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THE ROLE OF FOREIGN DIRECT INVESTMENT IN ECONOMIC GROWTH

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Abstract. This paper studies the effects of Foreign Direct Investment (FDI), domestic private investment, government expenditure and labour on economic growth using 1965 to 1992 data for 32 developing countries. The study finds that the contribution of domestic private investment to economic growth is more consistent and reliable than the contribution of FDI. Thus, FDI loses its attraction as an engine of growth if the adverse balance of payments consequences of the resulting profit repatriation are also taken into account. The study further finds that the contribution of government expenditure to economic growth is negligible and the productivity of labour is low, indicating that the growth strategy that neglects human capital cannot yield long-term benefits.

I. INTRODUCTION

While the debate on the relative importance of investment in the public and private sectors has now tilted in favour of the latter, there are growing concerns about the adequacy of private savings in Less Developed Countries (LDCs) in generating sufficient private investment expenditure. Though it is recognized that capital inflows are instrumental in jump-starting the growth process, economists have emphasized on the importance of distinguishing between external borrowing and private capital inflows in the form of Foreign Direct Investment (FDI). Klein (1991), for example, points out that the two forms of capital have different implications for the borrowers as well

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as the lenders. The debt servicing payments associated with loan capital are fixed and must be honored in time, except in the event of default, while the lender is unable to withdraw capital at will. On the other hand, equity capital is risky for lenders because its rate of return is variable and the payments can be postponed, but the lender can also withdraw capital at any time.[1]

During 1960s and 1970s many LDCs resorted to foreign aid and commercial borrowing from external sources to bridge the gap. However, the debt management crises in a number of such countries have called into question the wisdom of this growth strategy. On the other hand, recent developments in growth literature coupled with the successful growth experience in some of the Far East countries has brought the importance of FDI to the limelight. It is, therefore, not surprising that many LDCs are keenly engaged in finding out the ways and means to attracting FDI. Private capital inflows in the form of FDI include capital, technology, managerial and organizational practices, training and trade, which linked together help promote economic growth in the host country. With the transfer of technology and technical know-how FDI is supposed to play an important role in introducing improved products and processes.

The importance of FDI, however, does not diminish the role of productive investment from the domestic economy. While private domestic investment can be regarded as a permanent and reliable channel to enhance productive capacity, investment in public sector has been considered important in infrastructure, research and development and training. Public sector expenditure, however, also has a negative side in that it is likely to crowd out private investment and public sector is often found to be highly inefficient in resource management.

But how important is the role of FDI compared to domestic investment in the private or public sectors remains an unsettled question. The early literature (*e.g.*, Kemp, 1962a, 1962b, MacDougall, 1960) is based on neo-classical framework and it compares the benefits of foreign investment in terms of increased labour income with the cost in terms of profit repatriation. The analysis typically concludes that there are no long lasting effects of foreign investment. Using Solow-Swan growth framework (Solow, 1956;

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[1]Khan (1991) argues that debt and equity capitals are two alternative contractual arrangements for risk sharing and the relative merits of the two types of capital would depend on attitudes towards risk.

Swan, 1956), Crouch (1973) shows that the benefits of capital inflows, even if received as grants with no obligation to principal or profit payments, cannot be sustained along the steady state growth path. More recently Ahmad and Paul (1998) use similar growth framework to study growth dynamics of FDI. The study shows that foreign investment can raise per capita income in the host country on permanent basis under an institutional arrangement whereby foreign investors commit to re-invest at least a certain proportion of their profits in the host country. The study, however, demonstrates that such a possibility can exist only in the countries with very low saving rate and/or high share of capital in the national income. Ahmad (1999) shows that there are additional potential benefits from foreign investment if the foreign capital is engaged with technologically superior production process.

Bhagwati (1978) proposes that the benefits of FDI are higher in those countries that follow export promotion strategy. The empirical evidence from developing countries in Balasubramanyam *et al.* (1992) further supports this proposition. Gonzalez (1988), however, shows that welfare gain from foreign investment in the small economy is independent of the pattern of trade, though its size depends on labour market and trade distortion and the pattern of trade. In any case the literature finds that the empirical association between FDI and economic growth is rather weak.

Shabbir and Mahmood (1992) find that although foreign investment has a positive relationship with the growth rate of GNP in Pakistan, but it has eroded the domestic saving rate. In a more recent study for Pakistan, Khan (1997) finds that the inflow of capital in the form of aid and loans has an adverse effect on the growth performance because it introduces inefficiency and leakage in the use of resources and retards domestic saving efforts.

The objective of this study is to investigate empirically the relative importance of FDI, domestic private investment and government spending in the process of economic growth. The study is based on neo-classical production function, extended to distinguish between domestic and foreign owned capital and to allow endogenous technology that is dependent on the flow of FDI. To make the model consistent with available data appropriate stock to flow transformations are applied. The theoretical model is then applied to pooled time-series and cross-section data of a sample of 32 LDCs over the period 1965 to 1992. Most of these data are derived from the PENWORLD Table 1995, which is considered to be a consistent data source for inter-country studies.

The study is planned as follows. Section II explains the model and framework of analysis. Data and estimation procedure are discussed in Section III. The results of econometric exercises are presented in Section IV, while Section V consists of summary and conclusion.

II. METHODOLOGY

Our analytical framework is mainly derived from classic contributions to the subject such as MacDougall (1960), Kemp (1962a, 1962b) and Crouch (1973), in which FDI is introduced in the economy-wide production function. Following Ahmad and Paul (1998) we introduce FDI in the production function as a flow component of capital stock. However, since the present study focuses on the empirical side, we do not go much in theoretical details that are essential to ensure a close form solution to the model. Consider the following general form of production function:

$$Y = F\{L, K^d, K^f, T(t, K^f)\} \quad (1)$$

where Y, L, K^d, K^f and t are output, labour, domestic and foreign capital stocks and time, respectively. The technological factor $T = T(t, K^f)$ allows for the exogenous technological growth of the neo-classical type along with the spillover effects or externalities from foreign owned capital to the domestic economy.

The above equation relates aggregate output to domestic and foreign capital stocks on which no data are available. Since the data on domestic and foreign investment are available, we can estimate the above equation after applying stock-to-flow transformation. Thus, to bring domestic and foreign investment explicitly into the picture, consider the total differential of equation (1):

$$dY = \frac{\partial F}{\partial T}\frac{\partial T}{\partial t}dt + \frac{\partial F}{\partial L}dL + \frac{\partial F}{\partial K^d}dK^d + \left[\frac{\partial F}{\partial K^f} + \frac{\partial F}{\partial T}\frac{\partial T}{\partial K^f}\right]dK^f \quad (2)$$

An empirical counterpart of this equation can be obtained by imposing some Taylor Series approximation and replacing instantaneous rates of changes per unit of time, given by differentials, by first differences in discrete times. Here we consider linear Taylor Series approximation in natural logs. Thus, dividing both the sides of equation (2) by output and multiplying and dividing the second, third and fourth term on the right hand side by appropriate variables, we have

$$\frac{dY}{Y} = \frac{\partial F}{\partial T}\frac{T}{Y}\frac{1}{T}\frac{\partial T}{\partial t}dt + \frac{\partial F}{\partial L}\frac{L}{Y}\frac{dL}{L} + \frac{\partial F}{\partial K^d}\frac{K^d}{Y}\frac{dK^d}{K^d} + \left[\frac{\partial F}{\partial K^f}\frac{K^f}{Y} + \frac{\partial F}{\partial T}\frac{T}{Y}\frac{\partial T}{\partial K^f}\frac{K^f}{T}\right]\frac{dK^f}{K_f} \quad (3)$$

With the first order Taylor Series approximation in logs all the elasticities are treated as constants. Therefore, the discrete time log linear approximation to the above equation gives:

$$\frac{Y_t - Y_{t-1}}{Y_{t-1}} = \alpha_1 + \alpha_2\frac{L_t - L_{t-1}}{L_{t-1}} + \alpha_3\frac{K_t^d - K_{t-1}^d}{K_{t-1}^d} + \alpha_4\frac{K_t^f - K_{t-1}^f}{K_{t-1}^f} \quad (4)$$

The change in capital stock over two consecutive periods is equal to net investment during the current period, which in turn is equal to gross investment minus depreciation. Following the convention we assume that depreciation of capital is proportional to the capital stock in the preceding period. Thus, denoting the gross domestic and foreign investment in period t by I_t^d and I_t^f; the depreciation of domestic and foreign capital in period t by D_t^d and D_t^f; and the corresponding depreciation rates by δ^d and δ^f respectively, the change in domestic and foreign capital stocks can be written as follows:

$$K_t^d - K_{t-1}^d = I_t^d - D_t^d = I_t^d - \delta^d K_{t-1}^d \quad (5)$$

$$K_t^f - K_{t-1}^f = I_t^f - D_t^f = I_t^f - \delta^f K_{t-1}^f \quad (6)$$

Substituting (5) and (6) into (4) and rearranging the result yields:

$$\frac{Y_t - Y_{t-1}}{Y_{t-1}} = \alpha_1 - \delta^d - \delta^f + \alpha_2\frac{L_t - L_{t-1}}{L_{t-1}} + \alpha_3\frac{I_t^d}{K_{t-1}^d} + \alpha_4\frac{I_t^f}{K_{t-1}^f} \quad (7)$$

The last two expressions measure the growth rates of domestic and foreign capital. Since data on capital stocks are not available, we redefine these growth rates as the changes in capital stocks relative the GDP in the base year. For this purpose, the above equation is rewritten as:

$$\frac{Y_t - Y_{t-1}}{Y_{t-1}} = \alpha_1 - \delta^d - \delta^f + \alpha_2\frac{L_t - L_{t-1}}{L_{t-1}} + \alpha_3\frac{Y_{t-1}}{K_{t-1}^d}\frac{I_t^d}{Y_{t-1}} + \alpha_4\frac{Y_{t-1}}{K_{t-1}^f}\frac{I_t^f}{Y_{t-1}} \quad (8)$$

Further assuming that the two output-capital ratios, denoted σ^d and σ^f, are stable and denoting the growth rates by G, we can write:

$$G_t^Y = \alpha_1 - \delta^d - \delta^f + \alpha_2 G_t^L + \alpha_3 \sigma^d G_t^{K^d} + \alpha_4 \sigma^f G_t^{K^f} \tag{9}$$

Finally, introducing government expenditure, G, and a random error term yields the following econometric equation:

$$G_t^Y = \beta_1 + \beta_2 G_t^L + \beta_3 G_t^{K^d} + \beta_4 G_t^{K^f} + \beta_5 G_t^G + U_t \tag{10}$$

III. DATA AND ESTIMATION PROCEDURE

The data for this study have been taken from PENWORLD Table 1995. This data source does not provide information on FDI. The FDI data are, therefore, taken from International Monetary Fund (1994). All the nominal variables are measured in US dollars at constant US prices of 1990. For most of the variables data are available on annual basis for the period 1965 to 1992. Originally a sample of 55 countries was selected but after screening process 32 countries were selected for which data on all the relevant variables were available for at least 15 years. For the purpose of analysis some of the variables, such as GDP, have been converted from per capita basis to levels by using data on population. The variables given in terms of percentages to GDP are also converted into levels by using the series of GDP. Since all the data from PENWORLD Table are measured in constant US dollar prices, the series of foreign direct investment, which are taken from a different data source, are deflated by GDP price deflator of the USA to arrive at the series of real FDI. The domestic investment series are obtained by subtracting the series of foreign direct investment from the corresponding series of total investment.

Before moving to estimation procedure we note descriptive information on the relationship between FDI and GDP across the sampled countries. The cross sectional correlation coefficient between the average FDI to GDP ratio and average real per capita GDP over the entire period is estimated at 0.473, which is different from zero at 1% level of significance. Likewise the cross sectional correlation coefficient between the average FDI to GDP ratio and the compound growth rate of real GDP over the same period is estimated at 0.342, which is significant at 5% level. It means that some systematic relationship does exist between the flow of FDI and economic performance. This relationship is studied in more detail in the following section.

We now discuss estimation procedure for our model. Since our data do not have depth either in time series or cross section, we pool the cross-section and time series data for estimation. However, since the cross sectional units do not have similar characteristics, the relationship to be estimated could vary from one unit to another. Thus, imposing a single relationship on all the units is likely to suppress information. Estimating a separate relationship for each unit is obviously not a solution because it takes away all the advantage of larger degrees of freedom that is available due to pooling. A compromise approach is to allow uniform shifts across the cross sectional units while assuming that all the slope coefficients are common.

Econometrics literature suggests two approaches for uniform shifts (*see* Green, 2000 and Kmenta, 1986). One is to assume that the shifts are deterministic. Therefore, only intercept is allowed to change across the cross section units, while the random variations are assumed to be independent across the cross sections. It assumes that there is no contemporaneous or serial correlation across the random variations in different cross section units. Ordinary autocorrelation and heteroscedasticity within each time series of each cross sectional unit are, however, allowed and these can be easily tackled in estimation. According to the second approach, the uniform shifts are taken as random shifts. This is based on the assumption that the random variations in various cross sectional units come from overlapping but not the same populations. The random variations are decomposed into common and cross sectional specific components. The other assumptions are the same as in the first approach, especially with regard to the specification and solution for autocorrelation.

In the deterministic model a separate intercept is estimated for each cross sectional unit and these intercepts are called fixed (or deterministic) effects. On the other hand, the estimation based on random error decomposition gives estimates of the average random variations specific to each cross sectional unit and these estimates are called random effects.

The pooling of cross section and time series data gives more degrees of freedom as compared to the country by country analysis. Sine the pooled sample is quite large and the variations are substantial, especially across the cross sectional units, one can expect to capture the underlying relationship with more precision. We shall estimate all the equations using three estimation techniques, namely common effect model, fixed effects model and random effects model.

IV. THE RESULTS

As mentioned in the preceding discussion, equation (10) is estimated by three alternative techniques. The results of estimation are presented in Table

I. The results show that the overall performance of the estimated equations is satisfactory. The value of R^2 is in the range of 0.32 to 0.51, which appears satisfactory keeping in view that the estimation is based on a large sample containing substantial amount of cross-sectional variation and the time trends have been purged while considering the relationship in growth rates. As evident from the DW statistics, significant autocorrelation has been successfully removed by the autoregressive transformation of first order in two cases, while no significant autocorrelation exists in the third case.

TABLE 1

Parameter Estimates

Variables	Common-Effect Model	Fixed-Effects Model	Random-Effects Model
Growth rate of domestic capital	0.231 (7.63)	0.417 (9.60)	0.220 (7.22)
Growth rate of foreign capital	0.697 (2.51)	0.457 (1.45)	0.808 (3.62)
Growth rate of govt. expenditure	0.184 (11.13)	0.180 (11.36)	0.218 (11.69)
Growth rate of labour	0.350 (2.21)	0.264 (1.48)	0.115 (0.78)
Autocorrelation (ARI)	0.298 (8.07)	0.230 (6.14)	–
Common intercept	–0.013 (–2.01)	–	–0.009 (–1.44)
R^2	0.447	0.511	0.317
DW statistics	2.060	2.022	1.77

NOTE: The fixed and random effects for the last two models are reported in Table 2.

Before the interpretation of regression parameters, it may be noted that the estimated coefficients almost represent the long-run effects because the cross sectional variation in the data is much higher than the variation over time in the pooled sample. The results show that most of the parameter estimates are statistically significant and are by-and-large consistent with theoretical expectations. The growth rate of domestic private investment in each of the three equations is shown to have positive and statistically significant effect on the growth rate of real GDP in all the three equations. The estimates of the regression coefficient indicate that, for example, 1% increase in domestic private investment yields 0.22% to 0.42% increase in real GDP. The effect of growth in government expenditure on real GDP growth rate is positive and statistically significant in all the three equations. But the magnitude of regression coefficient is relatively small, indicating that, for example, 1% increase in government expenditure would yield 0.18% to 0.22% increase in real GDP. This result can be justified on the familiar arguments relating to inefficiency within the public sector and the distortions in resource allocation that are caused by a large public sector.

The effect of FDI on real GDP is also found to be positive though the relationship is not significant in the fixed effects model. The results also show that the effect of FDI on GDP is estimated to be higher than the effect of domestic investment in the OLS and random-effects models, while the effects of the two types of investment are almost the same according to the fixed effects model. Therefore, whether FDI is a more important factor in determining the growth process than domestic private investment depends on which particular model is considered more realistic. The statistical test on the restriction that all the fixed effects are equal to each other is rejected at 1% level, suggesting that the OLS model is rejected in favour of the fixed effect model. The choice between fixed and random effects models depends on whether the differences in growth rates of real output among the sampled countries are deterministic or random. Since the choice of countries considered for the analysis has been restricted by the requirement that they are less developed and sufficiently long time series data are available for each individual country, our sample is non-random. Furthermore we do not attempt to use the results to draw inference about the entire population of countries. It means that the cross-country differences in the growth rates of output cannot be attributed to random sampling and they should be regarded as fixed.

If the above interpretation is accepted, the results do not support the proposition that FDI is more important than the domestic private investment in generating economic growth. The null hypothesis that the coefficients of the growth rates of FDI and domestic private investment are equal cannot be rejected at very high levels of significance. Another observation is that the effect of FDI on economic growth appears statistically insignificant, though FDI cannot be relegated altogether as a redundant variable. A simple interpretation is that the role of FDI is not consistent and it can potentially vary a great deal over time and, especially, across countries. One of the factors that can contribute to inconsistency is the difference in the sector-wise composition of FDI across countries. For example, the beneficial externalities are mostly confined to the FDI in high-tech industries such as automobiles and electronics. The FDI in patented consumer goods industries do not necessarily produce spillover benefits to the local industry. FDI in patented goods can even retard domestic effort in research and development. Thus, while the average effect of FDI on economic growth is slightly higher than the effect of domestic private investment, it is relatively unstable.

Finally note that the effect of labour on real GDP is positive but it is not very significant, especially when country specific fixed effects are allowed in the regression equations. This is also an expected result because most of the sampled countries are underdeveloped with large labour force compared to the size of economy. Therefore, it is not surprising that the real marginal productivity of labour is not very significant.

Table 2 presents the estimated fixed and random effects for all the countries under consideration. There is no clear theoretical interpretation for the estimated random effects, except that they show random variations in growth rates across the sampled countries. These random variations capture the fluctuations in growth rate of GDP due to such factors that are specific to each country. The country specific intercepts or fixed effects measure the constant rate of exogenous technological progress minus the rate of capital depreciation. These fixed effects also include the average effects of the omitted variables, in particular the effects of such factors that are peculiar to each country.

Table 2 shows that with just two exceptions the fixed effects are much larger than the random effects. This further confirms our belief that the differences in growth performance among the sampled countries are mostly deterministic and they cannot be captured as random fluctuations.

The fixed effects are negative for almost all the countries. It means that the rate of technological progress is less than the rate of capital depreciation. The pattern of fixed effects shows that by-and-large the rate of technological progress is relatively higher and/or capital depreciation rate is lower in the Asian countries as compared to the South American countries.

Table 2 shows that the fixed effects vary quite substantially across countries and only in case of Bangladesh and Egypt the fixed effects are positive. The countries with small negative fixed effects, indicating better

TABLE 2

Fixed and Random Effects

Country	*Fixed Effects*	*Random Effects*
Argentina	–5.78	–0.48
Bangladesh	2.63	1.28
Barbados	–3.13	0.19
Bolivia	–4.82	–0.24
Brazil	–5.02	0.04
Chile	–6.28	–0.52
Costa Rica	–4.92	–0.07
Cyprus	–8.34	–0.89
Egypt	1.00	1.39
El Salvador	–2.62	0.10
Guatemala	–2.18	0.29
Honduras	–4.00	0.13
India	–3.49	0.17
Indonesia	–3.75	0.55
Jamaica	–8.69	–1.54
Kenya	–3.60	0.37
Mauritius	–1.72	0.51
Malta	–5.66	–0.22
Malaysia	–6.32	–0.12
Pakistan	–1.26	0.85
Panama	–6.75	–0.51
Paraguay	–3.03	0.49
Peru	–6.63	–0.75
Philippines	–4.55	–0.01
Sri Lanka	–1.39	0.77
Sudan	–5.97	–0.71
Surinam	–6.41	–0.61
Thailand	–3.14	0.71
Tunisia	–3.02	0.45
Uruguay	–6.12	–0.99
Zaire	–0.50	0.60
Zimbabwe	–4.82	–0.66

average growth performance, include Zaire, Pakistan, Sri Lanka, Mauritius, Guatemala and El Salvador. It means that there are factors other than those considered in the analysis that are playing favourable role in explaining better growth performance in these countries during the sampled period. On the other hand, the countries with large negative fixed effects include Jamaica, Cyprus, Panama, Peru, Malaysia and Chile.

V. SUMMARY AND CONCLUSION

This paper has been an attempt to study the comparative effects of FDI, domestic private investment, government expenditure and labour on economic growth using the neo-classical growth framework. The analysis is performed in a flow version of the log-linear approximation to production function. The production function includes domestic and foreign capital, labour and government expenditure. The empirical analysis is based on pooled cross section and time series data for 32 developing countries over the period 1965 to 1992. The relationship is estimated using three alternative econometric models for pooled data, namely common intercept and common random error model, fixed effects (country specific intercepts) model and random effects (country specific random errors) model.

The main conclusion that emerges from the analysis is that although FDI plays an important role in the process of economic growth, it cannot be regarded as more important than domestic private investment. Furthermore the contribution of domestic private investment to economic growth is more consistent and reliable than the contribution of FDI. This conclusion is based on the role of FDI in economic growth only. If additional factors like the adverse balance of payments consequences of the resulting profit repatriation, loss of employment due to the resulting rise in capital intensity, are taken into consideration, FDI loses its attraction as an engine of growth.

Although the effect of government expenditure on economic growth is found to be positive, there is a strong reason to support the currently popular wisdom that a small public sector is better for the economy. Since increase in government expenditure can crowd out private investment at least partially, the net contribution of government expenditure to economic growth is further reduced to the extent of crowding out effect. Furthermore large governments are typically accompanied by suppression of private sector in terms of complicated, long winding and inconsistent regulatory framework for the private sector, which is not conducive to foreign investment either.

Our results also indicate that productivity of labour is low in LDCs. This is an unfortunate conclusion, which needs to be addressed seriously. Labour is considered to be the prime factor of production and it can potentially play an important role in economic growth. Low labour productivity in LDCs is a well-known phenomenon. Traditional theories in development economics explain this phenomenon in terms of surplus labour and disguised unemployment. It has recently been recognized, however, that the main reason for low labour productivity is the low quality of human capital. LDCs have typically relied on capital-intensive growth strategy under the impression that with surplus labour force, the real bottleneck to growth is the lack of physical capital. This growth strategy obviously meant that the quality of labour is of secondary importance. Investment in human capital through development of education and health sector in most of the LDCs has been considered a social obligation rather than an economic compulsion. The importance of human capital is now well documented. It should be recognized that the growth strategy that neglects human capital cannot yield long-term dividends.

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