The Role of FDI in Domestic Exporting: Evidence from China

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[ABSTRACT]
This paper investigates the impact of FDI on domestic exporting firms. We show that domestic firms respond to an increase in the presence of FDI by increasing their exports even though the increase in foreign presence can drive up production costs and make the domestic market more profitable. Our test case for this hypothesis is China, where we confirm the significant positive impact of FDI on domestic firms' exports. This finding sheds light on the massive exports and rapid inflow of foreign investment that have been observed in China in the past three decades.

[KEY WORDS]
Export, Foreign Firm, FDI, Spillovers, China
[JEL CLASSIFICATION]
D21, F10, L20

1. Introduction

For many years, researchers have been investigating the driving forces of firm exporting behaviour from a variety of theoretical standpoints; they have used, for example, the classical absolute and comparative advantage theories, the Heckscher-Ohlin model, and the 'new trade theory' associated with Krugman (1979). More recently, Melitz (2003) looked at firm heterogeneity to explain why some firms export and others do not even if the firms are in the same industry (see David Greenaway & Kneller, 2007, for a survey).

Furthermore, one strand of empirical research has explored the determinants of firm exporting behaviour in different countries: Aitken, Hanson, and Harrison (1997) in Mexico; Roberts and Tybout (1997) in Colombia; Clerides, Lach, and Tybout (1998) in Colombia, Mexico, and Morocco; Bernard and Jenson (1999, 2004) in the US; Greenaway, Sousa, and Wakelin (2004) and Kneller and Pisu (2007) in the UK; Gorg, Henry, and Strobl (2008) in Ireland; and Sun (2009) in China. This paper contributes to this field of research by exploring the determinants of firm exporting behaviour in China.

Unlike the abovementioned studies, this paper focuses on the impact of foreign direct investment (FDI) on domestic export quantity. It has been widely recognised that FDI can positively affect domestic firms, either through forward and backward linkage, labour mobility, or imitation and competition effects (see Blomstrom & Kokko, 1998, for a survey). The positive spillovers from FDI affect the export behaviour of domestic firms. As shown below, an increase in the presence of FDI can generate an increase in domestic exports even if the increase in foreign presence also has a

negative impact, such as driving up production costs or making the domestic market more lucrative. This paper focuses on China, which is, on the one hand, one of the largest exporting countries and, on the other hand, one of the largest recipients of foreign investment. Understanding the impact of foreign firms on domestic export quantity will provide a better understanding, from a microeconomic perspective, of China's exports and its massive trade surplus.

The remainder of the paper is organised as follows. Section 2 surveys the existing studies on China's exports. Section 3 establishes a simple partial equilibrium model to examine the impact of foreign firms and presents the hypothesis for the subsequent empirical test. We next set up the econometric specification, describe the data, and construct variables in Section 4. Section 5 discusses the empirical results, and Section 6 concludes the study.

2. Literature Review

Because this paper focuses on China, our literature review is confined to studies on China's exports. China's massive exports have attracted considerable attention and have been explored from different angles.

A number of studies investigate China's exports in a comparative context. He and Zhang (2010) compare China's export dependency with other economies, and Greenaway et al. (2008) explore whether China's exports displace exports from other Asian countries to third markets. Edmonds et al. (2008) conclude that China's export boom is larger than those experienced by its East and Southeast Asian counterparts.

At a bilateral level, Bown and McCulloch (2009) discuss the US-Japan and US-China trade conflict and US efforts to reduce trade imbalances. Xing (2007) analyses the dynamics of China's intra-industry trade with Japan and the US. Wu and Zhou (2006) investigate the trends of and changes in bilateral trade between China and India. Fung and Lau (2003) estimate the bilateral trade balance between China and the US.

Several researchers focus on the relationship between exports and a certain aspect of the Chinese economy. Ma et al. (2009) investigate the relationship between China's geographical location and its processing trade patterns. Yu (2009) focuses on the impact of the revaluation of the Chinese Yuan on China's exports. Yue and Hua (2002) examine the impact on exports of China's shift from a development strategy oriented toward heavy industry to one based on comparative advantages. Xu and Lu (2009) and Xu (2010) examine the sophistication of China's exports.

Researchers have also investigated the relationship between FDI and China's exports at an aggregate level. Zhang and Song (2001) find that the level of FDI has a positive effect on provincial manufacturing export performance. Zhang and Felmingham (2001) and Liu et al. (2001) explore the causality between FDI and exports. At a micro level, a few studies explicitly investigate the impact of FDI on exports. Sun (2009, 2010) confirms the significant impact of FDI on the both the likelihood and the intensity of exports by Chinese domestic firms.

Because many of these studies do not consider the impact of FDI on China’s exports, this paper, which focuses on Chinese domestic exports from a microeconomic

perspective and their relationship with FDI, will make a contribution to the research on China's exports.

3. Export Quantity in the Presence of Spillovers

In an industry where firms are in an interval [0,1], firms located in $[0,\gamma]$ are foreign firms, and firms located in $(\gamma,1]$ are domestic firms. Thus, γ denotes the presence of foreign firms in the industry. All firms are homogenous and can sell their products in both the domestic and foreign markets. In the domestic market, firms play a Cournot game and have the following inverse demand function:

$$p = p(Q),\ p_Q < 0 \qquad (1),$$

where Q is the aggregate of domestic sales, $Q = \int_0^{\gamma}(q_i - e_i)di + \int_{\gamma}^{1}(q_j - e_j)dj$, q denotes the firm output, *e* denotes exports, and p_Q represents the derivative of *p* with respect to *Q*. The world market is a competitive market, and firms are faced with the world price *W*.

In the course of production and exporting, respectively, firms incur costs. For the production process, firm *i*'s cost function is $C\left(q_i, \int_0^{\gamma} q_j dj\right)$ with $C_1 > 0,\ C_2 > 0,$ $C_{22} < 0$, and $C_{12} < 0$ where the subscripts 1 and 2 denote the derivatives with respect to the first and second arguments of the production cost function, respectively. The foreign firms' activities drive up the production cost ($C_2 > 0$), for example, by increasing the average industry wage. Meanwhile, the presence of foreign firms also creates productivity spillovers for other firms. A number of empirical studies have confirmed this result, particularly in China, such as Liu (2008), Buckley, Clegg and

Wang (2007), Chuang and Hsu (2004), Liu (2002), and Li (2001). $C_{12} < 0$ captures productivity spillovers. An increase in foreign firm activity reduces the marginal production cost.

Firm *i*'s export cost function is $E = E\left(e_i, \int_0^\gamma q_j dj\right)$ where $E_1 > 0,\ E_{11} > 0,\ E_2 < 0,$ $E_{22} < 0$, and $E_{12} < 0$. $E_1 > 0$ and $E_{11} > 0$ show that the firm's export cost with respect to quantity is rising at an increasing rate. $E_2 < 0$ and $E_{22} < 0$ show that, for a given export quantity, the export cost is decreasing for the activities of the foreign firms in the industry and is doing so at a decreasing rate. Similar to the production cost, the presence of foreign firms also reduces the marginal export cost ($E_{12} < 0$). Foreign firms will have better knowledge in foreign markets about customer preferences, packaging requirements, and technical standards. Such knowledge can spill over to other firms and thus reduce the fixed cost of exporting. The higher the foreign presence in the industry, the easier and more effectively one firm can mimic the exporting behaviour of foreign firms. Therefore, the presence of foreign firms in the industry reduces not only the total export cost but also the marginal export cost.

Firm *i* chooses its output and export quantities to maximise its profit, given all of the other firms' output and export decisions:

$$\max_{\{q_i, e_i\}} \Pi_i = (q_i - e_i)p\left(\int_0^1 (q_i - e_i)di\right) + e_i W - C\left(q_i, \int_0^\gamma q_j dj\right) - E\left(e_i, \int_0^\gamma q_j dj\right) \quad (2)$$

By symmetry, all domestic firms choose the same output and export quantities, and all foreign firms choose the same output and export quantities. Let the domestic firms'

choice be (q_d, e_d) and the foreign firms' choice be (q_f, e_f). Firm profit maximisation yields the following conditions[1]:

$$P - C_{1,d} - E_{1,d} = 0 \quad (3)$$

$$P - C_{1,f} - C_{2,f} - E_{1,f} - E_{2,f} = 0 \quad (4),$$

where $C_{1,d}$ and $E_{1,d}$ are the first derivative of the production and export cost functions, respectively, in terms of the first argument, evaluated at the domestic firms' output and export quantities. $C_{1,f}$, $C_{2,f}$, $E_{1,f}$, and $E_{2,f}$ are the derivatives that are evaluated at the foreign firms' choice.

The first observation regarding Equations (3) and (4) is that $(q_d, e_d) \neq (q_f, e_f)$; domestic firms and foreign firms make different equilibrium choices regarding output and export quantities, which are the result of the asymmetric impact of foreign presence on the production and export costs. Furthermore, if the foreign firms have the same output as the domestic firms, specifically, $q_f = q_d$, then foreign firms will always export more than their domestic counterparts. Plugging $q_d = q_f$ into Equations (3) and (4), we obtain $E_{1,d} - E_{1,f} - E_{2,f} - C_{2,f} = 0$, which implies $E_{1,d} < E_{1,f}$ as $E_{2,f} < 0$ and $C_{2,f} < 0$. Because $E_{11} > 0$, $e_d < e_f$.

By differentiating Equations (3) and (4) with respect to *e* and γ and holding q_d and q_f constant, we obtain:

$$\frac{de_d}{d\gamma} = -\frac{C_{12,d} + E_{12,d}}{E_{11,d}} q_f > 0 \quad (5)$$

[1] The derivation is available upon request.

$$\frac{de_f}{d\gamma} = -\frac{C_{12,f} + C_{22,f} + E_{12,f} + E_{22,f}}{E_{11,f} + E_{12,f}} q_f \tag{6}$$

This result shows that for an increase in the foreign presence γ, domestic firms will increase their exports, but, in contrast, the foreign firms' decision is undetermined and depends on how their activities affect the marginal export cost.

An increase in the foreign presence, γ, will affect firms through three channels. First, this increase reduces the export cost and thus makes exporting more profitable; second, it increases the production cost, reducing the overall profit. Third, because the equilibrium choices of domestic and foreign firms differ, a change in the foreign presence will create a demand side shock because $dQ/d\gamma = (q_f - q_d) + (e_d - e_f) \neq 0$. If $q_d = q_f$, an increase in γ will reduce the aggregate domestic sales and thus increase the domestic price, making the domestic market more profitable. For domestic firms, the first channel dominates the second and third channels.

In the model, we assume both domestic firms and foreign firms share the same production and export cost functions. However, if we allow for the possibility that they are different, then the results of the model remain unchanged. In other words, the production and export cost functions for domestic firms are $C^d\left(q_i, \int_0^\gamma q_j dj\right)$ and $E^d\left(e_i, \int_0^\gamma q_j dj\right)$, respectively, and those for foreign firms are $C^f(q_i)$ and $E^f(e_i)$, respectively, with similar assumptions on the first, second and cross derivatives.

4. Econometric Specification and Data

Section 3 shows that domestic firms respond to an increase in the presence of foreign firms (FDI) by increasing their export quantity, which is due to the presence of positive spillovers (Equation 5). This hypothesis implies that domestic exports positively depend on the FDI presence, namely $\ln(EXPORTS_{it}) = \lambda_0 + \lambda_1 fp_{it} + \varepsilon_{it}$ where *fp* denotes foreign presence. However, we also need to control for the impacts of other factors on domestic firm exports. Drawing on Aitken et al. (1997), Greenaway et al. (2004), and Sun (2009, 2010), we thus incorporate a set of control variables in the following econometric specification:

$$\begin{aligned}\ln(EXPORTS_{it}) = {} & \lambda_0 + \lambda_1 \ln(firmsize_{it}) + \lambda_2 \ln(lp_{it}) + \lambda_3 age_{it} + \lambda_4 \ln(k_{it}) + \\ & \lambda_5 \ln(averagewage_{it}) + \lambda_6 ownership_{it} + \lambda_7 herfindahl_{it} + \\ & \lambda_8 oic_{it} + \lambda_9 lec_{it} + \lambda_{10} sei_{it} + \lambda_{11} fp_{it} + \\ & \lambda_{12} dindustry_i + \lambda_{13} dyear_t + \alpha_i + \varepsilon_{it}\end{aligned} \quad (7),$$

where the subscripts *i* and *t* denote domestic firm and year, respectively; *EXPORTS* is the domestic firms' exports; *firmsize*, *lp*, *age*, *k*, *averagewage*, *ownership*, *herfindale*, *oic*, *lec*, *sei*, and *fp* denote the firm size, labour productivity, firm age, capital intensity, average wage, ownership structure, Herfindahl index, overall industry concentration, local export concentration, relative total domestic exports, and foreign presence, respectively; *dindustry* and *dyear* are two sets of two-digit industry and year dummies that control for the industry fixed effect and time varying effect, respectively; α_i is the firm fixed effect; and ε denotes the i.i.d. normal error term.

Foreign presence (*fp*) is the variable of interest and is constructed as the share of foreign firms' output in the four-digit industries, $fp = \sum_{i \in I} y_i \Big/ \sum_{j \in J} y_j$, where *y* denotes

firm output, *I* denotes the set of foreign firms in the industry, *J* denotes the set of all firms in the industry, and $I \subset J$. A significant and positive estimate of its coefficient indicates that an increase in foreign presence leads to an increase in the export quantity, thereby confirming the hypothesis.

While we explored the impact of foreign firms on domestic firms' export quantity, we simultaneously controlled for other factors that affect firm export quantity. Drawing on previous studies, such as Aitken et al. (1997), Greenaway et al. (2004), and Sun (2009), we selected control variables that included firm characteristics (firm size, productivity, age, capital intensity, average wage, and ownership structure) and industry variables (the Herfindahl index, overall industry concentration, local export concentration, and relative total domestic exports).

Recent empirical and theoretical literature has shown that more productive and efficient firms export more successfully because they are more capable of meeting the fixed entry cost of exporting and overcoming other export barriers (Bernard & Jensen, 1999; Clerides et al., 1998; Gorg et al. 2008; Melitz, 2003). Therefore, we expect firm size, productivity, capital intensity, and average wage to affect the export quantity positively. Firm size is measured by the number of employees, and labour productivity is equal to value added per worker. Capital intensity and average wage are equal to the fixed assets and total salary divided by the number of employees, respectively. We also include firm age as a control variable to account for the impact of both experience and latecomer advantage. In China, on the one hand, older firms may have more experience in export and thus tend to export more, but, on the other hand, younger firms may have been established specifically to serve foreign markets.

Because these two channels have contrasting effects, we did not have a prior expectation for the coefficient of firm age. Ownership structure (*ownership*) is a dummy variable that takes a value of 1 if the firm is non-state and collectively owned, and it controls for the different export behaviours of these two types of firms. In China, it is easier for state-owned and collectively owned firms to finance their export activities, and it is thus easier for them to overcome fixed entry costs. However, privately owned firms are usually more competitive in the market.

In addition to the characteristics of the firm that affect export quantity, firms that are in different industries but are the same in all other aspects may have different export quantities. We controlled for this possibility with industry variables. The Herfindahl index, which is the sum of the squared firm domestic market share, captures the impact of market structure. In a more concentrated market, firms enjoy domestic market power and have less incentive to explore the world market. However, these firms tend to be large and are more capable of exporting. Overall industry concentration (*oic*) is equal to the province-industry (four digit) share of national industry employment divided by the province share of national manufacturing employment. Local export concentration (*lec*) is equal to the province-industry (four digit) share of national industry exports divided by the province share of national manufacturing exports. These two variables are included to control for the possibility that firms in an industry with concentrated manufacturing and exporting activities are more likely to export (Aitken, et al., 1997) and tend to export more. It is also likely that foreign firms tend to join industries with high exports, and our study controls for this tendency to avoid the endogeneity problem. Like Greenaway et al. (2004), we include relative total domestic exports, which is equal to the total domestic exports in

a four-digit industry divided by the total national domestic exports, to control for potential endogeneity.

Next, we employed a firm-level, balanced-panel data set, which covered 3,260 domestic firms from 2000 to 2007[2], to estimate the impact of foreign firms on domestic exports. The panel data were constructed from a comprehensive micro data set that covers China's 'above designated size' firms and accounts for over 85 percent of China's industrial output. The Chinese National Bureau of Statistics collects these data annually to compile the 'Industry' section of the *China Statistical Yearbook*. Similar data from the same source have been used to study other aspects of Chinese industrial economy, for example, Hu, Jefferson, and Qian (2005), Jefferson, Thomas, and Zhang (2008), Sun (2009), Fu and Wu (2010), and Wu (2010).

Following Jefferson et al. (2008), we cleaned the data set by excluding firms that (1) employ fewer than eight workers and may not have reliable accounting systems; (2) report negative net values of fixed assets, non-positive outputs, value added, and wages; and (3) are located in the upper and lower tails (more than four standard deviations from the mean) of the productivity distribution. Next, we deflated all of the monetary variables, such as value added, to the year 2000 price using the producer price index for manufactured goods, obtained from the *China Statistical Yearbook 2008*. The industry variables, such as foreign presence and the Herfindahl index, were constructed over the cleaned and deflated data set. After constructing all of the variables in Equation (7), we extracted a balanced-panel data set in which all of the firms have export records. By creating a balanced-panel data set, we were able to

[2] The 2001 and 2004 data are not available. In 2003 China revised its industry classification code, which we adjusted accordingly.

avoid the complications of the impact of firm entry and exit. Because all of the firms in the sample had export records, we could avoid the decisions by firms on whether to export, and we could focus on their decisions regarding how much to export. Table 1 presents the descriptive statistics of the variables used in the estimation.

<Insert Table 1 here>

5. Empirical Results

5.1 The estimation strategy

There is potential endogeneity in estimating Equation (7). First, while more productive firms tend to export more, the exporting experience will also improve their productivity level. Second, even though we included relative total domestic exports (*sei*) to control for the possibility that foreign firms tend to join industries with high exports, we may have nevertheless failed to fully control for this effect. Both of these issues led to an endogeneity problem that was supposed to be addressed in the estimation. We, therefore, adopted the following estimation strategy: (a) we assumed that both labour productivity and foreign presence are exogenous, and we applied a fixed effect estimator to estimate Equation (7); and (b) we accounted for the potential endogeneity problem by applying an instrumental variable (IV) estimator. An endogeneity test was subsequently performed to determine which estimation was more appropriate.

It is possible that, in step (a), the idiosyncratic error term in Equation (7) may be serially correlated and heteroskedastic. We thus conducted the Wooldridge (2002) test

and a modified Wald test to check for the AR(1) autocorrelation and groupwise heteroskedasticity, respectively. The Wooldridge test regresses the residuals, calculated from the regression of the first-differenced variables, against their one-period lags. Under the null hypothesis of no AR(1) autocorrelation, the coefficient estimated is -0.5, which can be tested with the usual *t* statistic. The Wooldridge test was shown by Drukker (2003) to have good size and power properties with a reasonable sample size, and it was therefore applicable to our context, which included nearly 20,000 observations. The test statistic obtained was 68.67 with a p-value of 0. For the modified Wald test, the test statistic obtained was 4.3×10^{6} with a p-value of 0. Thus, the two tests did not support the null hypothesis of no AR(1) autocorrelation and homoskedasticity, respectively, at the 5 percent level. Due to the autocorrelation and heteroskedasticity, we calculated their robust standard errors in the estimation using a procedure provided by Schaffer (2007).

In step (b), we performed the IV estimation following the Schaffer (2007) procedure in which we use the one-year lagged labour productivity, foreign presence, and number of firms in the four-digit industry as the instruments. Next, we calculated the heteroskedasticity and autocorrelation robust standard errors as a result of the evidence of these factors in step (a). Then, we conducted a feasible and efficient two-step generalised method of moments (GMM) IV estimation. The GMM IV estimation is more efficient than the two-step least square IV estimation if heteroskedasticity and autocorrelation are present (Baum, Schaffer, & Stillman, 2007). Because the instruments need to be relevant (i.e., correlated with the endogenous variables), we verified the relevance of the instruments by examining the fit of the first stage regression. In the first-stage regression, the Bound, Jaeger, and Baker (1988) partial

R-square and the Shea (1997) partial R-square are both 0.27 for the foreign presence and 0.09 for the labour productivity. The *F* statistic for the joint significance of the instruments is 180.42 with a p-value of 0 for the foreign presence and 80.1 with a p-value of 0 for the labour productivity. Therefore, the instruments are relevant. The instruments also need to be valid (i.e., uncorrelated with the error terms). As the number of instruments exceeds the number of endogenous variables, we can test the validity of the instruments as an overidentification test using the Hansen (1982) *J* statistic, which is χ^2 distributed with degrees of freedom equal to the number of overidentifying restrictions. The *J* statistic obtained was 3.29 with a p-value of 0.07. Therefore, at the 5 percent significance level, we were unable to reject the null hypothesis of orthogonality between the instruments and the error terms.

Finally, we determined whether step (a) or step (b) was more appropriate with an endogeneity test, the *C* statistic (Eichenbaum et al., 1988; Hayashi, 2000), to test the orthogonality of the endogenous variables. We obtained a *C* statistic of 21.99 with a p-value of 0, which provided no support for the null hypothesis of the orthogonality of the endogenous variable at the 5 percent level. Thus, we concluded that the GMM IV estimator was more appropriate to estimate Equation (7).

5.2 The impact of foreign firms on domestic exports

Table 2 shows the estimation results; the first column presents the estimation at step (a), and the second column presents the estimation at step (b). Because step (b) is more appropriate, the following interpretations are based on step (b); step (a) is presented for purposes of comparison.

The estimated coefficient of foreign presence is 0.57 with a *t* statistic of 2.28, which is significant at the 5 percent level. Hence, a 1 per cent increase in foreign presence will encourage domestic exporting firms to increase their export quantity by 0.57 per cent. In the past three decades, China's rapid growth in exports has been coupled with a rapid inflow of foreign direct investment. From 1991 to 2007, the average actually utilised FDI was as high as 43.5 billion US dollars with an average annual growth rate of 26 percent. In the same period, exports grew at 20 percent per annum on average, and average exports were 356 billion US dollars. The correlation between the exports and inflow of foreign direct investment was as high as 0.8. The positive and significant estimate of the coefficient of foreign presence confirms that one contribution to this close relationship is the positive impact of foreign firms on the exports of domestic firms. Although foreign direct investment can drive up production costs, domestic firms benefit from positive productivity spillovers and the dissemination of export market information, and they respond by increasing their exports.

<Insert Table 2 here>

The estimated coefficients for the control variables are largely consistent with our expectation. Firm size and productivity are found to significantly and positively affect export quantity, indicating that more efficient and productive firms export more. Capital intensity and average wage have no significant impact on exports. Firm age did not significantly affect export quantity either; the estimated coefficient is insignificant at the 5 percent level, indicating that the latecomer advantages of younger firms cancel out the experience of older firms. The coefficient of ownership

structure is negative and significant at the 10 percent level, implying that the state and collectively owned firms export more than their privately owned counterparts. This result is somewhat surprising because we would expect private firms to be more competitive in the market. Nevertheless, this result is feasible for the firms in our sample due to the importance of financing in the export process. This factor is relevant because state- and collectively owned firms in China have greater resources for better financing than their privately owned counterparts.

The impact of overall industry concentration is found to be positive and significant at the 5 percent level. A firm in an industry with more concentrated manufacturing activities exports more than a firm that is not. In contrast, local export concentration does not seem to have the same impact because its estimated coefficient is insignificant. Likewise, market structure, captured by the Herfindahl index, does not appear to significantly affect export quantity. Participation in an export-oriented industry boosts export quantity, which is confirmed by the positive and significant estimate of the coefficient for relative total domestic exports.

5.3 Sensitivity Analysis

Using the share of foreign firms' output in the four-digit industry as a measurement of FDI, we find that FDI has a significantly positive impact on the exports of domestic exporting firms. The following question then arises: to what extent is this result due to our method of calculating FDI? To examine the robustness of the finding, we re-estimated Equation (7) using the share of foreign firms' employee and assets in the four-digit industry as measurements of FDI, respectively. Table 3 presents the estimation results, and here, we can observe that some variations in the point estimate

of explanatory variables exist. Nevertheless, the finding of FDI's significantly positive impact does not change. Table 3 also provides information regarding the estimation result when the explanatory variables in Equation (7) are lagged by one year. Again, the positive impact of FDI appears to be robust.

<Insert Table 2 here>

6. Concluding Remarks

This study explores the impact of FDI on the export quantity of domestic exporting firms[3]. As a result of positive productivity spillovers from foreign firms, domestic firms respond to an increase in the presence of foreign firms by increasing their exports, even though FDI can drive up production costs and make the domestic market more profitable. This hypothesis was tested using a rich, firm-level, balanced-panel data set in China. Our results suggest that a 1 percent increase in foreign presence causes a 0.57 percent increase in domestic exports. From a microeconomic perspective, these results shed light on China's massive exports and the rapid inflow of foreign direct investment, two phenomena that have been observed in China in the past three decades.

[3] One may also ask how FDI affects domestic firms' export participation rate and export intensity. This issue was explored by Sun (2009), who found a significant impact.

Table 1 Descriptive Statistics

Variables	Mean	Std. Dev.	Min	Max
ln(EXPORTS)	9.86	1.52	1.39	17.72
ln(firm size)	-1.00	1.26	-4.61	5.09
ln(labour productivity)	3.71	0.88	-1.52	7.82
firm age	21.49	19.75	1	408*
ln(capital intensity)	3.54	1.17	-4.54	8.21
ln(average wage)	2.44	0.52	-4.67	5.12
Herfindahl index	0.02	0.07	0.001	8.56
overall industry concentration	37.70	137.95	0.03	7055.09
local export concentration	132.90	1116.03	0.001	61725.60
relative total domestic exports	0.01	0.02	0.000002	0.10
foreign presence	0.37	0.18	0	0.98
ownership	0.37			

Note: * Two firms that produce traditional Chinese medicine report a history dating back to the 15th century.
Source: The author's own calculation based on data from National Bureau of Statistics, Beijing, 2007.

Table 2 Estimation Results

	(a)			(b)		
Variables	Coefficient	Std. Err.	t	Coefficient	Std. Err.	t
ln(firm size)	0.79**	0.02	43.36	0.89**	0.04	24.03
ln(labour productivity)	0.40**	0.01	29.69	0.71**	0.07	9.87
age	-0.0004	0.001	-0.49	-0.001	0.001	-1.03
ln(capital intensity)	0.05**	0.01	4.34	0.01	0.02	0.55
ln(average wage)	0.17**	0.02	9.15	0.06	0.04	1.32
ownership	-0.06**	0.02	-2.63	-0.06*	0.04	-1.69
Herfindahl index	0.03	0.06	0.56	0.07	0.05	1.4
oic	0.0001	0.0001	1.63	0.0003**	0.0001	2.07
lec	-0.000002	0.000011	-0.2	0.000004	0.000018	0.22
sei	9.01**	0.68	13.32	9.36**	1.24	7.54
foreign presence	0.41**	0.08	4.92	0.57**	0.25	2.28
industry dummies	yes			yes		
year dummies	yes			yes		
				n.a.		
Centred R-square	0.30					
F statistic	113.88			0.2		
No. of Obs	19553			27.5		

Note: (a) is the fixed effect estimation without instruments; (b) is the GMM IV estimation; ** denotes significance at the 5 percent level; * denotes significance at the 10 percent level; oic denotes overall industry concentration; lec is local export concentration; sei represents relative total domestic exports.
Source: The author's own estimation based on data from National Bureau of Statistics, Beijing, 2007.

Table 3 Sensitivity Analysis

	(a)			(b)			(c)		
Variables	Coefficient	Std. Err.	t	Coefficient	Std. Err.	t	Coefficient	Std. Err.	t
ln(firm size)	0.57**	0.03	16.64	0.89**	0.04	24.18	0.89**	0.04	23.98
ln(labour productivity)	0.28**	0.02	12.62	0.71**	0.07	9.9	0.71**	0.07	9.8
age	-0.0029**	0.001	-2.51	-0.001	0.001	-1.05	-0.001	0.001	-1.03
ln(capital intensity)	0.03	0.02	1.48	0.01	0.02	0.57	0.01	0.02	0.55
ln(average wage)	0.16**	0.03	5.7	0.06	0.04	1.36	0.06	0.04	1.34
ownership	-0.01	0.03	-0.3	-0.06*	0.04	-1.75	-0.06*	0.04	-1.76
Herfindahl index	0.83*	0.49	1.71	0.05	0.05	1.01	0.09*	0.05	1.69
oic	0.0003**	0.0001	2.44	0.0003**	0.0001	2.14	0.0003**	0.0001	2.1
lec	0.000015	0.000015	0.98	0.000005	0.000018	0.3	0.000004	0.000018	0.22
sei	9.44**	1.07	8.86	9.64**	1.23	7.82	9.63**	1.23	7.85
foreign presence	0.31**	0.12	2.6	0.77**	0.27	2.84	0.56**	0.23	2.42
industry dummies	yes			yes			yes		
year dummies	yes			yes			yes		
Centred R-square	0.15			0.2			0.2		
F statistic	19.18			27.67			27.69		
No. of Obs	9776			9780			9780		

Note: (a) is the FE estimation without instruments where all explanatory variables, except industry and time dummies, are lagged by one year; (b) is the GMM IV estimation with foreign firms' employee share in the four-digit industry as a measurement of FDI; (c) is the GMM IV estimation with foreign firms' assets share in the four-digit industry as a measurement of FDI; ** denotes significance at the 5 percent level; * denotes significance at the 10 percent level; oic denotes overall industry concentration; lec is local export concentration; sei represents relative total domestic exports.
Source: The author’s own estimation based on data from National Bureau of Statistics, Beijing, 2007.

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