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Foreign Direct Investment and Economic Growth in India: A Production Function Analysis

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Abstract

The economic role of FDI is increasingly becoming significant in the Indian economy with the transition of FDI policy from a restrictive phase of seventies and early eighties to a relatively liberal phase of late eighties and nineties. In this context, it is essential to investigate whether FDI contributes positively to the production process, or negatively. Estimation of production function for the Indian economy suggests that FDI stock had contributed positively to the national production. Although the FDI impact was not significant for the overall period, bifurcating the sample indicate a significant impact for the relatively liberal policy phase.

For economic growth, the criticality of capital accumulation can hardly be exaggerated. Inadequate resources along with low level of governance can well explain the underdeveloped infrastructure, low human development and stagnant industrial base that characterize many developing countries until today. The role of FDI as a source of capital formation is thus critical in this context. By supplementing saving constrained domestic investment to reach a higher level otherwise not possible, FDI can directly contribute to economic growth. FDI can also contribute to growth indirectly. It's role as a vehicle of new technology and its spillovers to domestic firms in the economy has been verified by many empirical studies. However, the objective in this paper is very limited one. This paper focuses on the direct contribution of FDI to the economic growth of India by being a source of capital formation. The methodology adopted is the growth accounting framework where we have included FDI stock as an additional input in the production process.

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Next section of the paper focuses on the contribution of FDI stock to domestic capital stock of the Indian economy. The methodology of the study is introduced in section II. Section III described the data source, followed by section IV that is devoted to the empirical findings. Finally, section V concludes the paper.

I. The Contribution of FDI Stock To Domestic Capital Stock

The contribution of FDI stock to the net fixed capital stock (NFCS) of the Indian economy is not critical so far. It hardly accounts for one percent of the NFCS over the post-liberalized period 1992-1997. Nevertheless, in comparison to its past share in the seventies and eighties, it has shown a rapidly increasing trend. The average amount of net FDI stock at 1980-81 prices was estimated to be only Rs. 582 crores over the period 1970-80. This average figure nearly doubled to Rs. 1045 crores in the period 1981-91 and further estimated to be an impressive amount of Rs.4727 crores in the period 1992-97 (see, table-1 & figure-1).

Table-1: India: Average Amount of FDI stock, 1980-81 prices (Rs. Crores)

Period	*FDI stock*	*% Of Net Domestic Product*	*% Of Net domestic fixed capital stock*
1970-80	581.49	0.01	0.24
1981-91	1043.78	0.01	0.28
1992-97	4727.03	0.02	0.81

The faster rise in the average FDI stock in the eighties and nineties as compared to the seventies clearly resulted from policy liberalization that started since mid-eighties. Apart from that the size of domestic market, exchange rate, openness and a set of sound macroeconomic fundamentals are the crucial determinants of FDI inflows in the Indian context (Radhakrishnan and Jaya prakash, 2000). It is expected that increasing openness

of Indian economy to FDI with strengthening macro fundamentals will further the economic role of FDI in the future.

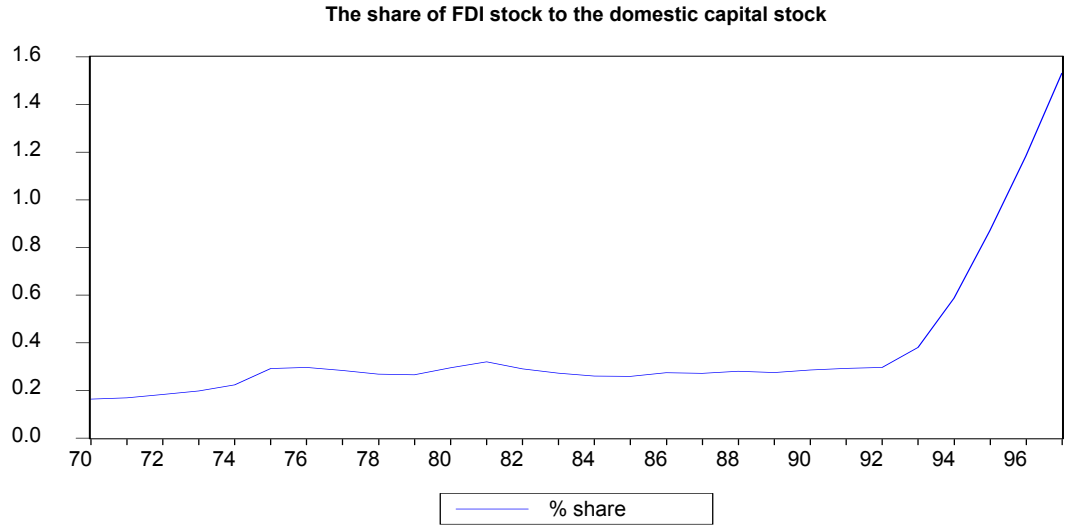

Figure: 1

II. Methodology

The study has considered the following three factors Cobb-Douglas production function for the Indian economy:

$$y = AK_d^{\beta_1} K_f^{\beta_2} L^{\beta_3} \qquad (1.1)$$

Where y, K_d, and K_f are respectively net domestic product (NDP), domestic capital stock and FDI stock in the economy. The stock of domestic capital has been obtained by subtracting FDI stock from the total capital stock of the economy. L is the labor input. The coefficient attached to each of the independent variable represents respective output elasticity.

Theoretically, β_1 and β_3 are expected to be positive. The sign of β_2 is anticipated to be positive as far FDI as a source of capital formation is concerned. However, this estimation does not have any mechanism to distinguish this direct effect of FDI stock to many other externalities that is being generated by it. If the negative effect of FDI

outweigh positive then β_2 may even appear with a negative sign. Hence, the sign of β_2 is indeterminate.

Now taking log on both side of the production function (1.1) and denoting log A as β_0 we can obtain the usual empirical specification of the production function as follows:

$$\log y_t = \beta_0 + \beta_1 \log K_{d,t} + \beta_2 \log K_{f,t} + \beta_3 \log L_t \quad (1.2)$$

III. Data source

The study obtained data from different sources. From CSO, NAS, we have a consistent and reliable net fixed capital stock data for the economy at constant prices 1980-81. Net FDI stock data was obtained from R.B.I. Bulletin, various issues. The obtained series of FDI stock was in current prices. We have expressed this series in the constant prices (1980-81) utilizing the deflator derived from the current and constant price gross fixed capital formation (GFCF) as given in NAS. It should be noted that the R.B.I. provides data on FDI stock up to 1995 and thereafter net FDI flows has been added to obtained subsequent period FDI stock. NDP at the constant price has been chosen as a measure of output. This data was also collected from CSO. About labor input, there exist no time series data compatible with the NDP. Therefore, we have used the decennial data as provided by census, 1971,1981 and 1991. Annual estimates of the labor force has been worked out by a linear interpolation of these census work force, and from 1991 to 1997, we have forecasted on the basis of interpolated series of the earlier years. The analysis has been carried out for the period 1970-71 to 1996-97.

IV. Empirical Results

Table-2 provides the estimated production function for the Indian economy over three periods – 1969-70 to 1996-97, 1969-70 to 1984-85 and 1985-86 to 1996-97. Results for the total sample 1969-70 to 1996-97, indicate that the estimated partial output elasticities with respect to domestic capital stock and labor have anticipated positive sign and are statistically significant. The output elasticity of domestic capital stock is 0.8735 and thus, over the study period, a 1 percent increase in the domestic capital stock led on the average a 0.9 percent increase in the output, holding FDI stock and labor input constant. The output elasticity with respect to labor (0.2446) is lower than that for the domestic capital stock and suggests that the contribution of domestic capital accumulation to output is relatively larger than that of labor. Over the same period, the output elasticity of FDI stock was observed to be positive (0.0178) but statistically insignificant. In other words, even though the contribution of FDI stock to output is positive over the sample period, it is not substantial. This is understandable given the fact that FDI stock accounts for less than 1 percent of the domestic capital stock and is obviously not able to significantly contribute to the economy's output. In terms of the F-statistic, the estimated model is highly significant. That means, all the estimated slope coefficients are jointly significant. Further, in terms of overall fit as indicated by the adjusted R-squared these estimates are remarkable. It should be noted that the interpretation of the production results is always with reference to the first difference of different variables as mentioned in the note of table-2.

Table-2: Estimation of Cobb-Douglas Production Function, India, 1970-97

Independent Variables	*Cobb-Douglas production function (GLS Estimation)*					
	Period: 1970-97		*Period: 1970-85*		*Period: 1986-97*	
	Coefficients (Standard Errors)	*P-values*	*Coefficients (Standard Errors)*	*P-values*	*Coefficients (Standard Errors)*	*P-values*
$logK_d$	0.8735 (0.0124)	0.0000	0.9436 (0.0233)	0.0000	0.8801 (0.0222)	0.0000
$logK_f$	0.0178 (0.0227)	0.4417	0.0390 (0.0486)	0.4384	0.0376 (0.0164)	0.0508
logL	0.2446 (0.1013)	0.0238	-0.01983 (0.1770)	0.9127	0.1453 (0.1453)	0.7220
constant	-0.0501 (0.0120)	0.0003	-0.1507 (0.0471)	0.0076	0.0748 (0.0358)	0.0700
Adjusted R-squared	0.9983		0.9938		0.9990	
F-statistic	5147.4250		802.7762		3668.298	
Prob(F-statistic)	0.0000		0.0000		0.0000	
Durbin-Watson stat	2.1216		2.3884		2.0429	
Number of observations	28		16		12	

Note: The Theil-Nagar modified d for small sample has been used to transform the data to correct for autocorrelation and the Prais-Winsten transformation to avoid loss of degree of freedom. Estimates presented over are thus OLS on the transformed data.

It is well established that the process of economic liberalization that started since mid-eighties and particularly 1991 onwards led to substantial inflows of FDI into the economy. In fact, during the post liberalization period 1992-93 to 1998-99, the amount of inflow was an impressive figure of Rs. 36208.6 crores (in nominal term). Therefore, it is expected that the contribution of FDI stock over this liberal policy phase (1986-1997) to be definitely different from that in the previous dirigistic period (1970-1985). The study accordingly estimated the production function for these two periods and following significant findings were obtained.

The output elasticity of FDI stock has been consistently positive over different period estimations. Importantly, this is observed to be statistically significant over the period 1986-97 but is not so in the case of 1970-85. A 1 percent increase in the FDI stock

in the economy, on an average, results in 0.04 percent increase in the output over the period 1986-97. Therefore, the contribution of FDI stock to the economy's production is significantly positive during the liberalized phase of FDI regime. Over these two periods, domestic capital stock has significantly positive output elasticity but the labor input indicates sign reversal although statistically insignificant. In terms of overall fit and F-statistic, the estimated coefficients are jointly explaining the maximum variation in the dependent variable and together their contribution is significant across these two periods.

V. Conclusions

The economic role of FDI is increasingly becoming significant in the Indian economy with the transition of FDI policy from a restrictive phase of seventies and early eighties to a relatively liberal phase of late eighties and nineties. In this context, it is essential to investigate whether FDI contributes positively to the production process, or negatively. Estimation of production function for the Indian economy suggests that FDI stock had contributed positively to the national production. The positive impact was consistent across different periods. Although the impact was not significant for the overall period, bifurcating the sample indicate a significant impact for the relatively liberal policy phase. The study concluded that FDI stock has largely beneficial impact on the economy. However, the deficiency of this aggregate analysis is obvious, as it cannot bring out sectoral dynamics of FDI in the Indian economy. Future research addressing this aspect of the problem can further contribute to the FDI-development debate in India.

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