Applied Economics Letters, 2005, **12**, 45–49

Routledge
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Foreign direct investment, public expenditure and economic growth: the empirical evidence for the period 1970–2001

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The simultaneous impact of public expenditures and foreign direct investment (FDI) on economic growth is studied. To the best of the authors' knowledge, this is the first study that takes into account the interaction between FDI and public expenditures in determining the economic growth rate. Using a sample of 105 developing and developed countries for the period 1970–2001, the main findings are (i) FDI, public capital, and private investment play important roles in promoting economic growth, (ii) public non-capital expenditure has a negative impact on economic growth, and (iii) excessive spending in public capital expenditure can hinder the beneficial effects of FDI.

I. Introduction

While foreign direct investment (FDI) is often seen as an important catalyst for economic growth, the question of whether public expenditure plays a similar role is controversial. On the one hand, public expenditure is a factor contributing to capital accumulation, which is the key determinant of growth. On the other hand, an increase of public expenditures requires an increase of tax, which directly reduces the benefits of taxpayers and lowers the economic growth rate eventually.

To the best of the authors' knowledge, there is no study that investigated the simultaneous impacts of public expenditure and FDI on economic growth. Existing studies have just examined the impact of either public expenditures or FDI on economic growth separately. Therefore, the question of which factor, FDI or public expenditures, contributes more on economic growth has been unanswered. Also, the issue of whether FDI and public expenditures complement or substitute each other has been untouched. Lack of such study makes it impossible to find the best policies that can maximize their beneficial effect.

This article contributes a new approach in the growth study by examining the interrelationships between public expenditures, FDI and economic growth. The regression analysis is based on data from 105 countries during the period 1970–2001. The results suggest that while FDI and public capital play important roles in promoting economic growth, public non-capital expenditure has a negative impact on economic growth. The results also show that excessive spending in public capital expenditure can hinder the beneficial effects of FDI.

II. Review of Literature

There have been quite a number of empirical studies analysing the impact of public expenditures on economic growth so far. The results, however,

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Applied Economics Letters ISSN 1350–4851 print/ISSN 1466–4291 online © 2005 Taylor & Francis Group Ltd
http://www.tandf.co.uk/journals
DOI: 10.1080/1350485042000293130

are varied as different analysis techniques and data samples are adopted.

The first school can be named for those who support the idea that public investment has a positive impact while public consumption has a negative impact on economic growth. Aschauer (1989), Barro (1991) and Easterly and Rebelo (1993) found that government expenditures spent on 'core infrastructure' such as streets, highway, airports, mass transit, and other public capital expenditures have the most explanatory power for private-sector productivity. Recently, Gupta *et al*. (2002) examined the relationship between growth and fiscal adjustment by analysing three aspects of fiscal policy: government budgetary balance, the financing of budgetary deficits, and expenditure composition. With a sample of 39 developing countries during the period 1990–2000, they suggested that in order to achieve a sustained fiscal adjustment, governments should reallocate expenditures of wages and salaries to more productive uses such as capital expenditures.

The findings above, however, have been challenged by numerous other works. Landau (1986) conducted a comprehensive study of the impact of government expenditure on economic growth. Government expenditure is divided into five categories: consumption, education, defence, transfers, and capital expenditure. Based on a crosssection data of 96 countries over various time periods between 1961 and 1976, his results implied that each type of government expenditure has either significant negative or insignificant positive effect on economic growth. The inconsistent relationship between public expenditure and economic growth is also supported by the findings of Grier and Tullock (1989). Their study was a pooled cross-section/time-series analysis on 24 OECD countries in the period 1951–1980 and 89 other countries in the period 1961–1980. The correlation between the growth of government's share in GDP and economic growth was found as positive in Asian countries but negative in OECD, African, and American countries. Using data of 43 developing countries over the period 1970–1990, Devarajan *et al*. (1996) found that an increase in the share of current expenditure has positive and statistically significant growth effects. In contrast, government capital expenditures (transport and communication) which are classified as productive by previous researchers (such as Aschauer, 1989; Barro, 1990) have either a negative or insignificant positive impact on economic growth.

Several other studies, including Balasubramanyam *et al*. (1996), Borensztein *et al*. (1998), and Durham (2004), investigated the FDI-growth nexus. Basically, they argued that FDI can have a positive impact on the technology upgrading progress and human capital of the recipient country. The degree of its impact on economic growth, however, depends on the absorptive capacity of the host country. Balasubramanyam *et al*. (1996) studied the effect of FDI on the growth process under the effect of the trade policy adopted by host countries. Using a cross-section data of 46 developing countries for the period 1970–1985, they confirmed the hypothesis originally suggested by Bhagwati (1978) that the positive effect of FDI on economic growth in export promoting (EP) countries is stronger than in those adopting an import substituting (IS) strategy.[1] Using a cross-country regression framework of 69 developing countries during the period 1970–1989, Borensztein *et al*. (1998) suggested that only when the host country has a certain threshold stock of human capital can the effect of FDI be recognized. Durham (2004) tested a variety of possible linear combinations of FDI, economic growth rate, and some 'doubtful variables' which include education rates, trade to GDP, and financial and institutional variables (stock market capitalization to GDP, the business regulation index, property rights index, and corruption index) using a sample of 18 OECD countries and 62 non-OECD countries over the period 1979–1998. His result showed that the degree of institutional and financial absorptive capacity influences the effectiveness of the positive effect of FDI on economic growth.

III. Empirical Results

The empirical analysis uses data obtained from the World Development Indicators 2003–CD ROM. The data cover 105 developed and developing countries over the period 1970–2001. The econometric model used here is based on the studies of Barro (1991), Devarajan *et al*. (1996) and Borensztein *et al*. (1998), in which the production function depends on the FDI, public capital expenditures, public non-capital expenditures, and domestic investment.

[1] The hypothesis is based on the assumption that in EP countries, the effective exchange rate on exports equates the effective exchange rate on imports while in IS countries, the latter exceeds the former. As a result, Bhagwati (1978) argued that EP countries would attract a higher volume of FDI.

The fixed-effect model is used to estimate equations with a five-year forward lag structure, i.e. explanatory variables in period t would have an effect on growth from period $t+1$ through $t+5$. This model follows the study of Devarajan *et al.* (1996), and there are three benefits associated with this approach. First, it implies that it takes time before the impacts of government expenditure and FDI on economic growth are recognized. Second, it reduces the possibility of reverse causality, i.e. government expenditures and FDI might change subject to the economic performance of a country, which is indicated by its economic growth rate. Finally, the fluctuation of short-term growth, which is a result of changes in public expenditures and FDI, is reduced.

Base regression results

The method of ordinary least squares (OLS) is used to estimate the following equation:

$$Growth_{i(t+1,\,t+5)} = a + b_1 Pubcap_{it} + b_2 Pubcur_{it} + b_3 Pricap_{it} + b_4 FDI_{it} + \sum_{j=1}^{4} b_j Dm_j + c_1 oda + d_1 edu + \varepsilon_{it} \quad (1)$$

where $i = 1, 2, \ldots, N$ (number of countries) and $t = 1970, 1971, \ldots, 2001$; $Growth_{i(t+1,t+5)}$ 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; Dm_j is the income level dummy variables, $j = 1$, 2, 3, 4, 5 corresponding to countries that fall into five categories: low income, middle-income lower level, middle-income upper level, non-OECD, and OECD respectively (in the regression, the OECD dummy variable would be used as the benchmark, thus it is dropped); *oda* is the ratio of official development assistance to GDP; *edu* is the secondary school enrolment ratio; and ε_{it} is the error term.

As shown in Table 1, coefficients of all explanatory variables are significant, except for that of public current expenditure in Equation 2. While Equation 1 includes only the main explanatory variables, Equations 2 and 3 check the robustness of the estimation by introducing two variables: official development assistance and the secondary school enrolment ratio.

Both public capital and public non-capital expenditure have significant impacts on growth rate. An increase in public capital expenditure leads to an increase in economic growth rate while the effect caused by a higher public non-capital expenditure is reverse. As argued by Barro (1990), this effect is expected because while public capital plays an important role in enhancing the productivity of private capital, an increase in public non-capital expenditure would create only a negative effect, as more tax is needed to finance this increase. This argument is confirmed by some previous studies such as Grier and Tullock (1989), Aschauer (1989), Easterly and Rebelo (1993) and Gupta *et al.* (2002). Private investment is found to have a significant positive effect on the five-year forward moving average of per-capita real GDP growth rate. The estimation also shows a positive and statistically significant relationship between the five-year forward moving average of per capita real GDP growth and the ratio of FDI to GDP. The coefficients of *FDI* range from 0.108 to 0.157. It is noted that the coefficient of FDI is larger than the coefficients of other explanatory variables. This fact was recognized by Balasubramanyam *et al.* (1996) and Borensztein *et al.* (1998) who suggested that FDI is the driving force in the growth process.

The inclusion of official development assistance (ODA) in Equation 2 produces a positive coefficient of this variable. This result is expected because ODA increases aggregate savings and investment and therefore, it has a positive effect on the growth rate.[2] The estimated coefficient of the secondary school enrolment ratio is also positive and significant. This result is consistent with the finding of Borensztein *et al.* (1998), and it suggests that human capital plays an important role in promoting economic growth.

It is interesting that as coefficients of dummy variables increase, their significance decreases from *dm*1 to *dm*4. It suggests that for the last 30 years, higher income countries have enjoyed a higher growth rate.

Threshold regression results

Table 2 presents the estimation of three equations in which the dummy variable *Dm* is introduced in the interactive form (*Dm* multipled by *FDI*) to check that at which level of public investment the effect of FDI is recognized. *Dm* is identified as

[2] As cited in Hansen and Tarp (2000), this argument is supported by several studies, including Hadjimichael *et al.* (1995), Durbarry *et al.* (1998), Lensink and White (1999) and Burnside and Dollar (2000).

Table 1. Fixed effects regression. Dependent variable: growth

Equation	(1)	(2)	(3)
Constant	1.742	4.315	−0.291
	(0.392)***	(0.698)***	(0.752)
FDI	0.131	0.141	0.108
	(0.039)***	(0.046)***	(0.043)**
Pubcap	0.076	0.054	0.083
	(0.024)***	(0.028)**	(0.037)**
Pubcur	−0.021	−0.012	−0.032
	(0.007)***	(0.009)	(0.011)***
Pricap	0.038	0.057	0.034
	(0.013)***	(0.015)***	(0.017)**
Dm1	−1.677	−4.902	−0.087
	(0.247)***	(0.611)***	(0.544)
Dm2	−0.929	−4.046	−0.108
	(0.216)***	(0.555)***	(0.384)
Dm3	−0.16	−3.165	0.784
	(0.212)	(0.565)***	(0.356)**
Dm4	0.442	−3.034	0.679
	(0.289)	(0.624)***	(0.432)
ODA	–	3.713	–
		(2.254)*	
Edu	–	–	0.027
			(0.007)***
Observations	1436	968	669
R^2	0.11	0.16	0.14
$\overline{R}^2$	0.09	0.13	0.12

Notes: Robust standard errors in parentheses.
* Significant at 10%; ** at 5%; *** at 1%.

Table 2. Threshold regression analysis

Equation	(4) If *pubcap* > 8	(5) If *pubcap* > 8.5	(6) If *pubcap* > 9
Constant	0.006	−0.002	−0.005
	(0.02)	(0.01)	(0.02)
FDI	0.198	0.2	0.2
	(5.93)***	(6.03)***	(6.04)***
Pubcap	0.05	0.051	0.05
	(2.13)**	(2.17)**	(2.15)**
Pubcur	0.007	0.007	0.007
	(1.24)	(1.25)	(1.27)
Pricap	0.066	0.066	0.066
	(5.00)***	(5.01)***	(5.01)***
FDIdm	−0.162	−0.174	−0.173
	(2.38)**	(2.60)***	(2.59)***
Observations	1436	1436	1436
R^2	0.08	0.08	0.08

Notes: Absolute value of *t*-statistics in parentheses (based on robust standard errors).
* Significant at 10%; ** at 5%; *** at 1%.

1 whenever the public investment ratio exceeds 8%, 8.5% and 9% in Equations 4, 5, and 6 respectively.[3] It is noted that coefficients of all explanatory variables are significant and consistent with the estimation shown in Table 1, except for the case of public current expenditure where its coefficient becomes positive and insignificant. 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 investment exceeds 8–9%. For instance, according to the estimation result of Equation 5, the coefficient of *FDI* is 0.2 while for *FDIdm* it is −0.174. It means that the slope coefficient of FDI reduces from 0.2 to 0.026 when the public investment ratio exceeds the level of 8.5%. Regarding the threshold analysis of previous studies, it is basically found that FDI has an impact on productivity or economic growth only when the host country has sufficient absorptive capacity. The latter has been analysed by focusing on human capital (Borensztein *et al*., 1998), the trade regime (Balasubramanyam *et al*., 1996) or financial and institutional development (Durham, 2004). This paper examines the effects of FDI on economic growth from a different approach which analyses how the degree of such effects is influenced by the public investment level which is a proxy for government intervention. The result suggests that excessive government intervention can have a negative impact on the absorptive capacity of the economy (similar to the crowding-out effect).

IV. Conclusion

While the existing empirical works have focused on the effects of either FDI or public expenditures on economic growth separately, this article contributes a new approach to the study of endogenous growth by examining the interrelationships between public expenditures, FDI, and economic growth. Public capital expenditure and FDI appear to have a positive impact on economic growth while public non-capital expenditure has a negative impact. The results also show that the effect of FDI on economic growth becomes weaker as the public investment ratio exceeds 8–9%. It suggests that too much government intervention may have a negative effect on the performance of the economy.

[3] In fact, the dummy variable *Dm* has been tested with various ratio of public investment ranging from 1% to 7.5%; however, none produce significant coefficients of explanatory variables. Thus, the result is presented here with the ratio of public investment at 8%, 8.5% and 9% only (10% of observations of *pubcap* have value greater than 8.27%).

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