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IMPACT OF FDI ON INDIAN ECONOMIC GROWTH*

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Capital/ investment and human resources are the pivots of development. Short supplies of domestic capital limit the growth of developing countries. Low GDP keeps savings and investment rates low which, in turn, limit growth. Low technological base of production is another factor impinging upon growth of developing countries. FDI mitigates these constraints to growth to some extent. FDI brings capital with foreign technology and modern managerial techniques and organizational structures (Prakash and Balakrishnan, 2005). *Besides, FDI and growth, like several other variables, are bi-directionally related.* Thus, FDI has both in and out flows, since developing economies like Korea, China and India are also the suppliers of FDI. Foreign Investment Outflows (FIO) depends basically on supply of capital in the home country. Developed rather than developing countries may, therefore, be hypothesized to be the main suppliers of FDI, and hence, FIO. As against this, countries of the third world could be envisaged to be the net recipients of FDI, howsoever high their growth rate and development status may be.

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Actual outflows of FDI are partly governed by demand in the recipient countries and partly by supply in home countries of FDI. We postulate that market size, as manifested by population and per capita income (Mathur, 1979), economic environment including macro policy, specially reforms, current growth rate(s) and future growth potential decisively affect quantum and sectoral composition of FDI in an economy.

Brief Review of Selected Studies

Several studies have focused on theoretical positive impact of FDI on growth. But there are only few empirical studies of this facet. Both macro and micro studies have generally been conducted to study the relationship between FDI and growth. *Micro studies find no positive evidence to support the thesis that* FDI positively contributes to growth. Macro studies, have, however, thrown up some evidence to show that FDI positively affects economic growth under certain conditions.

Balasubramanyam et. al (1996) tested the hypothesis that export promoting (EP) FDI in countries like India confer greater benefit than FDI in other sectors. They have used production function approach in which FDI is treated as an independent factor input in addition to domestic capital and labour. As FDI is a source of human capital accumulation and development of new technology for developing countries, FDI captures such externalities as learning by watching and/or doing and various spillover effects. Exports are also used as an additional factor input in this production function. This, however, leaves a gap. Once FDI enters a country, some of the erstwhile imports become domestic products. Hence, their output becomes a part of GDP which

needs consideration as a part of output or growth effect of FDI. This is probably explained by the fact that the authors have followed the lead of numerous empirical studies focusing on export led growth. In their model, real GDP depends on labour, domestic capital stock, foreign capital stock, exports, and technical progress through time. Time is an all inclusive proxy variable which captures the influence of all factors, including changing technology, that are impounded under the assumption of *ceteris paribus*. This is why time is defined as the parameter of functional shift. Thus, it is erroneous to interpret the coefficient of T as representing change in technology alone. However, it has become a customary to treat time as a representative of technological change.

Borensztin et al. (1998) examine absorptive capacity of recipient country, which is measured by stock of human capital required for technological progress; it takes place through 'capital deepening' associated with new capital goods brought into an economy by FDI. We think that the fructification of growth effect of FDI requires adequate infrastructure as a pre-requisite. For example, if there are frequent power cuts, it will reduce growth effect.

Some studies find fault with such macro studies. We think that such limitations are embodied either within the model used in the study or its data base or assumptions. At times, misspecification and misinterpretation of results also color the inferences. Nair-Reichart and Weinhold (2001) postulate panel and time series estimators to impose homogeneity assumptions across countries in the relationship between FDI and growth. They marshall evidence to show considerable heterogeneity across countries. Assumption of homogeneity can result in biased estimates which tend to yield invalid inferences and furnish faulty policy guidelines. To

circumvent the problem, authors used mixed, fixed and random (MFR) panel data estimation to test the causality between FDI and growth in developing countries. Results from MFR estimation differ substantially from those results furnished by panel data causality. However, traditional tests suggest significant and uniform impact of FDI on growth. This study finds the causal relationship between investment (foreign and domestic) and growth in developing countries to be highly heterogeneous. The authors have, however, failed to examine the effect of multi-co linearity arising from inter-relations between domestic and foreign investment. This compromises the reliability of their results of estimation and tests of significant. We may postulate that market size, composition and even choice of the recipient companies and their market shares will have a bearing upon the growth impact of FDI. Domestic investment is strongly correlated contemporaneously with growth, though it is generally not a strong determinant of growth. Besides, this study supports the thesis that efficacy of FDI is likely to be greater in more open economies. But it is highly heterogeneous across countries. The diversity of impact can be explained in terms of differences among countries and open economies are obviously likely to derive greater benefits from FDI simply because their openness not only permits acceptance of FDI but it also acts as an attraction for foreign investors than openness also make them depend on the growth of export earning as source of development.

Objectives

The main objective of the study is to estimate total and sector wise output effect of FDI in Indian economy for 2003-2004. The second objective is to estimate inter and intra sector variation of

output effect. The third objective is to decompose total output effect of FDI into output effect due to technology and pure output effect of FDI.

Model

We have, however, preferred input output to econometric modeling, since regression gives only direct impact multipliers irrespective of the degree of sophistication of modeling. IO model will easily capture both direct and indirect output effects of FDI. The I-O modeling will also enable us to impound growth effects of i) change in technology, and ii) domestic investment. The impounding of effect of change of a variable may be achieved by keeping its value constant. So constancy of technology matrix and its inverse will achieve this objective in the study.

Besides, a static model is inappropriate for growth accounting and investment, including FDI, which is exogenous to the model. We have, therefore, estimated the models given below at one point in time. The inverse matrices are specify as $(I-A_t)^{-1}$ and $(I-A_{t+1})^{-1}$, all other terms of the model remaining the same.

The following input - output models have been used:

$$X_t = (I - A_t)^{-1} F_t \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where X is gross output vector, $(I-A)^{-1}$ is Leontief inverse, F is final demand vector but it has only FDI non zero element. All other components of final demand vector are treated as zero. t

refers to time. In order to isolate the technology effect on output, we have also estimated the output effect from the following model:

$$\hat{X}_t = (I - A_{t-1})^{-1} F_t \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Obviously, the second model uses the Leontief inverse of preceding period. The differences between two output vectors X_t and $\hat{X}_t$ will reveal the role of change in technology in the growth of output.

The specification of final demand vectors of relation (1) and (2) is based on Prakash theorem which postulates that output of all sectors will show a positive growth even if final demand of one sector rises, though the growth effect shall be greater on sectors having non-zero change in final demand than those sectors which show zero change in final demand (1988). This is part of experiment. Then, we use all components of final demand vector, including FDI to work out output effect. Difference of these two solutions will isolate the impact of other components of final demand from the growth effect of FDI.

Database

Input output tables of India, prepared by CSO, and other public data sources related to industry wise official statistics have been used. We have used 2003-04 and 1998-99 Leontief inverses of CSO. We have gathered information about sector wise foreign direct investment in Indian

economy in 2004. Only 41 out of 130 sectors of the economy hosted for FDI. These data have been used as the final demand vector in the models

Empirical Results

Output Effect of Foreign Direct Investment in 41 Sectors, 2003-04

The models, outlined earlier, have been applied to 2003-04 and 1998-99 inverses of IO tables. We have used the 130 x 130 and 115X115 inverses of these years. During the period of study, 41 sectors of the Indian Economy received and absorbed FDI. Results are discussed in the ensuring pages.

Total output effect of Foreign Direct Investment on the economy, taken as a whole, is Rs 46406.95 crore. Maximum output effect is Rs 3247.606 crore for miscellaneous manufacturing sector, while the minimum output effect is only Rs 0.063255 crore for coffee sector. Miscellaneous manufacturing sector is an agglomeration of several manufacturing activities, while coffee manufacturing is one single manufacturing activity. This may partly explain the differential output effect of FDI on these sectors. This result is at variance with the postulation of backward linkage index to have a direct bearing upon output effect. It seems that the spread of backward linkages is more important than the overall value of the linkage index so far as output effect and its sectoral distribution is concerned. In one way, the results are as per expectations or predictions of theory. Since the backward and forward linkages of miscellaneous manufacturing are far more strong than those of coffee sector, the former show higher output effect of FDI.

Average output effect is Rs 356.9765 crore. The magnitude of average effect and its range of variation suggest that total effect varies greatly between sectors for examining this facet, which are reported below. We have used ANOVA for evaluating inter and intra-sectoral variation of output effect. The inference drawn above is supported by the results of ANOVA.

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Rows	416186.1505	129	3226.249	1.4755	0.0004	1.2143
Columns	1187665.631	129	9206.71	4.21061	4E-51	1.2143
Error	36386389.36	16641	2186.551			
Total	37990241.15	16899				

It is inferred from the results of ANOVA that i) both within and between sector variation of output effect of Foreign Direct Investment is highly significant statistically. This is the inference drawn from between the rows variation, which shows the effect of total Foreign Direct Investment in 41 sectors on each of the 130 sectors of the economy and the effect varies greatly. It is statistically significant as $F = 1.48 > F^* = 1.21$, F^* is the critical value. CV is also as high as 181.42 percent.

Columns represent the inter sector variation of the backward linkage effect of FDI in one sector, while rows highlight inter-sector differences of forward linkage effect of FDI. Results of ANOVA shows that output effect of FDI varies significantly between sectors both via forward and backward linkages. This lends credence to our thesis that the direction or composition of FDI has a bearing upon its output effect.

But, there is hardly any sector which does not show the positive output effect of FDI (See Table in Appendix). This supports first Prakash theorem. Among 41 sectors that absorbed FDI, Miscellaneous Manufacturing attracted the largest share of total FDI. It is the sector which shows the greatest output effect. Besides, output effect shown by 89 sectors, not having received any FDI, have shown lower output effect than 41 sectors which attracted FDI. Among these sectors also, output *effect varies directly with the magnitude of FDI (in final demand).* This result substantiates the second Prakash theorem. Naturally output effect varies greatly between the sectors.

Output Effect of Foreign Investment on Specific Sector

Each of the 41 sectors in which FDI has been parked shows the output effect of investment in the sector (represented by that column) on all other sectors of the economy. Column wise maximum output effect on all the sectors of the economy is Rs 7219.275 crore; it is again related to Miscellaneous Manufacturing sector. The minimum output effect of Foreign Direct Investment in Miscellaneous Manufacturing sector is Rs 12.15 crore, which is related to Printing and

Publishing sector. But these effects of Foreign Investment vary from one sector to another. This is also supported by the results of ANOVA. Effect of Foreign Investment in an individual sector on different sectors of the economy is also significant, because the between column variation is significant. Calculated value of F is 4.21 which is greater than the critical value, F* = 1.21 at .05 probability level.

The output effect of Foreign Direct Investment on the *economy as a whole is as high as 36.05 percent of total Foreign Investment*. Marginal Output Investment ratio is thus 0.3605. It means that one rupee worth of foreign direct investment leads to an increase in output worth 36 paisa. Thus, it shows a moderately high productivity of capital.

The maximum output effect of Foreign Direct Investment in the economy is 7 percent of FDI on Miscellaneous Manufacturing sector. Thus, it shows a low productivity of capital.

The minimum output effect of Foreign Direct Investment in the economy is 0.000136 percent for Printing and Publishing sector. It means that one rupee of foreign investment leads to an increase in output worth Rs 0.000136. Thus, it shows extremely low productivity of capital. We may speculate that more capital intensive the technology in use in a sector, greater shall be the output effect of FDI that it tends to show.

In order to examine the inter sector variation of minimum and maximum output effect of FDI in each sector, we have subjected sectoral minimum and maximum output effect of FDI in a sector to ANOVA. Results are reported below:

ANOVA of Maximum and Average Output Effect

ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Rows	5641558	1	5641558	19.52988	7.37E-05	4.084746
Columns	12350034	40	308750.9	1.06883	0.41716	1.692797
Error	11554722	40	288868.1			
Total	29546314	81				

Both maximum and average output effect differs significantly between and within the sectors. The variation follows a set pattern. Maximum output effect is displayed by sectors in which FDI had been parked. The output effect shown by sectors other than those in which FDI had been parked differs according to the strength of backward linkage of the sectors which had attracted FDI. Most of these sectors are FMCG sectors of the Indian economy on the one hand, and export and BPO based sectors on the other.

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