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Foreign Investment, Technological Spillovers and Productivity : A Study of Post-reform Indian Industry

By

Murali Patibandla
&
Amal Sanyal

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Please address all your correspondence to:

Murali Patibandla
Indian Institute of Management Bangalore
Bannerghatta Road
Bangalore – 560076, India
E-mail: muralip@iimb.ernet.in
Phone : 080 – 2699 3039
Fax : 080 - 6584050

Amal Sanyal
Economics Commerce Division
PO Box 84, Lincoln University
New Zealand
Phone: 64 3 325 2811 Fax: 64 3 325 3847
E-mail: Sanyala@lincoln.ac.nz

Foreign Investment and Productivity: A Study of Post-reform Indian Industry

Abstract:

The paper uses panel data for Indian industries in the post-reform period to study the direct and indirect productivity effects at firm level generated by foreign investment. It finds no evidence that foreign investment directly increases firm-level productivity, nor that R&D spending is more productive in firms or sectors with higher foreign investment. It however finds strong evidence that local firms benefit from foreign investment in their industries. These benefits are higher for larger firms and those that do more business domestically.

Keywords: Transnational Corporations; Foreign Investment; Technology Spillover; Indian industries.

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1. Introduction

Recent years have seen significant increase in the flow of direct foreign investment (DFI) into developing economies (World Investment Report, 2001). Given its scale compared to host developing economies, DFI inflows are expected to have significant impact on the industrial structure of host countries. The literature on Transnational Corporations (TNCs) observes that their ownership of assets such as technology, marketing, management, and networks benefit developing economies through a process of spill-over (Caves, 1996, Dunning, 1981). Property rights on intangible assets being underdeveloped, they are partially public goods and others can use assets developed by one firm at a small cost. If local firms, through deliberate effort or spillover, obtain the superior practices of TNCs, it would improve industrial efficiency in host countries. If TNCs help faster diffusion of new technology (Teece, 1977; Gonclaves, 1986, Kokko, 1994), then it also leads to important industrial policy implications for the host country governments (Aitken and Harrison, 1999).

Though there are notable exceptions[1], a large part of the literature on the experience of industries in host countries is based on case studies whose qualitative methods usually present mixed evidence (eg. Mansfield and Romeo, 1980; Rhee and Belot, 1989). Availability of panel data across industries for some countries now makes it possible to use quantitative methods. The purpose of our paper is to examine issues related to foreign investment's contribution to productivity in the context of Indian industries, which became open to DFI following economic reforms in the late eighties.

There are a number of studies on TNCs in India. Some of the earlier work eg, Basant and Fikkert (1996) and Kumar (1990) are based on cross-section data. Our study focuses on the post-reform phase using firm level panel data across industries where significant DFI has been registered since the reforms. The data set spans over 1989 to 1999 across eleven industries that received significant DFI in post reform period. The sample covers all firms in the organized sector of respective

[1] *Inter alia*, Caves, 1974 (Australia); Blomstrom and Persson,1983 (Mexico); Blomstrom,1986 (Mexico); Blomstrom and Wolff, 1989 (Mexico); Branstetter, L.G., 2000 (U.S); Aitken and Harrison, 1999 (Venezuela).

industries giving 1132 data points with observations on inputs, sales, ownership structure and expenditures at each data point.

The study focuses on the two issues. First, whether more foreign investment embodied in a firm results in higher productivity. Though the literature does not question the technological superiority of foreign investment by TNCs, it has been observed that such investment faces a learning curve in the host environment (Wu, 2000) and therefore may not necessarily perform better. We examine the direct productivity of foreign investment at the firm level and explore if these productivity effects are concentrated in particular industries. Secondly we try to find out if there are firm- and industry-specific attributes that might influence these effects. A related question examined is whether R&D spending is more productive in firms and industries with larger foreign investment.

Secondly, are there externality benefits from foreign investment in a given industry for firms in that industry? This so-called process of spillover can occur irrespective of whether embodied foreign investment itself is currently more productive or not, since the process is thought to be based on the diffusion of knowledge and practices. The issue can be broken into two separate questions. The first is whether there is at all any positive externality. This externality can benefit not only local firms but also TNCs who benefit from one another's existence. Secondly, are the benefits different as between TNCs and locals? There is a large literature on the second question and evidence appears varied. Lichtenberg and van Pottelsberghe de la Potterie (1996) found that FDI flows did not result in positive spillovers among OECD countries during 1970–1990, while Hejazi and Safarian (1999) found significant R&D spillovers from US firms to other OECD countries during the same period. In a study across 69 developing countries Borensztein, Gregorio, and Lee (1998) using data on FDI flow from OECD countries concluded that FDI had a positive effect on per capita income growth only for countries that had reached a minimum human capital threshold. A recent study by Xu (2000) corroborates this finding for spillover effects from US firms across forty countries. Studies on individual countries also provide mixed conclusions. Caves, (1974) for Australia, Globerman, (1979) for Canada and Blomstrom and Persson (1983) for Mexico found positive effects of the presence of TNCs on local productivity. But Haddad and Harrison (1993) for Morocco and Aitken and Harrison (1999) for Venezuela find no evidence of spillover onto local firms. The study of Liu, Siler, Wang and Wei (2000) of UK's panel data shows evidence of positive spillovers of FDI. They also observe that: (1) the greater the technological capabilities of local firms, greater are the spillover benefits; and (2) that the spillover effects are on average negatively related to the technology gap between foreign and locally-owned firms. A recent study of Feinberg and Majumdar (2001) of India's pharmaceutical industry adopts augmented Cobb-Douglas production function framework to examine spillovers of foreign R&D and from FDI. They observe that only MNCs gained from each other's R&D spillovers.

In this paper, we adopt an augmented production function framework similar to that used in Aitken and Harrison (1999) and Feinberg and Majumdar (2001). With firm level panel data for 11 Indian industries, we explore if there are externality benefits and whether they are concentrated in specific industries. Secondly, are there systematic firm-level correlates that influence the ability of firms to avail of the benefits? The correlates focused on are international trade intensity[2] and R&D. Section 2 describes the methodology of the work. Section 3 discusses the data and empirical exercises. Section 4 analyzes the results. Section 5 concludes with a summary.

2. Methodology

The contribution of intangible assets introduced through foreign investment in a firm[3] is expected to show in its total factor productivity. Similarly if there are externalities for the industry, then the amount of foreign investment in an industry should register in the factor productivity of firms in that industry. Both these effects can be nested in a suitably augmented production function at the firm level. We augment the production function of a firm with foreign investment in it and the amount of foreign investment in the industry to which it belongs. Foreign investment in the firm and in the industry to which it belongs are thus .treated as virtual inputs. We have used a logarithmic form so that, suppressing firm and time identifiers, the production function is

(1) $$q = \alpha + \beta' (\mathbf{D}) + \gamma' .(\mathbf{i}) + \gamma_1 .FE + \gamma_2 .FP + \varepsilon$$

where q is the logarithm of output, (i) is a vector of the logarithm of production inputs, FE is the percentage of foreign equity holding in the firm and FP is a measure of foreign presence in the industry explained below. The random term ε is assumed to have a normal distribution with zero

[2] In the light of the study of Hejaji and Safarian (1999) firms in developing countries derive externalities both from FDI and international trade and incorporating only one of the elements may lead to overestimation of externalities.

[3] Assets in this category are technology, managerial practice, patents, brand names, marketing networks, etc. There is a view that foreign investment tends to flow into knowledge-intensive industries where intangible assets are more significant and provide TNCs with relative advantage (Dunning, 1981, Caves, 1996).

mean and fixed variance over the sample. **(D)** is a 10×1 vector of industry dummies for capturing industry-specific intercepts.

γ_1 is the effect of a firm's foreign equity holding on its productivity. To probe if the productivity enhancing effect of foreign investment is different across industries (1) is augmented by an interactive term:

(2) $q = \alpha + \beta' \text{(D)} + \chi' .\text{(i)} + \gamma_1 .FE + \gamma_2 .FP + \gamma_3' .\ FE.\text{(D)} + \varepsilon$

In (2), γ_3' is a vector of coefficients that would indicate effects of firm-level foreign investment differentiated by industry.

γ_2 measures the effect of the presence of foreign investment in the industry to which a firm belongs. To examine if firms with different foreign equity levels benefit from this effect differently, we add the interactive variable *FE*FP* to equation (2):

(3) $q = \alpha + \beta' \text{(D)} + \chi' .\text{(i)} + \gamma_1 .FE + \gamma_2 .FP + \gamma_3' .\ FE.\text{(D)} + \gamma_4 .FE{*}FP + \varepsilon$,

where a negative γ_4 would imply positive externality benefits of foreign investment in an industry for local firms in that industry. Later on in place of *FE*FP* in (3) a number of alternative interactive terms are used to explore if the ability to benefit from foreign investment externality depends on any other firm-level attribute or the nature of the industry. These equations are:

(4)	$q = \alpha + \beta' \text{(D)} + \chi' .\text{(i)} + \gamma_1 .FE + \gamma_2 .FP + \gamma_3' .\ FE{*}\text{(D)} + \gamma_4 .FP{*}\text{(D)} + \varepsilon$	Industry dummies.
(5)	$q = \alpha + \beta' \text{(D)} + \chi' .\text{(i)} + \gamma_1 .FE + \gamma_2 .FP + \gamma_3' .\ FE{*}\text{(D)} + \gamma_4 .\ RD{*}FP + \varepsilon$	*RD* = R&D/sales.
(6)	$q = \alpha + \beta' \text{(D)} + \chi' .\text{(i)} + \gamma_1 .FE + \gamma_2 .FP + \gamma_3' .\ FE{*}\text{(D)} + \gamma_4 .\ IM{*}FP + \varepsilon$	*IM* = import/sales.
(7)	$q = \alpha + \beta' \text{(D)} + \chi' .\text{(i)} + \gamma_1 .FE + \gamma_2 .FP + \gamma_3' .\ FE{*}\text{(D)} + \gamma_4 .EX{*}FP + \varepsilon$	*EX* = export/sales.
(8)	$q = \alpha + \beta' \text{(D)} + \chi' .\text{(i)} + \gamma_1 .FE + \gamma_2 .FP + \gamma_3' .\ FE.\text{(D)} + \gamma_4 .SZ{*}FP + \varepsilon$	*SZ* measures firm size defined below.
(9)	$q = \alpha + \beta' \text{(D)} + \chi' .\text{(i)} + \gamma_1 .FE + \gamma_2 .FP + \gamma_3' .\ FE.\text{(D)} + \gamma_4 .VI{*}FP + \varepsilon$	*VI* is a measures of vertical integration defined below.

Variables tried out in equations (4) to (9) have been shown against the equations. R&D expenditure and the size of a firm are often suggested to directly influence the ability of a firm to take advantage of available industry-level pool of knowledge and practices. Larger vertical integration of production and lower import intensity imply that a larger share of the firm's activity can potentially benefit from technology absorption. Larger proportion of export to total sales is expected to put pressure to remain internationally competitive and motivate technology absorption. Besides these equations, a number of other regression equations have been estimated to take some of the queries to specific directions, and will be reported in the appropriate place.

3. Data and Empirical Results

Data

Data is sourced from the publications of the Centre for Monitoring the Indian Economy. Industries are: airconditioners, auto ancillaries, communication equipment, electronic process control, light commercial vehicles, motor cycles, motors and generators, passenger cars, refrigerators, tyres and tubes, and washing machines. The values are normalized by the producer wholesale price index. Table 1 describes the sample.

Table 1 here

Variables:

1. q = logarithm of value added
2. (i) = (log$K$, log$L$). K is measured by the value of plants and equipment and L is proxied by wages and salary.
3. (D) industry dummies. Table 1 provides the industry identification of each dummy.
4. FE = percentage of foreign equity in a firm.
5. FP = a measure of foreign investment presence in an industry. We have used three alternative measures. The first is $\frac{\sum F_i K_i}{\sum K_i}$ over all firms in the industry. F_i is the share of foreign equity in total equity of firms. The second and the third replace K with L and value added respectively. All three measures have sufficient sample variance and are not significantly correlated with primary variables of the system[4].
6. RD = R&D expenditure of a firm as percentage of its total sales.
7. IM = import of intermediate and capital goods as percentage of sales.

[4] Since firms with more foreign investment are expected to be more capital intensive, the measure of FP based on plant and equipment was expected to be higher than that based on labor. But the computed serieses do not display this property.

8. *EX* = exports as percentage of sales.

9. *SZ* = firm's share of total industry sales as percentage.

10. *VI* = value added as percentage of sales.

Empirical Results

We estimated 9 equations each with three different measures of foreign presence and each equation has a large number of variables. To keep the presentation manageable, we report the estimated coefficients for only equations 1, 2 and 3 below[5]. They appear in Table 2. The qualitative results are however presented in full for all the equations and all variants of the measure for foreign presence. They appear in Table 3, where column 1 refers to the equation number in the same sequence as presented in section 2. Column 2 shows the right hand side variables in the regression equation. The third column states the adjusted R^2 in parenthesis and mentions the variables significant at 5 per cent level[6]. A (-) sign indicates the estimated coefficient is negative; D_i indicates that some of the dummies are significant, positive or negative; and $X*D_i$, where X is any variable, indicates that some elements of $X*(D)$ are significant, positive or negative. In all other cases the coefficient is positive. For each estimated equation three measures of FP are used. The third column states if the measure is based on plant and equipment, labour or value-added. The three sets of estimates produce identical qualitative conclusions for all but two equations.

Tables 2 and 3 here

4. Discussion

Foreign Investment in a Firm and its Productivity

Estimates of equation (1) show that at the overall sample level there is no evidence that more foreign investment in a firm leads to higher productivity. Equation (2) tries to examine if there are particular industries where these effects may be concentrated. In the estimate of equation (2) four industries return significant coefficients for *FE**(D)[7], of which only two are positive. These two

[5] We have provided the results for all the estimations to the Editor.

[6] All references to the level of significance in the text are at 5 per cent or lower level.

[7] Unless otherwise qualified statements like this will mean that it is true for estimates using all three definitions of *FP*.

industries are both characterized by a small number of firms and relatively large foreign presence, while the two with negative coefficients have a very large number of firms with much smaller foreign presence. However, a general statement that foreign investment in a firm generates comparatively higher productivity if it is located in an industry with large foreign presence is not true. Estimates of equation (3) show that the opposite is true.

We also explored the related question whether foreign investment in a firm or in its industry of membership increases the effectiveness of its R&D spending. The evidence is that the contrary is true. In regression estimates of *q* on {(i) (D), *RD, FE*RD*} and on {(i) (D), *RD, FP*RD*} the coefficients of *FE*RD* and *FP*RD* are significant but negative. Thus the sample provides evidence that R&D activity is more productive in firms with smaller foreign holding and industries with smaller foreign presence[8]. A plausible explanation of the finding is that firms with higher foreign investment undertake their more serious R&D expenditures at parent organisations abroad. Spendings on R&D in the host country may be of more minor nature, and thus less contributive to productivity than those of local firms. However this is a tentative hypothesis and our present study is not designed to probe into this possibility.

It is possible that foreign investment contributes to firm level productivity conditional on some firm- and /or industry-level attribute and thus the effect remains obscure at the overall sample level. A number of exercises were done to probe this possibility. The best in-sample predictor equation is a regression of *q* on {(i) (D), *IM, FE*IM*}, and it returns significant negative coefficients for *IM* and *FE*IM*. Thus among local firms, those who depend more on locally produced materials benefit more by copying practices of TNCs than those who are more import intensive. We will report below that a similar observation holds for the productivity of industry-level investment, too.

Foreign Investment in an industry and the Productivity of its Firms

Though equation (1) shows no evidence that an industry's *FP* generates productivity gains for firms in that industry at the overall sample level, significant negative coefficient of *FE*FP* in equation (3) implies that firms with lower foreign investment (tentatively, locals) gain from foreign investment in their industry of origin. Equation (4) tries to break up the overall effect across industries, and examines if it is concentrated in particular industries. The only industry where it is unambiguously concentrated is tyres and tubes, which has a large number of firms with relatively small foreign presence. Thus the overall effect in the sample seems to be distributed across industries.

Are there firm level attributes that help local firms to access more of this effect? Equation (5) shows that the firm's own R&D effort is not one of such attributes, and equation (8) shows that size of the firm matters. Equations (6) and (7) show that the effect is significantly correlated with the firm's imports and exports as percentage of sales. But contrary to expectations, firms that buy more from and sell more to the domestic market enjoy more of the benefits of industry-level foreign investment. This is an interesting finding. We should add that equations (6) and (7) are the best in-sample predictors of log q among all the equations estimated here. It is also noteworthy that equation (9) fails to return a significant coefficient for the level of vertical integration of the firm. Note that by definition:

$VI = 1 - IM -$ (domestic purchases/sales).

The significant coefficient of IM in (7) and the failure of VI to be a significant regressor in (9) imply that it is the share of domestic inputs in a firm's sales that matters, and not the share of its own production. Findings from equations (6) and (7) can be summarized as an aphorism: firms that do more business at home get more benefit from foreign investment.

5. Conclusion

The paper uses Indian industrial data for her post-reform era to study the productivity effect of direct foreign investment. It finds no evidence that foreign investment is directly more productive than domestic investment. Also, the effectiveness of R&D spending is higher for firms and industries with more domestic rather than foreign investment.

Regarding externalities, there is evidence of spillover to domestic firms. It is found that firms with more domestic ownership derive more benefit from industry level foreign investment than firms with more foreign investment. Also larger firms are able to absorb the spillovers more effectively

[8] The regression of q on {(I) (D), RD, FE*RD, FP*RD} does better than both of these equations on F-test,

than smaller firms. Finally firms that do more domestic business, both buying inputs at home and selling in the domestic market, tend to derive more benefits from foreign investment in the industry. This finding is interesting and consistent with the following explanation. Local firms that are highly outward oriented through imports and exports derive externalities associated with international trade. However those local firms who depend more on local inputs and sell more at home (inward oriented) benefit more by emulating the practices of multinational corporations.

The paper has incorporated industry and firm specific factors in understanding the issue of spillovers. An interesting extension would be to examine whether local firms in industries that operate in technologically dynamic clusters are able to reap the externality benefits more effectively than in dispersed industries (Baptista 2000). Another useful extension is to consider the possibility of endogenity of the direct foreign investment variables. Our regression results are consistent with the arguable possibility that foreign investment tends to flow into low productivity local firms or industries. Such a hypothesis cannot be tested within the model and method we have used here but is a worthwhile extension.

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and produces the same qualitative conclusion.

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Table 1: The Sample

Industry	Identifying Dummy	Number of firms	Number of data points
Airconditioners	D1	5	54
Auto Ancillaries	D2	24	264
Communication Equipment	D3	22	227
Electronic Process Control	D4	5	52
Light Commercial Vehicles	D5	6	72
Motor Cycles	D6	4	48
Motors and Generators	D7	6	66
Passenger Cars	D8	10	68
Refrigerators	D9	4	47
Tyres and Tubes	D10	19	197
Washing Machines		5	37

Table 2. Estimation Results for Equations 1, 2 and 3									
	FP with Value-added			FP with Plant and Machinery			FP with Salaries and Wages		
variables	Equation 1	Equation 2	Equation 3	Equation 1	Equation 2	Equation 3	Equation 1	Equation 2	Equation 3
Constant	0.5 (5.6)*	0.51 (5.7)*	049 (5.4)*	0.63 (7.3)*	0.64 (7.6)*	0.57 (6.8)*	0.62 (5.3)*	0.62 (5.5)*	0.61 (5.5)*
Log K	0.28 (12.4)*	0.28 (11.3)*	0.27 (11)*	0.30 (12)*	0.28 (11.4)*	0.28 (11)*	0.30 (12)*	0.28 (11)*	0.26 (10)*
Log L	0.67 (29)*	0.68 (29)*	0.68 (29)*	0.67 (29)*	0.67 (29)*	0.68 (29)*	0.67 (29)*	0.68 (29)*	0.69 (29)*
FE	0.005 (0.53)	0.001 (1.43)	0.003 (2.8)*	0.0002 (0.57)	0.001 (1.6)**	0.0048 (3.9)*	0.0002 (0.58)	0.001 (1.55)**	0.005 (4.5)*
FP	-0.01 (-0.06)	0.002 (0.014)	0.19 (1.0)	-0.34 (1.67)**	-0.36 (1.8)**	0.02 (1.0)	-0.18 (1.0)	-0.18 (1.0)	0.046 (0.25)
FE*FP	-	-	-0.01 (2.49)*	-	-	-0.017 (3.6)*	-	-	-0.013 (4.5)*
D1	0.16 (2.1)*	0.07 (0.94)	0.05 (0.7)	0.12 (1.8)**	0.034 (0.45)	0.01 (0.14)	0.08 (0.79)*	-0.006 (0.06)	-0.03 (0.3)
D2	0.27 (4.2)*	0.39 (6.0)*	0.38 (5.8)*	0.23 (4.5)*	0.35 (6.4)*	0.32 (5.9)*	0.21 (2.9)*	0.33 (4.5)*	0.29 (3.9)*
D3	-0.21 (3.2)*	-0.2 (3.0)*	-0.21 (3.3)*	-0.28 (4.5)*	-0.27 (4.5)*	-0.28 (4.7)*	-0.29 (3.1)*	-0.28 (3.1)*	-0.3 (3.6)*
D4	-0.07 (1.2)	-0.36 (8.2)*	-0.43 (4.9)*	-0.019 (0.28)	-0.3 (3.4)*	-0.43 (4.6)*	-0.08 (1.51)**	-0.37 (4.6)*	-0.4 (5.6)*
D5	0.58 (10)*	0.67 (8.2)*	0.63 (7.5)*	0.59 (10)*	0.68 (8.4)*	0.6 (7.3)*	0.54 (7.6)*	0.63 (7.0)*	0.03 (0.27)
D6	0.11 (1.63)**	0.14 (1.17)	0.12 (0.96)	0.08 (1.3)	0.11 (0.94)	0.08 (0.65)	0.05 (0.59)	0.08 (0.63)	0.03 (0.27)
D7	0.10 (1.47)	-0.03 (0.45)	-0.056 (0.72)	0.06 (1.0)	-0.07 (1.0)	-0.1 (1.3)	0.01 (0.15)	-0.12 (1.1)	-0.14 (1.3)
D8	0.37 (6.29)*	0.42 (5.8)*	0.38 (5.0)*	0.37 (6.4)*	0.42 (5.9)*	0.37 (5.0)*	0.31 (4.0)*	0.37 (4.2)*	0.3 (3.5)*
D9	-0.07 (1.14)	-0.06 (0.97)	-0.09 (1.3)	-0.07 (1.2)	-0.06 (0.97)	-0.13 (2.0)*	-0.13 (1.6)**	-0.12 (1.49)	-0.17 (2.0)*
D10	0.36 (5.0)*	0.4 (5.6)*	0.40 (5.6)*	0.29 (4.6)*	0.33 (5.2)*	0.34 (5.3)*	0.29 (3.1)*	0.32 (3.7)*	0.3 (3.5)*
D1*FE		0.003 (1.94)*	0.002 (1.6)**		0.003 (1.9)*	0.0031 (1.9)*		0.0031 (1.9)*	0.0008 (0.52))
D2*FE		-	-		-	-		-	-
D3*FE		-0.0056 (5.2)*	-0.006 (5.6)*		-0.005 (5.3)*	-0.005 (5.0)*		-0.005 (5.2)*	-0.006 (5.6)*
D4*FE		0.008 (4.4)*	0.01 (5.0)*		0.008 (4.3)*	0.01 (5.7)*		0.008 (4.3)*	0.01 (5.5)*
D5*FE		-0.003 (1.67)**	-0.0024 (1.2)		-0.003 (1.73)**	-0.001 (0.55)		-0.003 (1.72)**	-0.002 (1.46)
D6*FE		-0.001 (0.32)	-0.001 (0.34)		-0.001 (0.3)	-0.0005 (0.18)		-0.001 (0.35)	-0.001 (0.59)

D7*FE		**0.003** (3.1)*	**0.003** (2.7)*		**0.003** (3.0)*	**0.003** (3.0)*		**0.003** (3.0)*	**0.001** (0.89)
D8*FE		**-0.002** (1.43)	**-0.001** (0.79)		**-0.0021** (1.57)**	**-0.0005** (0.38)		**-0.002** (1.5)**	**-0.002** (1.6)**
D9*FE		**-0.0005** (0.39)	**-0.0003** (0.3)		**-0.0006** (0.49)	**-0.001** (1.1)		**-0.0006** (0.47)	**-0.001** (1.0)
D10*FE		**-0.002** (2.1)*	**-0.003** (3.1)*		**-0.002** (2.2)*	**-0.003** (3.3)*		**-0.002** (2.2)*	**-0.004** (3.6)*
Adjusted R^2	**0.89**	**0.90**	**0.906**	**0.89**	**0.90**	**0.907**	**0.89**	**0.90**	**0.907**

Figures in the brackets are t-values. *Significant at 0.01; **Significant at 0.05 levels

Table 3: Qualitative Summary of Empirical Results

Equation 1	α, (D), K, L, FE, FP	(0.8986) α, D_i, K, L (0.8997), α, D_i, K, L (0.8984); α, D_i, K, L	Plant Labour Value added
Equation 2	α, (D), K, L, FE, FP, FE*(D)	(0.9061) α, D_i, K, L, $FE*D_i$ (0.9059), α, D_i, K, L, $FE*D_i$ (0.9077); α, D_i, K, L, $FE*D_i$	Plant Labour Value added
Equation 3	α, (D), K, L, FE, FP, FE*(D), $FE*FP$	(0.9071) α, D_i, K, L, FE, (-)$FE*FP$, $FE*D_i$ (0.9076) α, D_i, K, L, FE, (-)$FE*FP$, $FE*D_i$ (0.9082); α, D_i, K, L, FE, (-)$FE*FP$, $FE*D_i$	Plant Labour Value added
Equation 4	α, (D), K, L, FE, FP, FE*(D), FP*(D)	(0.9067) α, D_i, K, L, (-)FP, $FE*D_i$, $FP*D_i$ (0.9098); α, D_i, K, L, (-)FP, $FE*D_i$, , $FP*D_i$ (0.9081); α, D_i, K, L, (-)FP, $FE*D_i$, $FP*D_i$	Plant Labour Value added
Equation 5	α, (D), K, L, FE, FP, FE*(D), $FP*RD$	(0.9062) α, D_i, K, L, $FE*D_i$ (0.9061); α, D_i, K, L, (-)$FP*RD$, $FE*D_i$ (0.9060); α, D_i, K, L, (-)$FP*RD$, $FE*D_i$	Plant Labour Value added
Equation 6	α, (D), K, L, FE, FP, FE*(D), $FP*IM$	(0.9115) α, D_i, K, L, (-)$FP*IM$, $FE*D_i$ (0.9113) : α, D_i, K, L, (-)$FP*IM$, $FE*D_i$ (0.9112); α, D_i, K, L, (-)$FP*IM$, $FE*D_i$	Plant Labour Value added
Equation 7	α, (D), K, L, FE, FP, FE*(D), $FP*EX$	(0.9126) α, D_i, K, L, (-)$FP*EX$, $FE*D_i$ (0.9128); α, D_i, K, L, (-)$FP*EX$, $FE*D_i$ (0.9123); α, D_i, K, L, (-)$FP*EX$, $FE*D_i$	Plant Labour Value added
Equation 8	α, (D), K, L, FE, FP, FE*(D), $FP*SZ$	(0.9063) α, D_i, K, L, (-)FP, $FP*SZ$, $FE*D_i$ (0.9065); α, D_i, K, L, $FP*SZ$, $FE*D_i$ (0.9061); α, D_i, K, L, $FP*SZ$, $FE*D_i$	Plant Labours Value added
Equation 9	α, (D), K, L, FE, FP, FE*(D), $FP*VI$	(0.9060) α, D_i, K, L, $FE*D_i$ (0.9058); α, D_i, K, L, $FE*D_i$ (0.9057); α, D_i, K, L, $FE*D_i$	Plant Labour Value added