Do High FDI Indian Firms Pay Low Wages & Have Higher Output?

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Since trade liberalization in 1991, foreign firms in large numbers came to invest in India. It may cause wage increases in foreign owned firms leading to wage spillover effects within the industry. This paper investigates the relationship between wage dispersion and output of firms belonging to industry sectors with high foreign investment in India. It was found that the current wage dispersion may have a stronger significant effect on the decreasing current output. The low paying firms in industry sector with high foreign investment however will generate more output in the next year compared to those in other industry sectors.

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Introduction

Wage dispersion may come from high vs. low education, skilled vs. unskilled and after vs. before trade liberalization. Since trade liberalization in India in 1991, foreign firms came to invest in the country in large numbers. The liberalized trade policy may lead to productivity increase at the firm level. It may cause wage increases for the employees of foreign owned firms, leading to the wage spillover effect within the industry (Kumar & Mishra, 2008). On the other hand, the wage inequality in India may come from the human capital differences (Dutta, 2005).

India has had some success in exerting a pull on FDI since 1991. With the Indian market being opened to foreign investors several companies are setting up operations in the country. However, foreign investment in India may lead to some changes in the outcomes of domestic firms (DFs). Table 1 shows that the three different types of foreign owned firms in India pay higher wages than domestic firms (FDI=0). First, foreign direct investment is larger than 20% (FDI≥20%). Second, foreign direct in-

Table 1 The Characteristics of Foreign Firms vs. Domestic Firms

	(1)FDI firm≥20%	(2)20%>FDI firm≥10%	(3)10%>FDI firm>0%	(4)FDI firm=0%
Yearly Wage	0.0278(0.017)	0.0214(0.0124)	0.0358(0.1623)	0.0188(0.0153)
Output	5178.68(11749.598)	2276.5712(7478.485)	1511.262(9349.739)	341.3643(535.0181)
Firm Size	4077.987(5411.878)	1268.2867(2598.71)	1532.842(8885.8380)	522.1608(2224.372)
Capital Input	2995.227(4249.923)	976.6179(2073.589)	1053.71(4817.778)	343.1317(473.3631)

Note: (1) Inside the parentheses are the standard deviations.
(2) All variables in Table 1, including Yearly Wage, Output, Firm size and capital at the Firm Level expressed in 10 million Rupees.

vestment is between 20% and 10% (20%>FDI≥10%). Third, foreign direct investment is between 10% and 0% (10%>FDI>0%). Those foreign owned firms have higher output than the domestic firms. As seen in Table 1, not only the wage and output of foreign owned firms are larger than of domestic firms, the foreign owned firms have larger firm size and capital input than the domestic firms. Scholars provide two reasons to explain the above phenomenon. First, increased competition is likely to force inefficient firms to exit the market (Aitken & Harrison, 1999; Sarkar & Lai, 2009). It might be due to the fact that large-size firms (which are highly competitive) can more readily comply with the labor legislation (Lai & Sarkar, 2013; Lai & Sarkar, 2016). Second, the firm's absorptive capacity will lead to higher output because of which the domestic firms will hire workers who have acquired prior knowledge of technology and are able to implement it in domestic firms (Fosfuri et al, 2001; Glass & Saggi, 2002; Crespo & Fontoura, 2007). The foreign owned firms compared to domestic firms are more compatible and willing to follow and comply with the labor legislation to improve the overall working and employment conditions of labor (Lai & Sarkar, 2017).

Theoretical Model

Some studies on FDI spillovers in past have focused on output effect within or across industries (inter industry or intra industry) (Kneller & Pisu, 2007, Kugler, 2006), or within or across nations (international or intra national) in scope (Lee, 2001). Based on the absorptive capacity of domestic firms, some authors have argued that FDI spillovers appear to be greater in developed region and R&D intensive sections (Crespo & Fontoura, 2007; Savvides & Zachariadis, 2005; Karpaty & Lundberg, 2004). However, unlike the previous studies, in this paper we will not focus on whether the spillovers within and across industry sector(s) are greater in any particular sections. Rather in this paper we argue that the absorptive capacity of domestic firms will affect the output within the industry sector (hereafter industry) with high foreign investment. More importantly, we presume that the last one

year's wage dispersion may increase the current output of domestic firms in an industry with high foreign ownership in comparison to other industries in India. It means even the firms in industry with high foreign investment that have paid low wages during last one year will be able to create more current output in comparison to firms in industry with relatively low foreign investment.

The last one year's wage dispersion may increase the current output of domestic firms.

The state of technology in Cobb-Douglas production function is represented by A. To avoid problems of firm size, fixed capital costs and number of firms, the convenient assumptions of constant returns to labor (L) and capital (K) were adopted. The product segmentation from capital can separate such that the capital from foreign investment caters to K_d and capital from domestic firms caters to K_f. Using a Cobb-Douglas formulation production function is given by $F(K,L) = AK_d^{\alpha_1} K_f^{\alpha_2} L^{\beta}$, where $\alpha_1, \alpha_2, \beta < 1$. Production in a firm is , a homogenous production function. Prices of all manufactured goods are normalized at one.

$$Q = F(K,L) = AK_d^{\alpha_1} K_f^{\alpha_2} L^{\beta} \quad \text{.....1}$$

All firms operate in a common set of factor markets for labor and capital whose prices are w and r respectively. The foreign investment firms are supposed to bring capital to India – that is why they are foreign – the relevant rental price of capital are smaller for foreign investment firms (r_f) rather than domestic firm (r_d). This study writes the cost expression in (2), total cost is represented by current w_t at year t and r.

$$C = r_d K_d + r_f K_f + w_t L \quad \text{.....2}$$

Setting output price to unity, the firm aims at profit maximization which can be expressed as

$$Max\pi = F(K,L) - C$$

$$- r_d K_d - r_f K_f - w_t L \quad \text{.....3}$$

$$\frac{\alpha_2 Q}{K_f} = r_f \quad \text{.....4}$$

.....5

This study would like to determine how the optimal choice functions respond to change in a parameter of current wage at year t (w_t), rent of capital (r). The optimal choices have to satisfy the first-order conditions which require

From these two first-order conditions, the ratio of marginal products of capital and labor to their respective marginal costs was established. As seen in equation (6) and (7), the second- order condition is derived from the first-order condition with respect to the current wages at year t (w_t).

$$\pi_{K_f K_f} \frac{\partial K_f}{\partial w_t} + \pi_{K_f L} \frac{\partial L}{\partial w_t} = 0 \quad \text{.....6}$$

$$\pi_{LK_f} \frac{\partial K_f}{\partial w_t} + \pi_{LL} \frac{\partial L}{\partial w_t} = 1 \quad \text{.....7}$$

The second-order conditions are established in equations (6) and (7). The determinant of the cross-partials of the objective function,

$$D=\begin{vmatrix}\pi_{K_fK_f} & \pi_{K_fL}\\ \pi_{LK_f} & \pi_{LL}\end{vmatrix}=\frac{\alpha_2\beta(1-\alpha_2-\beta)\theta^2Q^2}{K_f^2L^2}>0..8$$

As shown in the equations 6, 7 and 8, this study determines the effects of a change in current wages on the capital formation. Using Cramer's rule, we obtain

$$\frac{\partial K_f}{\partial w_t}=\frac{\partial FDI(firm)}{\partial w_t}=\frac{-K_fL}{(1-\alpha_2-\beta)\theta Q}<0..9$$

Based on equation 9, the current wages of employees will discourage the capital accumulation through foreign investment. Therefore, this study indicates that the negative effect of a change in current wages on inward FDI in equation 9 implies that the rate of foreign investment for a specific firm will decrease in response to higher current wage.

The current or lag wage dispersion (at year t or t-1) have a negative relationship with current wage ($WD_{t\text{-}h}$ =

$$\frac{\text{Max w}_{\text{t-h}}-w_{t-h}}{\text{Max w}_{\text{t-h}}} \text{ and } \frac{\partial w_t}{\partial WD_{t-h}}<0,$$

where h=0 or 1). Because the firms who have high current or lag wage dispersion (wage inequality) will have low wages in current year

($\frac{\partial w_t}{\partial WD_t}<0$ and $\frac{\partial w_t}{\partial WD_{t-1}}<0$).

Hence, equations 10 and 11 will show that the current or lag wage dispersion (inequality) will decline the investment of foreign firms (K_f =FDI(firm) and h=0 or 1).

$$\frac{\partial K_f}{\partial WD_{t-h}}=\frac{\partial K_f}{\partial w_t}\times\frac{\partial w_t}{\partial WD_{t-h}}<0 \text{ .....10}$$

$$\frac{\partial FDI\,(firm)}{\partial WD_{t-h}}=\frac{\partial FDI\,(firm)}{\partial w_t}\times\frac{\partial w_t}{\partial WD_{t-h}}<0 .11$$

On the other hand, based on previous studies (Lai & Sarkar, 2011; Sarkar & Lai, 2009), the investment of foreign firms will increase the current output of firms at year t, as seen in equation 12.

$$\frac{\partial Y_t}{\partial K_f}=\frac{\partial Y_t}{\partial FDI\,(firm)}>0 \text{ .....12}$$

Combining equations 10, 11, and 12, equations 13 and 14 show that the wage dispersion will decrease the current output of firms. The firms will have lower output when their wage gap becomes larger between their pay and the maximum level. Therefore, our first hypothesis will try to investigate the negative effect of current or lag wage dispersion on current output.

$$\frac{\partial Y_t}{\partial WD_{t-h}}=\frac{\partial K_f}{\partial WD_{t-h}}\times\frac{\partial Y_t}{\partial K_f}<0$$

where K_f =FDI(Firm) and h=0 or 1.....13

$$\frac{\partial Y_t}{\partial WD_{t-h}}=\frac{\partial FDI(firm)}{\partial WD_{t-h}}\times\frac{\partial Y_t}{\partial FDI(Firm)}<0..14$$

Regarding to the second theoretical model, it will be related with spillover effect. Based on our previous studies (Lai & Sarkar, 2011; Sarkar & Lai, 2009),

the spillover effect may happen via knowledge or technology imitation and hired employees from the investment of foreign firms within the specific industry. Therefore, equation 15 shows that the firm level output should have a positive relationship with foreign investment within a specific industry level.

$$\frac{\partial Y_t}{\partial K_f \times \partial FDI(industry)} = \frac{\partial Y_t}{\partial FDI(firm) \times \partial FDI(industry)} > 0 \quad \text{....15}$$

The firm level output should have a positive relationship with foreign investment within a specific industry.

The ratio of foreign owned firms within a specific industry will increase the current output at year t. Based on equations 9 and 15, as seen in equations 16 & 17, the current or lag wage dispersion at year t or t-1 via FDI spillovers will increase the current output of the whole industry. We expect the spillover effect may happen in the next year which may be through knowledge or technology imitation or hired employees from the foreign firms. The lag wage dispersion may affect current output via spillover effect. Therefore, our second hypothesis will try to investigate the negative effect of current or lag wage dispersion on overall current output of the industry in response to a rise in foreign investment.

$$\frac{\partial Y_t}{\partial WD_{t-h} \times \partial FDI(industry)} = \frac{\partial K_f}{\partial WD_{t-h}} \times \frac{\partial Y_t}{\partial K_f \times \partial FDI(industry)} < 0 \quad \text{.....16}$$

where K_f =FDI(Firm) and h=0 or 1

$$\frac{\partial Y_t}{\partial WD_{t-h} \times \partial FDI(industry)} = \frac{\partial FDI(firm)}{\partial WD_{t-h}} \times \frac{\partial Y_t}{\partial FDI(firm) \times \partial FDI(industry)} < 0 \quad \text{.....17}$$

Data

We have used detailed firm-level data for Indian industries from *Capitaline 2005* provided by Capital Market Ltd. The database provides firm level financial information of more than 13,000 companies. However, due to the constraints on matching variables of different types and to obtain greater homogeneity in data set, the present study has used data related to only 305 firms distributed among the 14 industries for three financial years (FY 2002-03, FY 2003-04, and FY 2005-06). The data set originally used for analysis consists of 630 firms from 14 industries. Some observations were dropped due to the missing value for employee cost (details in Table 2). In order to test the effect of wage dispersion and spillover with one year lag, the sample of three years was merged into a two years' sample which has one year lag. The unreported robust tests indicates that the wage dispersion lagged by two years do not have significant effect on output. Therefore, we adopted the test only for lagged by one year. However, the sample used for empirical is not the panel data. Therefore, we did not require to adopt the techniques generally used for panel data (like fixed and random effect), and we used OLS method to test the effects of wage dispersion and spillovers.

In order to test different ratios of foreign investment within industry, there are three measurements of ratio of industry sales of non-domestic firm (NDF or foreign firms) to total sales of industry for a particular year. We adopt three benchmarks where the percentage of industry sales of NDF to total sales of industry in a year is not lesser than 50%, 40% and 30%.

Empirical Model

The statistics for dependent and independent variables are presented for different foreign investment ratios within industry (Table 3). Dependent variable in equation 18 is a log value of output Y_{ijt} for firm *i* in industry *j* in financial years 2004-05 and 2005-06. The independent variable is a vector of X_{ijt}, which is a matrix of inputs hypothesized to impact on output, namely firm size Sz_{ijt} and capital input Cap_{ijt}. All money related variables were deflated to FY 2002-2003 as the base year. There were two measures of foreign ownership i.e., Ffm_{ijt} and $Find_{jt}$. *b* is a vector of constant parameters to be estimated. Ffm_{ijt} is a variable used to capture the share of foreign ownership at firm level. Share of foreign equity participation was used as the measure for Ffm_{ijt}. In contrast to the numerable variable of Ffm_{ijt}, the dummy variable of $Find_{jt}$ was used as a measure of ratio of industry sales of non-domestic firm (NDF or foreign firms) to total sales of industry for a particular year. $Find_{jt} = 1$, if the percentage of industry sales of NDF to total sales of industry in one year is not lesser than 50%, otherwise it will be zero. This was our first benchmark. In order to do the robust tests, we also checked other ratios of $Find_{jt}$. The second benchmark was where the percentage of industry sales of NDF to total sales of industry in a year is not less than 40%. Third benchmark is where the percentage is not less than 30%. The interaction terms for Ffm_{ijt} and $Find_{jt}$ were able to measure the spillover effect. In order to

Table 2 Industry-wise Sample Distribution

Industry Sector	No. of Firms
Chemicals & allied products – carbon black, paints, plastics, fertilizers,	63
Engineering – power generation, steel, metal	53
Domestic appliances and FMCG – decorative, leather products	20
Services – trading, telecommunication, construction, entertainment	7
Electronics and electrical appliances/equipments	19
Food and diary products – coffee, tea, vanaspati, distilleries, sugar	19
Computers	8
Pharmaceuticals and biotechnology	23
Automobiles and auto ancillaries	30
Textile	23
Cement	10
Mining – minerals / refineries / oil exploration/gas	12
Paper	6
Others – rubber, tires, miscellaneous,	12
Total	305

Table 3 The Sample Statistics for Different FDI Ratios in the Industry

Variable	FDI Industry≥50%	FDI Industry≥40%	FDI Industry≥30%
Dependent Variable:			
Y_{ijt}: log value of Output in Rupees	9.533(0.641)	9.449(0.627)	9.524(0.775)
Independent Variables:			
Ffm_{ijt}: The share of foreign equity	8.194(8.077)	7.568(7.755)	6.293(7.184)
WD_{ijt}: Wage dispersion	0.571(0.236)	0.574(0.236)	0.614(0.228)
FSz_{it}: log value of firm size	9.163(2.078)	9.040(1.970)	8.893(2.337)
Cap_{ijt}: log value of capital input	9.219(0.740)	9.160(0.651)	9.301(0.781)
RD_{ijt}: R&D ratio	1.185(3.465)	0.885(2.386)	1.039(2.317)
$Find_{jt}$: The dummy variable of foreign owned firms. If the ratio of foreign equity≥50%, 40%, 30%, then $Find_{jt}$ =1. Otherwise will be $Find_{jt}$ =0.	1(0)	1(0)	1(0)
Industry Dummy variables:			
D1: Chemicals and Fertilizers	0(0)	0(0)	0.267(0.443)
D2: Engineering	0(0)	0(0)	0.225(0.418)
D3: Domestic Appliances/FMCG	0(0)	0(0)	0(0)
D4: Telecommunication	0(0)	0(0)	0(0)
D5: Electric-Electronic	0(0)	0.176(0.383)	0.081(0.273)
D6: Food and Diary Products	0(0)	0(0)	0(0)
D7: Computers	0.167(0.377)	0.074(0.263)	0.034(0.181)
D8: Pharmaceuticals	0(0)	0.213(0.411)	0.097(0.297)
D9: Automobiles , Auto, Ancillaries	0.625(0.489)	0.278(0.450)	0.127(0.334)
D10: Textile	0(0)	0(0)	0(0)
D11: Cement	0.208(0.410)	0.093(0.291)	0.042(0.202)
D12: Mining-oil-refineries	0(0)	0(0)	0.051(0.220)
D13: Paper	0(0)	0.056(0.230)	0.025(0.158)

avoid the problem of endogeneity, we set variables (fX_{ijt}) to simultaneously determine the foreign ownership and firm's output including the current and one year lagged R&D ratio (RD_{ijt-h}), log value of capital input (Cap_{ijt-h}), and log value of firm size (Sz_{ijt}). Since the R&D and capital input have lag effect on output, we have considered here the one year lagged R&D ratio (RD_{ijt-h}) and capital input (Cap_{ijt-h}). The variable $Ffm_{ijt} \times fX_{ijt}$ was able to control the problem of endogeneity of a firm. Assuming that α is correlated with the regressors, dummy variables or "within estimator" d_{it} was used where α_{it} for each firm *i* is obtained by including dummy variables, which takes the value 1 for the corresponding *i* and 0, otherwise. d_{it} denotes the coefficient of industry dummy and represents the coefficient of time dummy for FY 2004-05 (FY 05) and FY 2005-06 (FY 06), respectively. ε is a random error term. The type of industry and year in which foreign investment is made might be correlated with factors that also affect output. Use of annual time dummy and industry dummy has helped us to tone down such concerns.

$$Y_{ijt} = \alpha_{it} + \sum_{k=1}^{n=5} \delta_k fX_{ijt} + \beta_1 Ffm_{ijt} + \beta_2 Find_{jt} + \beta_3 Ffm_{ijt} \times Find_{jt} + \sum_{k=1}^{n=5} \chi_k Ffm_{ijt} \times fX_{ijt} + \sum_{h=0}^{n=1} \delta_l WD_{ijt-h} + \sum_{h=0}^{n=1} \phi_h Find_{jt} \times WD_{ijt-h} + d_{it} Ind_j + g_1 Y05 + g_2 Y06 + \varepsilon_{ijt} \quad \ldots\ldots\ldots\ldots 18$$

Where, f Xijt =

$$\sum_{h=0}^{n=1} RD_{ijt-h} + \sum_{h=0}^{n=1} Cap_{ijt-h} + Sz_{ijt}$$

$$WD_{ijt-h} \quad \frac{\text{Max W}_{\text{ijt-h}} - W_{ijt-h}}{\text{Max W}_{\text{ijt-h}}} = (h=0,\ 1)$$

The current or one year lagged dispersion of firm-level wages from the most efficient firm has been denoted as WD_{ijt-h}. Firm's output growth brought by foreign investment is expediently determined by the drop in the current or one year lagged wage deviation from the firm that pays highest wage and rest of the firms (absorptive capacity). Wijt-h denotes wages for firms *i* in industry *j* at year *t* and *h* represent the years of lag (*h* =0 or 1). The wage dispersion here is represented by differences between Wijt-h and wages of the firm that pay highest wage during the current year or one year lag in an industry *j* in year *t* with *h* representing the years of lag (Max W_{ijt-h}) in terms of its wage deviation from the firm that pays highest wage.

As seen in Equation 18, if foreign owner subscribed capital (equity) participation in firm, one should observe a positive coefficient on Ffm_{ijt}. Similarly, one should observe a positive coefficient on $Ffm_{itj} \times Find_{jt}$ if the gain in output of foreign firms spills over to domestic firms in a specific industry. Finally, the coefficient on the interaction term of $Find_{jt} \times WD_{ijt-h}$ would be able to measure the effect of the current or one year lagged wage deviation on output in a firm from the highest pay firm within industry sector that has foreign investment rather than others. Estimation of equation has been done by the OLS method.

Results

The variable of $Find_{jt}$ indicates that output of firms in industry with high foreign investment (FDI≥40%, columns (3) and (4) of the Table 4) will be significantly less in comparison to firms in industries with other percentages of foreign investment, as seen in Columns (1), (2), (5), and (6) of the Table 4.

The positive coefficient of WD_{ijt} signifies a negative effect of current wage dispersion on output as it decreases from 8 to 4 percent (Columns (1)-(6) of the Table 4). However, the effect of wage dispersion on output does not vary much between the different percentages of foreign investment i.e., 50%, 40% and 30%. In contrast, the results of regression by excluding industry variables for FDI≥40% and FDI≥30% for the coefficient of WD_{ijt-1} signifies a negative and significant effect of wage dispersion on current output with one year lag (Columns (3), (4) and (6) of the Table 4). Nevertheless, the high wage dispersion during the current year will have a stronger

Table 4 Effect of Foreign Investment on Output

	FDI Industry≥50%		FDI Industry≥40%		FDI Industry≥30%	
	(1)	(2)	(3)	(4)	(5)	(6)
Ffm$_{ijt}$	0.009(0.023)	-0.003(0.024)	0.003(0.024)	-0.003(0.025)	0.014(0.023)	0.005(0.024)
Find $_{it}$	X	-0.018(0.058)	-0.485(0.231)**	-0.485(0.231)**	0.128(0.264)	0.180(0.217)
Ffm $_{ijt}$**×Find**$_{it}$	0.016(0.009)*	0.014(0.009)	0.005(0.004)	0.005(0.004)	0.003(0.004)	0.005(0.004)
WD$_{ijt}$	-0.051(0.021)**	-0.080(0.018)***	-0.056(0.019)***	-0.076(0.019)***	-0.043(0.023)*	-0.043(0.024)*
Find$_{it}$**×WD**$_{ijt}$	-0.018(0.045)	0.061(0.034)*	0.004(0.030)	0.037(0.031)	-0.020(0.074)	-0.027(0.030)
WD$_{ijt-1}$	-0.029(0.031)	-0.019(0.019)	-0.036(0.019)*	-0.054(0.017)***	-0.034(0.026)	-0.041(0.018)**
Find$_{it}$**×WD**$_{ijt-1}$	-0.026(0.088)	0.066(0.034)*	0.004(0.065)	0.081(0.046)*	-0.002(0.074)	0.014(0.031)
R^2	0.827	0.804	0.827	0.804	0.826	0.803

Note:
1. In column (1), the variable of Find $_{it}$ excluded in the regression by SPSS.
2. Dependent Variable = Log value of Output for firm
3.* p < .01 ** p < .005 *** p < .001.
4. Inside the parentheses are standard deviations.
5. Columns (1), (3) and (5) will include the time and industry variables, but Columns (2),(4) and (6) will exclude the industry variables.

negative effect on output in comparison to the one year lagged wage dispersion.

One year lagged wage dispersion has a weak positive effect on current output within industry.

The results of regression by including industry variable for FDI≥50% for the coefficient of interaction term of $Find_{jt}×WD_{ijt}$ show that the current wage dispersion has a weak positive effect on current output within the industry as it has increased by only 6 percent (Column (2) of the Table 4). The results of regression by including industry variables for FDI≥50% and FDI≥40% for the coefficient of interaction term of $Find_{jt}×WD_{ijt-1}$ show that the one year lagged wage dispersion has a weak positive effect on current output within industry as it has increased from only 7 to 8 percent (Columns (2) and (4) of the Table 4).

Conclusion

Results of regression by including industry variables have a less significant effect in comparison to the regressions by excluding industry variables. It implies the first hypothesis has stronger empirical evidence rather than second hypothesis. The empirical result proves the first hypothesis that the

firms will have lower output when their current and lag wage dispersion (wage gap) increases between their pay and the maximum level for different percentages of foreign investments. The firm whose current and lag wages are low will increase wage inequality and decrease output. Moreover, the current wage dispersion may have a stronger significant effect on decreasing the current output for a firm rather than lag wage dispersion.

Our empirical result has only a little to prove the second hypothesis, revealing a weak negative effect of wage dispersion on overall output of the industry in response to a rise in foreign investment. The lag wage dispersion has a more significant effect on output within industry than current wage dispersion. Low pay firm within the industry with high foreign investment is more likely to create higher output in the next year (although it has a positive effect on output in the current year too) in comparison to the firms in other industries. The low wage firms which will have high wage dispersion (wage gap) between them and highest pay firm, may increase the output by knowledge or technology imitation and by hiring employees from the foreign firms. However, the effect is weak and does not control the industry effect.

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