditure are negatively related to investment. Although the standard error of government revenue is high, the sign is correct because theory suggests that increase in tax would reduce investment. The long-run parameters may also be stated as equation as follow:

$$\text{inv} = 0.326 \text{ gdp} - 0.617 \text{ rev} + 1.725 \text{ gsd} - 1.592 \text{ gsc} + 0.404 \text{ opn} \quad (3)$$

The positive impacts of development expenditure on investment and economic growth are in line with Bahmani-Oskooee (1999), Bose et al. (2007) and Ang (2009). The negative effects of government revenue and current expenditure provide additional evidence of the existence of the crowding out effects (Buiter, 1977; Bernheim, 1989). The significance of the openness supports the result of Ahmed and Miller (2000).

The lower row of Table 4 presents the estimated loading factors or responses of each of the variables to the error correction term. We can see from the result that the response of investment is quite rapid. The value of -0.62 for the loading factor of investment indicated that 62% of the adjustment process takes place in the following year and completes within the period of two years.

We also conduct exogeneity test for each variable in the cointegrating relationship. The procedure is to set a restriction on each of the loading factor of the variables. The result of exogeneity test is presented in Table 5. It is clear that all variables can be considered endogenous variables. Furthermore, the diagnostic tests on the residuals do not indicate any problems (see Appendix Tables).

The dynamic effects of shocks to fiscal variables on investment and GDP are consistent with the theory. Figure 3 presents the impulse responses functions of investment and GDP. The responses of investment and GDP to a one-standard-deviation structural shock to fiscal variables are in line with theory. The responses of both investment and GDP to positive innovations in government revenue and current expenditure are negative. On the other hand, the responses of investment and GDP to a positive innovation in development expenditure are positive. The results confirm both crowd out and crowd in effects of government activity. Government revenue and current expenditure crowd out investment, while development expenditure crowds in investment.

Government may use the development expenditure to stimulate investment and accelerate economic growth. In the same time, government also should pay attention to the negative effects of misallocating the resource to unproductive expenditure. In addition, financing through an increase in government revenue may induce negative effects. Increase in development expenditure without increase in revenue would imply budget deficits. However, budget deficits would be followed by an increase of tax in the future. The possible scenario for developing countries would be the utilization of development expenditure to enhance productivity and growth to grow out of debt. We should interpret the implications carefully because large budget deficits may affect fiscal sustainability and resilience in the future.

4. Conclusion

This paper reviews the relationships among fiscal variables, investment and economic growth. The growth accounting shows that physical capital is the largest contributor of economic growth in Indonesia. The results indicate that government revenue and current expenditure affect investment and economic growth negatively. On the contrary, development expenditure has positive effects on investment and economic growth. The results imply that the government may use development expenditure and budget deficits to enhance economic growth as far as fiscal sustainability and resilience can be maintained.

Acknowledgement

The author would like to thank Prof. Komatsu Masaaki for invaluable comments and support.

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Table 1. Growth accounting

Source	Period	Output growth per worker	Contribution of		
			Physical capital	Human capital	TFP
Bosworth et al., 1995	1980-1986	2.6	3.2	0.5	-1.1
	1986-1992	3.9	2.6	0.5	0.8
Collins and Bosworth, 1996	1973-1984	4.3	2.3	0.5	0.5
	1984-1994	3.7	2.3	0.5	0.9
Sarel, 1997	1978-1996	4.7	2.9	0.6	1.2
	1991-1996	5.1	2.2	0.7	2.2
World Bank, 2005	1967-1980	5.0	2.0	0.5	2.4
	1981-1997	3.8	2.5	0.5	0.8
	1998-1999	-8.8	0.9	0.5	-10.0
	2000-2003	2.1	0.4	0.4	1.2
	1967-2003*	3.4	2.0	0.5	0.9

Notes: * is author's calculation based on the simple average of the sub-periods from the World Bank (2005) data.

Table 2. Unit root test

	ADF					PP						
	level		first difference			level		first difference				
	lag	t stat	lag	t stat		bwd	t stat	bwd	t stat			
inv	1	-1.466	0	-4.547	***	4	-1.237	8	-4.308	***		
gdp	0	0.553	0	-4.671	***	0	0.553	2	-4.632	***		
rev	0	-0.241	0	-6.753	***	31	0.862	23	-7.829	***		
gsd	0	-1.772	0	-6.368	***	0	-1.772	2	-6.396	***		
gsc	0	1.472	0	-4.389	***	15	2.599	9	-4.197	***		
r	0	-3.408	**	1	-6.291	***	2	-3.379	**	32	-13.764	***
opn	2	2.497		0	-6.392	***	6	2.357		1	-6.394	***

Notes: *, ** and *** represent 10%, 5% and 1% levels of significance, respectively. The null hypothesis of ADF tests and PP tests is unit root. The lag length selections for ADF tests use Schwarz information criterion. PP tests use Newey-West bandwidth selection with Bartlett kernel.

Table 3. Cointegration test

Eigenvalue	H0	Trace			lmax		
		Stat	5% CV		Stat	5% CV	
0.745	$r = 0$	119.118	95.754	***	51.931	40.078	***
0.489	$r \leq 1$	67.187	69.819	*	25.512	33.877	
0.450	$r \leq 2$	41.675	47.856		22.690	27.584	
0.259	$r \leq 3$	18.986	29.797		11.367	21.132	
0.175	$r \leq 4$	7.619	15.495		7.292	14.265	
0.009	$r \leq 5$	0.327	3.841		0.327	3.841	

Notes: *, ** and *** represent 10%, 5% and 1% levels of significance, respectively. Variables included are inv, gdp, rev, gsd, gsc, opn as endogenous variables and crisis dummy as exogenous variable.

Table 4. VECM result

	inv			gdp			rev			gsd			gsc			opn		
β' matrix	1.000			-0.326	***		0.617			-1.725	***		1.592	***		-0.404	***	
				(0.042)			(0.544)			(0.583)			(0.340)			(0.074)		
α matrix	-0.617	***		-0.806	***		-0.208	*		0.154	***		-0.239	***		-0.999	***	
	(0.119)			(0.174)			(0.121)			(0.065)			(0.081)			(0.339)		

Notes: *, ** and *** represent 10%, 5% and 1% levels of significance, respectively. The standard errors are in the parentheses.

Table 5. Exogeneity test

	t value	p value
inv	23.120	0.000
gdp	14.678	0.000
rev	3.248	0.072
gsd	5.784	0.016
gsc	9.525	0.002
opn	7.800	0.005

Appendix Table 1. Serial correlation test

lags	LM-Stat	p value
1	44.955	0.146
2	33.961	0.566
3	38.877	0.341
4	45.805	0.127

Appendix Table 2. Normality test

	χ^2	p value
Skewness	2.881	0.824
Kurtosis	13.647	0.034
Jarque-Bera	16.528	0.168

Appendix Table 3. White heteroskedasticity test

χ^2	p value
339.383	0.165

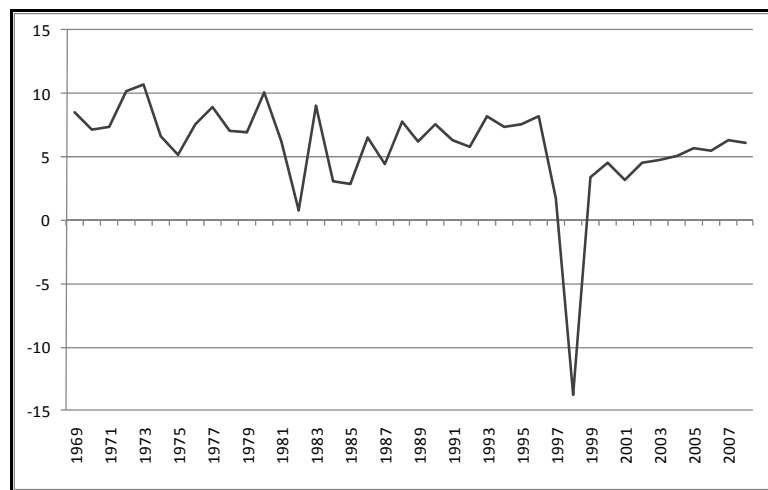


Figure 1. Economic growth (% annual)

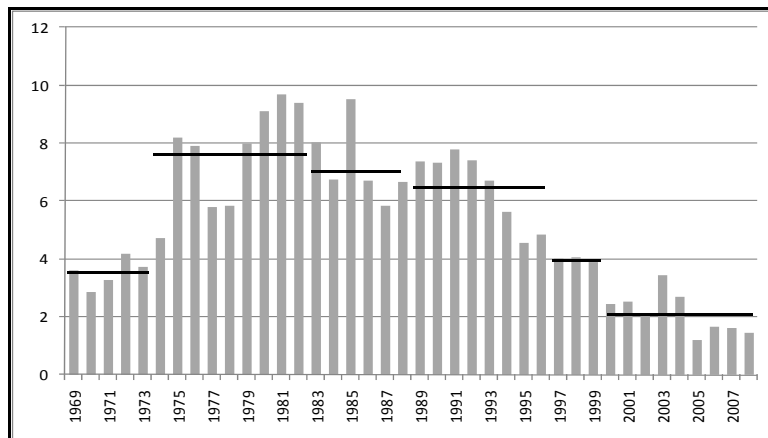


Figure 2. Development expenditure (% of GDP)

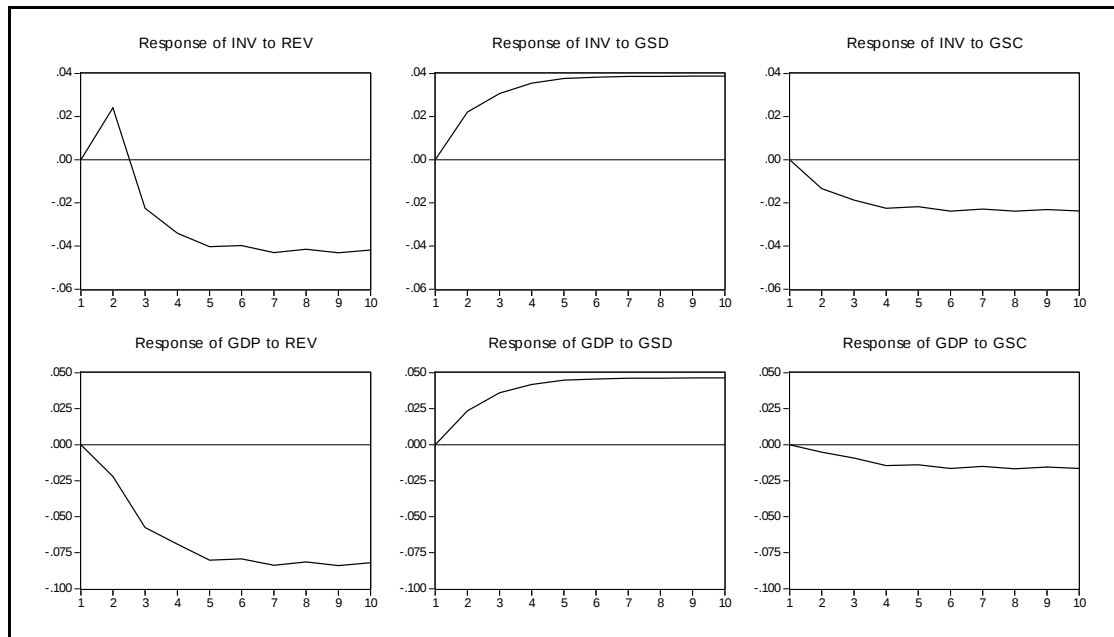


Figure 3. Responses of investment and GDP to shocks in fiscal variables