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Abstract

The existing endogenous growth theory considers either the effects of FDI or public expenditures on economic growth separately. As far as we concerned, no theoretical growth model has taken into account the interaction effect of these two factors. As found out by Le and Suruga (forthcoming), there is evidence that excessive spending in public expenditures can hinder the beneficial impact of FDI. This article examines some other potential relationships between FDI and public expenditure and proposes that more efforts should be contributed in building a theoretical model which presents the interrelationship between these factors in determining the long-term economic growth rate.

Key words: Theory; Foreign direct investment; Public expenditures; Economic growth
***JEL* Classification**: E62; F21; F43; H50; O40

1. Introduction

Foreign direct investment (FDI) has been a subject of interest for economists since the post-Second World War period when European countries and Japan needed capital from the US to finance reconstruction following the damage caused by the war. FDI has grown continuously since then, and in the 1990s, it accounted for about a quarter of international capital outflows. FDI can have an impact on many aspects of a host country's economy such as output, the balance of payments, and market structure. However, it is believed that bridging the gap in technology between the foreign country and the host country is the main effect of FDI, which in turn improves the productivity and growth of the host country (Moosa, 2002).

Public expenditure is an important instrument for a government to control the economy. Economists have been well aware of its two-side effects in promoting economic growth. On the one hand, public investment is a factor contributing to capital accumulation. Public expenditures are also used to fill up the holes that are left untouched in a market economy such as public utilities, health care, social security, etc. On the other hand, however, tax, which is the entire financial source for public expenditures, does directly reduce the benefits of taxpayers. As human capital plays the key role in promoting economic growth, a lower benefit of citizens is associated with a lower economic growth rate. Considering the economy as a whole, the question of how to spend public expenditures appropriately has been a difficult task.

Previous studies have found no consensus on the impact of public expenditures on economic growth (Gupta et al., 2002). The effects of FDI although are confirmed as positive in most of the studies; however, the degree of such impact depends on the absorptive capacity of the host country, which consists of the level of human capital, infrastructure, financial and institutional development, and trade policies (Makki and Somwaru, 2004). The main purpose of this article is to contribute more empirical evidences which can be used as guidance for building up a growth model that structures the linkages between FDI and public expenditures in determining the long-term economic growth rate.

2. The model

2.1. Literature review

There is an extensive literature examining the impact of public expenditures on economic growth. As one of the government's instruments together with taxation and welfare policy, public expenditures are claimed as "the most powerful economic agent in all modern societies" (Arrow and Kurz, 1970). Some economists believe that while government consumption has a negative effect on economic growth, government investment can be considered as one of its important beneficial factors (Aschauer, 1989; Barro, 1991; Easterly and Rebelo, 1993; Gramlich, 1994; Gupta et al., 2002; and Turnovsky, 2004). In contrast, many others claim a negative linkage between economic growth and government spending or find a non-robustness relationship between these two factors (Landau, 1986; Grier and Tullock, 1987; Devarajan et al., 1996; and Folster and Henrekson, 2001).

The literature of FDI study is not much controversial as economists believe that FDI has a positive impact on the technology upgrading progress of the recipient country (Blomstrom, 1992; Borensztein et al., 1998; and Moosa, 2002) and its economic growth eventually. This impact can be found via many channels but mainly by increasing the degree of competition in host-country markets, incorporating new inputs and foreign technologies in the production function of the host country; and augmenting the level of knowledge in the host country. The volume and type of FDI inflows as well as the degree of its impact on economic growth are argued to depend on the absorptive capacity of the host country. The root reason is because domestic firms need a certain absorptive capacity before they can benefit from new technologies brought by foreign firms (Girma, 2003). At the macro level, the analysis of the absorptive capacity is done by examining the recipient economy's trade regime, legislation, political stability, human resources, institutional and financial absorptive capacity, balance of payments constraints, and the size of the domestic market for the goods produced via FDI (Balasubramanyam et al., 1996; Borensztein et al., 1998; de Mello, 1999; and Durham, 2004).

The question of which factor, FDI or public expenditures, plays a more important role in promoting economic growth has been rarely touched because most of the existing theoretical and empirical studies have examined the effects of these factors on economic growth separately. The first attempt in considering the interrelationship of FDI and public expenditures in determining the economic growth rate is the study of Le and Suruga (forthcoming). They suggested that excessive spending in public capital expenditure can reduce the positive impact of FDI on economic growth. This article continues their approach by investigating some other potential interactions between these two factors and provides some implications for future research.

2.2. The model

Endogenous growth theory has been well developed for quite a long time but its implications for public expenditure/FDI have only emerged in recent years (Devarajan, 1996; Moosa, 2002). The radical departure for many studies in this literature is the original contribution of Barro (1990) who theorized the linkage between public spending and economic growth by using an endogenous growth model. His limitation is that only flow of public expenditure is taken into account in the model. Recognizing this fact, Futagami et al. (1993) adopted the Barro model in another polar case where public services are derived from public capital only and derived the similar conclusion to Barro's. The extension of Barro's model went further when Tsoukis and Miller (2003) assumed that public services are derived from both public capital and public expenditure flow. One of Barro's main conclusions that have been generalized by the model developed in this paper is that the growth-maximizing ratio of public spending over GDP should be equal to the public service's elasticity in aggregate production.

This section presents a simple modification added to the model developed by Tsoukis and Miller (2003). Their model includes the determinant factors of economic growth as public capital expenditure,

public current expenditure and tax rate but excludes technology factor. As discussed in the previous section, the effect of FDI on economic growth can be recognized via technology upgrading progress, and therefore, the total factor productivity level is added to the model and assumed to be a function of FDI.

It is assumed that the government attempts to maximize the utility function, which has the following CES function:

$$U = \int_0^{\infty} (C^{1-\theta} - 1)/(1-\theta) e^{-\rho t} dt \quad (1)$$

where C is the consumption, θ is inter-temporal substitution elasticity: $\theta > 0$ and ρ is the constant rate of time preference: $\rho > 0$.

The production function is assumed to have the following form:

$$Y = AK^{1-\phi}(P^{\alpha} H^{1-\alpha})^{\phi}, \; A = f(F) \quad 0 < \phi, \alpha < 1 \quad (2)$$

where Y is total final output; K and P are the aggregate stocks of private and public capital, respectively; H is the flow of non-capital public expenditure and F is the stock of FDI; A, total factor productivity level, is a function of FDI. This model assumes that the government runs a balanced budget by an output tax on firms.

Following the transformation procedure which is similar to that of Tsoukis and Miller (2003), the long-term growth rate is defined as:

$$\bar{g} = \frac{1}{\theta}\left((1-\tau)(1-\phi)(A)^{1/(1-\phi)} \left(\frac{x}{\bar{g}}\right)^{\alpha\phi/(1-\phi)} \left(\frac{H}{Y}\right)^{(1-\alpha)\phi/(1-\phi)} - \rho \right) \quad (3)$$

where τ is the tax rate, h and x are the ratios on output of non-capital public expenditure and capital public expenditure respectively, overbars indicate steady-state values.

The relationship between these factors is generalized in the following form:

$$\Rightarrow \bar{g} = f(\tau, A, x, h) \quad (4)$$

3. Empirical evidence

3.1. Data and choice of variables

The relationship between public expenditures, FDI and economic growth has been the subject of numerous recent papers. However, most of the researchers have focused on the impact of either public expenditure or FDI on economic growth separately without considering the potential interaction effects of these two factors. [i] Le and Suruga (forthcoming) is the first study devoted to this approach and they suggested that too much spending in public capital expenditure can reduce the positive impact of FDI.

Our study uses the same data sample used in Le and Suruga (forthcoming), i.e. 105 developed and developing countries from 1970 to 2001. The data is obtained from the World Development Indicators

2003 CD Rom.[ii] Their approach of using five-year forward lag structure where explanatory variables in period *t* would have an effect on growth from period *t+1* through *t+5* is also adopted.[iii]

According to the result presented in the previous section, long-term growth is described in equation (4) as follows:

$$\overline{g} = f(\tau, A, x, h)$$

In the empirical analysis, the relationship between the long-term growth rate, FDI and public expenditures is investigated under the linear form. The key explanatory variables are the share in GDP of FDI, public capital, and public non-capital expenditure. Tax rate, τ, is omitted because of insufficient data. In addition, following the study of Tsoukis and Miller (2001), this study also includes the share of private investment to GDP in the empirical analysis.

3.2. Regression analysis

The following equation is estimated using the fixed-effect model:

$$Growth_{i(t+1,t+5)} = a + b_1 Pubcap_{it} + b_2 Pubcur_{it} + b_3 Pricap_{it} + b_4 Fdi_{it} + b_5 Fdicur_{it} + c_1 Fdicap_{it} + d_1 Fdidm_{it} + \varepsilon_{it}$$

where i = 1,2, …, N (number of countries) and t = 1970, 1971, … 2001; $Growth_{i(t+1,t+5)}$ is the five-year forward moving average of per-capita GDP growth for country i; $Pubcap_{it}$, $Pubcur_{it}$, $Pricap_{it,}$ and Fdi_{it} are the ratios to GDP of annual public capital expenditures, public current expenditures, private capital flow, and FDI respectively; $Fdicur_{it}$ and $Fdicap_{it}$ are the interaction terms between *Fdi* and *Pubcur* and *Pubcap* (*Fdi*Pubcur* and *Fdi*Pubcap*) respectively; $Fdidm_{it}$ is the interaction term between *Fdi* and *Dm* (a dummy variable which is identified as 1 where *Pubcur* exceeds 25%); and ε_{it} is the error term.

INSERT TABLE 1 HERE

Table 1 presents the estimation for the data of developing countries. The coefficient of *Fdi* is positive and significant in all of the cases. This result confirms the previous findings, such as Balasubramanyam (1996), Borensztein et al. (1998), Durham (2004), and Le and Suruga (forthcoming). *Pubcur* has a positive but insignificant coefficient. *Pubcap* and *Pricap* are found to have significant positive coefficients and this result is consistent with other studies (Aschauer, 1989; Barro, 1991; and Easterly and Rebelo, 1993).

The interrelationship between FDI and public expenditures are examined in different ways. Equation (1) and (2) include the interaction terms between FDI, public current expenditures and public capital expenditures, respectively. That the interaction terms in equation (1) and (2) are negative suggests that FDI and public expenditures (both capital and current expenditures) do not support each other in promoting economic growth of developing countries. Equation (3) is the threshold examination toward the potential impact of the spending level of public current expenditure on the FDI's effect on economic

growth. The negative coefficient of the variable *Fdidm* suggests that the positive effect of FDI on economic growth is reduced when the ratio to GDP of public current expenditure exceeds 25%.[iv] This finding follows the study of Le and Suruga (forthcoming) who suggested that the effect of FDI on economic growth becomes weaker as the public capital expenditure exceeds 8-9%.

INSERT TABLE 2 HERE

According to Galor and Moav (2004), the main engine of its economic growth varies at different stages of a country's development. While physical capital accumulation is the main engine of economic growth at the early stages of development, human capital accumulation plays the similar role in more advanced societies. As such, one should expect that FDI, public capital, and private capital - factors increase directly the physical capital accumulation rather than human capital accumulation - may be less important the higher development level of the country becomes. The estimation of developed countries' data given in table 2 provides quite interesting results. While the negative effects of FDI and *Pricap* on economic growth in developed countries are as expected from this theory, the positive sign of *Pubcap* suggests that further work should be done in order to verify its validity. Because of insufficient data, public capital is taken into consideration in this paper as a lump sum. Due to this limitation, it is possible that many capital expenditures spent to build up human capital (e.g. education or health care) are categorized as spent to increase the physical capital.

Pubcur has a significant negative coefficient in all three cases and this result is consistent with the findings of Le and Suruga (forthcoming). However, as shown by the tests of the interrelationship between *FDI* and *Pubcur*, the real impact of *Pubcur* on economic growth may be more complex than expected. The coefficients of interaction terms in equation (4) and (6) are positive. The result in equation (4) implies that there is a positive multiplicative effect of *FDI* and *Pubcar* on economic growth in developed countries. Equation (6) presents the result of a similar test to that of equation (3) and suggests that the larger the public current expenditures, the higher possibility of positive effect of FDI on economic growth is recognized.

4. Conclusion

Using panel data from 105 developed and developing countries during the period 1970-2001, the interrelationship between FDI and public expenditures in determining the economic growth rate is examined. The results of this paper suggest some implications in building a theoretical model which structures the impacts of FDI and public expenditures on economic growth.

FDI is expected to have positive impact on economic growth but such impact should be stronger at the early stages of development process and become less important when the country becomes more advanced. As suggested by Galor and Moav (2004), the effect of public capital on economic growth must also follow the same model. However, due to insufficient data, we can not confirm this expectation in this

paper. We suggest that further empirical analysis should be performed with more detail information on public capital expenditures' categories to verify their theory.

The interrelationship between public current expenditures and FDI in promoting economic growth appears to be quite complex. In developing countries, the effect of FDI on economic growth is reduced when the ratio to GDP of public current expenditure exceeds 25%. A contrast relationship, however, is found in developed countries. In addition, while the individual effects of these two factors on economic growth are negative, their interaction term has a positive sign. Further investigation is needed so that an appropriate explanation for this phenomenon can be given.

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Appendix

INSERT TABLE 3 HERE

INSERT TABLE 4 HERE

Table 1. *Developing countries*

Equation	(1)	(2)	(3)
Constant	-0.203	-0.421	-0.228
	(-0.59)	(1.24)	(0.67)
Fdi	0.303	0.349	0.227
	(2.92)***	(6.47)***	(5.54)***
Pubcap	0.042	0.086	0.045
	(1.67)*	(3.17)***	(1.8)**
Pubcur	0.012	0.006	0.0126
	(1.22)	(0.74)	(1.41)
Pricap	0.065	0.067	0.065
	(4.52)***	(4.74)***	(4.54)***
Fdicur	-0.006		
	(-1.28)		
Fdicap		-0.021	
		(4.23)***	
Fdidm			-0.157
			(2.49)**
Observations	975	975	975
R-squared	0.10	0.15	0.10

Absolute value of t statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 2. *Developed countries*

Equation	(4)	(5)	(6)
Constant	4.394	3.029	4.108
	(6.75)***	(4.98)***	(6.45)***
Fdi	-1.355	-0.122	-0.701
	(4.95)***	(0.75)	(4.62)***
Pubcap	0.210	0.217	0.177
	(3.34)***	(2.04)**	(2.79)***
Pubcur	-0.075	-0.039	-0.063
	(6.14)***	(4.10)***	(5.71)***
Pricap	-0.005	0.002	-0.007
	(0.28)	(0.10)	(0.38)
Fdicur	0.033		
	(4.56)***		
Fdicap		-0.011	
		(0.16)	
Fdidm			0.655
			(4.12)***
Observations	461	461	461
R-squared	0.23	0.20	0.23

Absolute value of t statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 3. *Descriptive statistics*

Variable	Obs.	Mean	Std. Dev.	Min	Max
Growth	2412	1.295266	3.613516	-24.03802	14.58576
Pubcap	2184	4.262512	3.419158	.0025085	25.34318
Pubcur	2194	23.85845	11.20408	.0733427	90.39733
Fdi	2290	2.158943	3.786232	.0004835	93.71999
Pricap	2156	18.80772	6.647677	.1578905	50.64721

Table 4. *Correlation matrix*

	Fdi	*Pubcap*	*Pubcur*	*Pricap*
Fdi	1.0000			
Pubcap	0.0938	1.0000		
Pubcur	0.0568	0.0783	1.0000	
Pricap	0.2982	0.0431	0.0817	1.0000

[i] See Le and Suruga (forthcoming) for detail literature review

[ii] See Appendix (table 3 and 4) for the summary of descriptive statistics and the correlation matrix

[iii] See Devarajan et al. (1996) and Le and Suruga (forthcoming) for further information of this approach

[iv] 60% of observations of *pubcur* have value greater than 25%. The same regression has been tested at different levels of *pubcur* and only in the range from 21% to 29%, coefficient of *Fdidm* is significant. Due to the space limitation, the regression with dummy variable at other levels is skipped.