The Impact of Exporting on Firm Performance: Evidence from Chinese firms *

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Abstract

China has been undergoing a period of extremely high economic growth and this, in part, is due to the massive levels of foreign trade. The empirical research upon firm performance and exporting has a high potential value as a guideline for Chinese policy-maker to facilitate globalization. It is apparent that, on average, exporters are larger, more productive, more capital-intensive, more technology-intensive, and willing to pay higher wages. Exporting can be an important source of competitive pressures, information and other productivity advantages for firms, leading to significant performance improvements that have been identified as 'learning by exporting'.

This study empirically focuses on estimating and analyzing the parameters of the impact of exporting on firm performance, with panels of the top thousand Chinese companies in the period 2002 - 2005 and 2400 small and medium firms in the period 2000-2002. The quality of data in this study, especially in small and medium firm data set, together with the variability of the microeconomic firm level data, enables particular attention to be paid to a number of econometric problems that may have affected previous research, reaching a precise estimation of the impact of exporting on performance. This study documents that 1) the impact of exporting on firm performance is significant(particular in the entrant year) ; 2) the difference in performance growth between exporters and non-exporters is unclear; 3) the impact of exporting on small and medium firm samples is more significant than that in large firm samples; 4) when samples used in the paper are restricted to the matched firms, there is generally little evidence of an export premium.

Keywords: Total Factor Productivity, Performance, Exporting.

JEL Codes: F10, F14, D20.

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1 Introduction

The most productive firms tend to invest in foreign plants and facilities; the small and medium level firms are willing to serve foreign market through exporting, while the least productive firms may only serve the domestic market, as firms need to afford sunk cost to expand the market to global level through exporting or investment. It is apparent that, on average, exporters are larger, more productive, more capital-intensive, more technology-intensive, and willing to pay higher wages. Exporting can be an important source of competitive pressures, information and other productivity advantages for firms, leading to significant performance improvements that have been identified as 'learning by exporting'(Krugman 1980, Bernard et al. 2003).

The impact of exporting on the performance is the main feature that the literature is concerned with. Widespread and robust research has proposed and tested the existence of this causal effect by theoretical and firm level empirical research. As early as the 1980s, Krugman (1980) proposed a model using cost and utility function, and argued that when firms are allowed to trade, increasing returns and gains from trade can occur even if the economies do not have identical tastes, technology, and factor endowments. Recent strands of theory initiated by Melitz (2003), Bernard et al. (2003), Helpman et al. (2004) have extended Krugman's early trade framework to domestic multinationals and other specifications. Bernard & Jensen (1995) published the first empirical research using a large comprehensive longitudinal data set drawn from official US statistics that investigates the productivity disparity between exporters and domestic firms, and finds some evidence of the 'self-selection' hypothesis (higher productive firms are exporters). Some evidence was also found in Yasar & Rejesus (2005), Wagner (2002), Greenaway & Yu (2004), Blalock & Gertler (2004), Jensen & Musick (1996), Mengistae & Pattillo (2004). During the last ten years, most empirical studies concern the role of the "Learning by Exporting" hypothesis. Learning by exporting fosters firms to become more productive, and transfers the knowledge flows from international buyers and competitors to help to improve the post-entry performance of exports. Moreover, exporters are exposed to a global market with its intense competition.

So far, strong evidence on the impact of export on performance (Learning by exporting) was found in Kraay (1999), Hallward-Driemeier et al. (2002), Baldwin & Gu (2003), Van Biesebroeck (2005), Girma & Görg (2004), Hahn (2004), Blalock & Gertler (2004), De Loecker

(2004). But little evidence was found in Clerides et al. (1998), Aw et al. (2000), Delgado et al. (2002), Castellani (2002), Bigsten et al. (2002), and no evidence was found in Bernard & Jensen (1999), Isgut (2001), Fafchamps et al. (2005), Arnold & Hussinger (2005*a*), Alvarez & Lopez (2005). The comparability of firms in the 'treatment' (exporters) and 'control'(domestic firms) groups was a crucial aspect of most recent empirical studies after Wagner (2002). Recently some researchers have suggested that matching methods can be more effective than traditional OLS and other methods in terms of generating an adequate 'like-for-like' comparison between the two groups (Rosenbaum & Rubin 1983). A matching approach was conducted in Yasar & Rejesus (2005), Girma et al. (2004), Wagner (2002), Greenaway & Kneller (2003), Fernandes & Isgut (2005), De Loecker (2004), Greenaway & Kneller (2004*a*), Arnold & Hussinger (2005*b*), Kostevc (2005), Greenaway & Kneller (2004*b*), Greenaway et al. (2005).

Given its potential relevance, the 'learning by exporting' hypothesis spurred a large number of empirical studies that seek to assess the causal effect of exporting at the firm level. However, there is no consensus on whether such effect exists or what specific factors may be behind it. In fact, a very recent survey (Wagner 2007) indicates that the evidence on this 'learning effect' is "mixed and unclear", while it is well established that, on average, firms that export are more productive than firms that do not export and that there is evidence of 'self-selection' in the exporting process. Martins & Yang (2007) surveys more than 30 papers, conducting different robustness tests, and finds some clear patterns concerning the study features that can systematically predict study outcomes. In particular, the study finds that the impact of exporting upon productivity 1) is higher in developing than in developed economies; 2) is higher in the first year that firms start exporting than at later years; 3) is lower with an OLS estimator; and 4) is lower when only matched firms are analyzed. Moreover, there is no evidence of publication bias.

Following from the literature on the causal effect of exporting on productivity, this study analyzes the effect in the case of Chinese firms in the period 2000-2005. China has been undergoing a period of extremely high economic growth and this, in part, is due to the massive levels of foreign trade. Moreover, given that the figure is likely to increase, China will still have in the future very high gains it may obtain from export market. The empirical research upon firm performance and exporting has a high potential value as a guideline for Chinese policy-

maker to facilitate globalization. Kraay (1999) has found some export premium evidence in Chinese firms, using a panel of 2105 firms in the period 1988 - 1992. This study uses the latest micro firm level data from different sectors and regions that consists of a panel of 2400 small and medium firms in the period 2000-2002 and a panel of the top thousand companies in the period 2002-2005. The quality of data in this study, especially in the small and medium firm data set, together with the variability of the microeconomic firm level data, enables particular attention to be paid to a number of econometric problems that may have affected previous research, and enables a precise estimation of the impact of exporting on performance.

This study documents that 1) the impact of exporting on firm performance is significant(particular in the entrant year) ; 2) the difference in performance growth between exporters and non-exporters is unclear; 3) the impact of exporting on small and medium firm samples is more significant than that in large firm samples; 4) when samples used in the paper are restricted to the matched firms, there is generally little evidence of an export premium

The next section 2 describes in more detail the data set that was used to investigate the impact of exporting on performance. Section 3 describes the empirical model undertaken in the study, while section 4 presents the results. Finally, section 5 gives concluding remarks.

2 Data and Descriptive Analysis

This study estimates the parameters of the impact of exporting on performance from two new firm level data sets. The first data used in this study comes from the Orbis data set that covers the top thousand Chinese firms in the period 2002-2005 from 22 Provinces, 5 Autonomous Regions and 4 Municipalities, and these samples almost cover the whole mainland China. The second data comes from 2000-2002 World Bank Dataset that contains 2400 small and medium Chinese firms in most provincial capitals and some costal cities. [1]

[1]China is administratively divided into 23 provinces, 5 autonomous regions, 4 centrally administrative municipalities and 2 special administrative regions (SAR). The most interest of this study is to investigate the impact of exporting on mainland Chinese firms. Additionally, the sample in Orbis only lists mainland firms; therefore, firms from Taiwan, Hong Kong and Macao are not included in the study. — Twenty-three Provinces: Anhui, Fujian, Gansu, Guangdong, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan, Zhejiang and Taiwan. — Five Autonomous Regions: Guangxi, Inner Mongolia, Ningxia, Tibet (Xizang) and Xinjiang. — Four Municipalities: Beijing (Peking), Chongqing, Shanghai and Tianjin. — Two Special Administrative Regions (SAR): Hong Kong and Macao. Municipalities are directly under the administration of central government. A municipality has the same political, economical and jurisdictional rights as a province; Special Administrative Regions (SAR) was established specially designed for solving Hong Kong and Macao issues

2.1 Orbis Data set

Orbis is a global product, which combines data from Bureau Van Dijk (BvDEP)'s company information, and it collects and comprehensively maintains data from several thousands of Chinese companies. This study mostly concerns the features of the top thousand companies.

1. *Data*

   The orbis data was combined from nearly 100 sources which are filtered into various standard report formats to facilitate global searching and company comparisons. Orbis is a comprehensive database of companies around the world, and the data sections include general contact information and overview; industry and activities; detailed history and overview of companies' activities; financial profile and others. In order to analyze the exporting shock to the performance of large companies, the empirical focus of this study relates to the top thousand Chinese corporations compiled by private-owned enterprises and public quoted enterprises with minimal annual turnover of 2315 million Renminbi (USD 290 million). It is estimated that the sum of these 1000 firms's annual turnover accounts for nearly 59 percent of Chinese Gross Domestic Production.

   The data used in this study includes information on annual turnover, cost of material, operational expense, number of employees, cost of employees, value of total assets, intangible fixed assets, net profit margin, gross profit margin, return of asset, ownership structure, geographic location, description of main business, and the most crucial factor, the export value. The data also contains information on tangible fixed assets (include net land, net stated land, net buildings, net plant and machinery, net transport equipment, net leased assets and net other property plant and equipment [2]). The information on tangible fixed assets enables calculation of capital in the total factor productivity function as captured in the equation 3. These top thousand companies are located in over 260 cities or counties. To capture the economic influence of each region as captured in equation 3, this study creates a set of regional dummies. The study divided 260 cities /counties into 22 Provinces, 5 Autonomous Regions and 4 Municipalities. Table 3 exhibits the geographic location of China's the top thousand firms, of which,

[2]Net land is equal to land minus depreciation, net building is equal to building minus depreciation, the same as net plant and machinery, net transport equipment, net leased assets and other net property plant and equipment

Guangdong province, Jiangsu province, Shandong provinces, Shanghai municipality and Beijing municipality together account for over 50 percent.

Based on the description of main business sectors, this study categories firms into 10 different sectors. Of the total samples, over 90 % is in manufacturing, and the remaining ones are business service companies and wholesaling. There are ten manufacture sectors that include auto and auto parts; chemical products; food processing (e.g. meat, ice cream, cocoa and tobacco); consumer products (e.g. paper, plastic, public order, glassware and other appliances, life company, etc); electronic equipment (e.g. electronic equipment electronic parts, house holding electronic. etc); textile (e.g. garment, footwear, weaving, leather and textile. etc) ; metallurgical products; natural product (e.g. petroleum, gas, oil and coal, etc); transportation equipment (e.g. bicycle, telecom equipment etc); weapons. Two business sectors are business services and wholesaling.

The raw data covers the period 2002 - 2005. 37.5 percent are publicly quoted firms, and the remaining 62.5 percent are privately owned firms. However, within the data set 375 publicly quoted firms and 50 private owned firms do not reveal their export status and export value for the whole period. It is seriously biased when considering non available value on export figure to be domestic firms (Although maybe some domestic firms will only write 'n.a' in the survey); The sample used in this paper is those 575 exporters with full information on export value as the export value enables a parametric estimation of the impact of exporting on performance; therefore, final number of observations that this study ended up with was a total of 2018 observations based on 575 firms.

2. *Descriptive analysis*

Table 1 summarizes the main features of the top thousand firms. It contains 2018 observations in the data set, of which 68% are exporters. The average annual turnover is 6675 million Renminbi ($ 834 million), and the average employment is 9751, and the average annual wage is 34300 RMB ($4287). Average profit margin and gross profit margin are 5.73 % and 17.43%, respectively. Each firm, on average, has been for 17 years in an economy zone (allows the cooperation with foreign economies under the Chinese 'open door policy')

2.2 World Bank Data set

1. *Data*

The second data used in this study is another newly available and detailed plant-level data from World Bank Dataset that is grounded on eleven core sections.[3]. The World Bank Dataset covers a panel of 2400 companies in the period 2000-2002 that are located in 18 major provincial capitals and costal cities. Firms from the Orbis data set are representatives of those large Chinese companies, while, firms in World Bank Dataset are more likely to be representatives of those relatively small and medium Chinese firms as the descriptive statistics in table 1 and table 2. The reasons are 1) firms from the Orbis data set have an annual turnover 36.9 times higher than those in World Bank Dataset; moreover, 2) on average, employment and capital are 17.4 times and 21.7 times larger, respectively. Therefore, the final observations for the analysis are a total of 557 largest firms in the period 2002-2005 and 2400 small and medium firms in the period 2000-2002.

The data on small and medium firms contains information on net value of buildings; production machinery and equipment (excluding IT); cars, vans and trucks equal to total capital the company holds. The World Bank Dataset also reports the value of new investment on building; production machinery and equipment (excluding IT); cars, vans and trunks. Other detailed firm level data that the World Bank Dataset provides includes the expenditure on Research and Development, information on general manager's education and nationality. The quality of data in this study, especially in the small and medium firm data set, together with the variability of the microeconomic firm level data, enables particular attention to be paid to a number of econometric problems that may have affected previous research, and enables a precise estimation of the impact of exporting on performance. This will be explained in more detail in section 4.

Of the total sample, 67.3 % refers to Manufacturing sectors that include garment

[3]World Bank Dataset is normally carried out under auspices of national stakeholder. In the year of 2002, the World Bank Dataset in China was implemented by National Bureau of Statistics (NBS). The firms are located in five cities from ten sectors, including manufacturing and service companies, and cover a panel of 1548 firms in the period 1997-2000. Of the ongoing surveys in the year of 2003, World Bank Dataset was also conducted by National Bureau of Statistics, coving 2400 companies in eighteen cities and fourteen sections, including information technology and business services. It embraces three year time-dimension data in each firm in the period 2000 - 2002.

and leather products; electronic parts making; household electronics; auto and auto parts; food processing; chemical products and medicine; biotech products and Chinese medicine; metallurgical products and transportation equipment, and the remaining 32.7% are four service sectors that consist of information technology; accounting and non-banking financial service; advertisement, marketing and business services sectors.

2. *Descriptive analysis*

   Table 2 summarizes the main features of firms from the World Bank Dataset. 7111 observations are contained in the data set, of which 15% are exporters. The average annual turnover is 180 million Renminbi that equal to $ 22.5 million and the average employment is 559. The average sale per worker is 5.8 million RMB ($725,000). 68% of the firms are in manufacturing. 16% of the firms has a contractual or long-standing relationship with a local University or a research institution. 25 % of general managers were appointed either directly by government or else by a government agency, the remainder were appointed by board of directors, shareholders or employees; 22 % of general managers are members of the Chinese Communist party, 6 % of general managers have been educated in a foreign University or institution, 5% of general managers are foreigners (including HK, Macao and Taiwan), and 6 % of general managers were previously appointed as government officials before entering the company.

3 Empirical Model

Total factor productivity (TFP) explains the relationship between the outputs and inputs of the firm. Besides TFP, this study also estimates the impact of exporting on profit margin, gross profit margin, labor productivity, sales per worker, employment and wages.

3.1 Total Factor Productivity Empirical Model

The total factor productivity function in this study is built on the approaches by (Olley & Pakes 1996, Levinsohn & Petrin 2003) that use intermediate input and investment as the inputs, respectively. The impact of being an exporter or multinational is a highly influential factor that may be correlated with the outputs. Martins & Yang (2007) found that the TFP approach has became a common empirical model to analyse the impact of exporting on

performance. The production function is given by equation 1:

$$Y_{it} = L_{it}^{\beta_1} K_{it}^{\beta_2} \phi, \tag{1}$$

, where Output Y_{it} is the annual turnover, Labor $L_{it}^{\beta_1}$ is the total number of workers employed by the plant, capital $K_{it}^{\beta_2}$ is the sum of stocks of the tangible fixed assets, including land, building, plant and machinery, transport equipment, leased assets, and other property, each of them obtained after subtracting the depreciation value. ϕ addresses effects in total output not caused by capital or labor. Considering potential factors that may affect the output, this study defines $\phi = exp(\beta_0 + I_{it}^{\beta_3} + \beta_e E_{it} + \beta_5 W_{it} + \beta_6 R_{it} + \beta_7 S_{it} + \beta_8 \ell_{it} + \varpi_{it} + \epsilon_{it})$. Input $I_{it}^{\beta_1}$ is the sum of materials, outsourcing expenses and energy. Export dummy E_{it} is equal to one if the firm export in the current year, W_{it} is the average cost of an employee, R_{it} is the region dummy, S_{it} is the sector dummy, ℓ_{it} is year dummies [4] , ϖ_{it} is the disturbance error that may affect the total factor production, however, it is unknown to the econometricians.

Taking logs in equation (1) and inserting γ , a set of factors including sector dummies S_{it}, regional dummies R_{it} ,average wage W_{it} ,ℓ_{it} year dummies and disturbance ϖ_{it} . The study obtains the following estimating equation 2 :

$$Y_{it} = \beta_0 + \beta_e E_{it} + \beta_2 L_{it} + \beta_3 I_{it} + \beta_4 K_{it} + \gamma + \epsilon_{it}, \tag{2}$$

Melitz (2003) and Krugman (1980) built a dynamic model with heterogeneous firms to show how, given the opportunity to engage in international trade, more productive firms do export, while, less productive firms produce only for the domestic market, and the least productive firms exit production entirely.

Assuming the firm occurs continually, when it begins exporting, the firm should first invest an initial sunk cost, measured as a fixed entry cost f_c >0, that involves the expenditure on facilities, such as research and development, overseas branch. etc. If the firm's initial productivity (ϑ) subtracts sunk cost f_c is still positive, firms enter the export market. Firms may remain exporters, and export impact β_e may be a big shock to the total factor productivity function.

[4]The data set covers the period 2002 to 2005. ℓ2002 equal to one if year==2002, the same as the remaining years

3.2 The Impact Function

'Export Premium' is the process of the computation of the percentage difference of performance between exporters and domestic firms. The Export premium is computed by the equation 3

$$LnY_{it} = \beta_0 + \beta_e E_{it} + \beta\gamma_{it} + \upsilon + \epsilon_{it}, \tag{3}$$

Of which, i refers to the individual firm, t is the index to the year, LnY_{it} refers to the log of performance, such as total factor productivity, labor productivity, employment and wages. γ_{it} is a set of the control variables, such as the the total asset, regional dummies, sector dummies, age, ownership, and all other possible shocks that influence the performance. υ is unobservable factors that correlate with firm performance and other control variables. β_e refers to the average percentage difference between exporters and domestic firms.

A related question that most recent studies are also interested in concerns the differences in performance growth between exporters and domestic firms. In most cases, $LnY_{it} - LnY_{it-1}$ is measured as the difference of performance growth during the year before and after entrance that was investigated based on the empirical model shown in equation 4.

$$\Delta LnY_{it} = \alpha_0 + \beta_e E_{it} + \beta\Delta\gamma_{it} + \epsilon_{it}, \tag{4}$$

of which, ΔLnY_{it} refers to performance growth rate. The regression coefficient β_e is the estimate for the difference in growth rate between exporters and non-exporters. The outputs are total factor productivity, labor productivity, employment and wages.

The other interest of this study is to investgiate the impact of exporting on the entrant year. Taking first difference Fixed effect in the export premium, the firm fixed effect will be deleted. The results came from equation 5.

$$\Delta LnY_{it} = \beta_e \Delta E_{it} + \beta\Delta\gamma_{it}, \tag{5}$$

of which, ΔLnY_{it} refers to performance growth rate. The regression coefficient β_e is the estimate indicates that how much percentage higher the new entrant perform better than other firm in terms of performance growth rate. $\Delta\gamma_{it}$ is the growth of firm characteristics.

4 Results

The evidence of the export premium in large, small and medium firm samples are not consistent. Superior performance characteristics of exporting plants are mostly documented in small and medium firm samples.

4.1 Large firm samples

The total Factor Productivity function conducted in large firm samples' analysis is as following eqation,

$$Y_{it} = \beta_0 + \beta_e E_{it} + \beta_2 L_{it} + \beta_3 I_{it} + \beta_4 K_{it} + \beta_5 W_{it} + \gamma + \epsilon_{it}, \tag{6}$$

, where Output Y_{it} is the log of the annual turnover, the dummy variable E_{it} refers to the export status in the current year equal to one if the firms export in current year, Labor $L_{it}^{\beta_1}$ is the log of total number of employees, $K_{it}^{\beta_1}$ is the log of capital, W_{it} is the log of the average cost of each employee, γ refers to a set of control variables that shock the outputs, including regional dummies, sector dummies and length of years(years after the location of the firm became the open economy zone). Open economy zone is part of China's door open policy and fosters cooperation, trade and inward investment from foreign countries. The most important estimate β_e refers to the percentage difference of the output that exporters perform.

1. *OLS and FE Estimates*

   The usual motivation for the OLS estimates with robust standard errors is to transform a system of equations where the error has no scalar variance-covariance matrix into the system. This OLS function form was obtained by multiplying equation by $\Omega^{-1/2}$(Wooldridge 2001). In order to overcome the heteroskedascity issue, the $\Omega = E(u_{it} \otimes u_{it}^{'})$ was introduced in the analysis to get an unbiased estimate on the export shock to the outputs. The estimate β_E is equal to $(\acute{X}\Omega^{-1}Y)(\acute{X}\Omega^{-1}X)^{-1}$. This study will use OLS estimates with robust standard errors to have a first look at the impact of export.

   The estimate β_E is seriously biased when the unobservable shock υ in equation 3 correlates with the firm performance or other control variables. Random effect and Fixed effect are alternative solutions. Random effect analysis puts unobservable effects υ into

constant c_i. $\hat{\beta_{RE}} = (\acute{X}\lambda^{-1}Y)(\acute{X}\lambda^{-1}X)^{-1}$, of which, $\lambda = (\sigma_u)^2 I_T + (\sigma_c)^2 J_T \otimes \acute{J_T}$, and J_T $\acute{J_T}$ are the $T * T$ matrixs. There are two caveats. Caveat One: If the model satisfies the assumptions of Fixed Effect and Random Effect, Random Effect estimate is more efficient than Fixed Effect estimate as fixed effect needs to lose more N degree of freedom, and random effect can simply computation of the test statistics. Caveat Two: Once ϵ_{it} and X_{it} are correlated, then Fixed effect is still consistent, but Random Effect is inconsistent. Hausman test is based on the difference between the random effects and fixed effect estimates, as the following function.

$$Var[\beta_{FE_E} - \beta_{RE_E}] = \psi$$

$$W = (\beta_{FE_e} - \beta_{RE_e})' \hat{\psi}^{-1} (\beta_{FE_e} - \beta_{RE_e})$$

Wald test in our analysis shows the difference between FE and RE is significantly different from zero, finally fixed effect is the alternative solution after Ordinary Least Square with robust standard error in our analysis. Fixed Effect [5] estimate $\hat{\beta}_{FE}$ is equal to $(\acute{X}Q_B X)^{-1}$ $(\acute{X}Q_B Y)$. The implication of the fixed effect $\hat{\beta}_{FE}$ is on estimating the impact of exporting on firm performance in the entry year.

The main results, based on the estimation of equation 6 are presented in Tables 4. In this tables, the coefficients of 'treated' in the first two columns indicate the percentage difference of firm performance between exporters and non exporters as captured in equation 3, and the remaining two columns consider the difference in growth rate of firm performance as in equation 4. The table 4 shows that an export premium on total factor productivity was not evidenced in the top thousand firm samples.

The study complements the analysis of the exporting impact by extending the specification with firm performance that are profit margin, gross profit margin, sales, employment and wages. Ordinary Least Square estimates with robust standard error in table 5 show that exporters tend to be 13.9 %, 46.6 % and 7% higher in sales, employment and wage,

[5] $Q_B = \begin{pmatrix} -1 & 1 & 0. & 0 \\ 0 & -1 & 1. & 0 \\ . & . & . & . \\ 0 & 0 & 0. & 1 \end{pmatrix}$

respectively. Fixed effect estimates in table 6 delete the covariance between unobservable factors with other independent variables, and finds that new exporters tend to be 7.9 %, 1.3 % and 7.3% higher in sales, employment and wage, respectively. But profitability signs no significant impact from exporting. On the other hand, the difference of performance growth between exporters and non-exporters is unclear in table 7 and table 8.

2. *Propensity Score Matching*

   Propensity score matching do not need to consider heterogeneous problem. Given observable characteristics the treated group (exporters) is independent of potential outcomes; the observation in control group (non-exporters) will be selected only based on the observable characteristic that is the closest in terms of propensity score. Martins & Yang (2007) finds that the impact of exporting upon productivity is higher when the sample used in the study is not restricted to matched firms. Across all columns in table 9, this study finds no impact of exporting on firm performance when unmatched samples were excluded.

4.2 Small and Medium firm samples

The total factor productivity that conducted in small and medium firm samples analysis is as the following equation:

$$Y_{it} = \beta_0 + \beta_e E_{it} + \beta_2 L_{it} + \beta_3 I_{it} + \beta_4 K_{it} + \beta_5 W_{it} + \beta_6 I_{it} + \gamma + \epsilon_{it}, \tag{7}$$

, where Output Y_{it} is the log of annual turnover, the export dummy E_{it} refers to the export status in the current year, Labor $L_{it}^{\beta_1}$ is the log of total number of employees, $K_{it}^{\beta_1}$ is the log of capital, W_{it} is the log of average cost of a employee, I_{it} is the log of new investment in current year. γ refers to a set of control variables that affect the output, including expenditure on research and development, regional dummies, sector dummies, institution dummy(long term relationship with research institution), appoint dummy (general manager was appointed by government), managergov dummy (have ever appointed as a government official before entering the firm). The key estimate β_e refers to the percentage difference of the outputs that exporters may gains.

1. *OLS and FE Estimates*

   Firms in World Bank Dataset are small and medium firms as the main descriptive analysis in section 2.2. OLS estimates with robust standard errors in table 11 show that exporters tend to be 12 %, 12.2 % , 12% and 14.4% higher in TFP, labor productivity, sales per worker and employment, respectively. Fixed effect estimates in table 12 indicate that new exporters tend to be 11.9 %, 11.1 % , 11.9% and 4.3% higher in TFP, labor productivity, sales per worker and employment. The difference of performance growth between exporters and non-exporters is unclear in small and medium firm samples in table 7 and table 8.

2. *GMM(IV) and Propensity Score Matching Estimates*

   The simultaneity problem arises when there is a contemporaneous correlation between export dummy E_e and ϵ_{it}, and it violates biased and inconsistent issues. The $\hat{\beta}$ refers to the inconsistency if there is a contemporaneous correlation between $X^{'}$ and ϵ_{it}.

$$\hat{\beta_E} = (\acute{X}X)^{-1}\acute{X}Y$$

   of which, $\hat{\beta_E}$ is the estimate of the impact of exporting on firm performance Y, X is a set of matrixes that consist all possible shocks that may influence firm performance, and, symmetrically the $\hat{\beta_E}$ can be simplified as the equation 8,

$$\hat{\beta_E} = \beta_E + (\acute{X}X)^{-1}\acute{X}\epsilon_{it}, \tag{8}$$

   If X is correlated with ϵ_{it}, then $\hat{\beta_E}$ is not equal to β_E that leads to inconsistent and biased estimates. The instrumental variables (IV) approach achieves consistency by instrumenting the explanatory variables that correlated with the β_E but uncorrelated with ϵ_{it} in equation 2. The IV approach can alleviate the measurement error problems, and make the coefficient unbiased and consistent. The sophisticated IV approach that adjusts the β_e is as follows. The potential instruments Z_{it} are correlated with the E_{it} but uncorrelated with ϵ_{it}, that is $E[Z_{it}(Y - \acute{x_{it}}\beta)]$ =0, then estimate β_{IV} is equal to the following

$$\beta_{IV} = [X^{'}Z(Z^{'}Z)^{-1}Z^{'}X]^{-1}X^{'}Z(Z^{'}Z)^{-1}Z^{'}Y$$

Symmetrically, β_{IV} is equal to equation 9

$$\beta_{IV} = [X^{'}Z(Z^{'}Z)^{-1}Z^{'}X]^{-1}X^{'}Z(Z^{'}Z)^{-1}Z^{'}X\beta + [X^{'}Z(Z^{'}Z)^{-1}Z^{'}X]^{-1}X^{'}Z(Z^{'}Z)^{-1}Z^{'}\epsilon_{it}, \tag{9}$$

where, $[X^{'}Z(Z^{'}Z)^{-1}Z^{'}X]^{-1}X^{'}Z(Z^{'}Z)^{-1}Z^{'}X$ is equal to I_n, if instrumental variables are uncorrelated with ϵ_{it}, then $[X^{'}Z(Z^{'}Z)^{-1}Z^{'}X]^{-1}X^{'}Z(Z^{'}Z)^{-1}Z^{'}\epsilon_{it}$ is equal to 0. Under the instrumental variables regression, the β_E is consistent and unbiased.

Export is an endogenous variable in the performance function. Most productivity firms may pay the sunk cost in the trade market; therefore, the performance will affect the general manager's decision on whether to export or not. In the statistic part, the study also finds simultaneity problem between outputs and exporting status. Two instrumental variables are introduced that are the nationality (a dummy equal to one if the general manager is a foreigner) and education (a dummy equal to one if the general manager was educated from a foreign University or institution) of general managers to alleviate the error. Sargan test has demonstrated that none of these two instruments affect the residuals. After deleting the covariance effect between β_E and ϵ, the GMM estimates is much more positive than OLS estimates. Exporters perform 64.8 %, 65.4% and 64.8% higher in TFP, labor productivity and sales per workers in table 13

Table 14 and table 15 show that there is little evidence on the difference of performance growth rate between exporters and non-exporters, (although all estimates β_E are positive). Moreover, when observations used in World Bank Dataset are restricted to matched firms, propensity score matching estimates reflect that some marginal effects of exporting on performance were found in table 10. Exporters perform 12.8% and 12.2% better in labor productivity and sales per worker, respectively; however, other estimates do not have any sign of an export premium.

5 Concluding Remarks

In a very recent survey, Wagner (2007) concludes that the effects of exporting on productivity are "mixed and unclear". Martins & Yang (2007) conducted a meta-analysis

of more than 30 papers, and found that the evidence of export premium is higher in developing countries and also higher when the observations are not restricted by the matched sample. This paper investigated this effect in the case of Chinese top 1000 large companies in the period 2002-2005, and 2400 small and medium firms in the period 2000 and 2002. This study estimates and analyzes the impact of exporting on firm performance using two data sets. One dataset is a panel of the top thousand Chinese companies in the period 2002 - 2005 and the other one covers 2400 small and medium firms in the period 2000-2002. This study documents that 1) the impact of exporting on firm performance is significant(particular in the entrant year) ; 2) the difference in performance growth between exporters and non-exporters is unclear; 3) the impact of exporting on small and medium firm samples is more significant than that in large firm samples; 4) when samples used in the paper are restricted to the matched firms, there is generally little evidence of an export premium.

Kraay (1999) has found some evidence on the export premium, using a panel of 2105 firms in the period 1988 - 1992. The quality of data in our paper, especially in small and medium firm data set, together with the variability of the microeconomic firm level data, enabling particular attention to be paid to a number of econometric problems that may have affected previous research, reaches a precise estimation of the impact of exporting on performance. This is the first paper to introduce micro firm level instrumental variables to avoid the endogenous issue to get more precise estimates. Little research use IV approach to violates the endogenous issue. (see one lag of performance as IV was conducted in Greenaway & Yu (2004), Kraay (1999)). This study also finds some evidence of the export premium.

Besides contributing to a better understanding of the impact of exporting on productivity and other firm performance in the case of Chinese firms, our results may also help the analysis of the Chinese high foreign trade. For an instance, large firm samples may have the relatively strong ownership advantage (large capital, total asset, sales and employment, as descriptive statistics in table 1 and table 2) and may take more domestic market share; therefore, the parametric estimation on 'export premium' is not so significant. In most small and medium firm samples, firms have small annual turnover,

employment, and other ownership advantage, and, the returns and gains from the export market are significant.

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Table 1: Descriptive Statistics (Orbis Data Set)

Variable	**Mean**	**Std. Dev.**	**N**
Treated	0.68	0.47	2018
Sales	6675876.85	10314756.85	2127
Employment	9751.03	16463	2123
Captial	3140686.46	6993011.36	2127
Profit Margin	5.73	9.41	2120
Gross Profit Margin	17.43	31.52	2126
Wage	34.3	122.32	2115
Input	5444986.02	7917456.57	2126
Special Economic Zone	17.47	3.81	2127
year	2003.44	1.11	2127

Notes: This descriptive statistics comes from Orbis data set. 'Treated' is a dummy variable equal to one when the firms are exporters rather than non-exporters; 'Sales' and 'Wage' are measured by 1,000 Renminbi; 'Capital' is measured by 1,000 Renminbi that involves land, building, plant and machinery, transport equipment, leased assets, and other property; 'input' is the sum of materials and energy that measured by 1,000 Renminbi. 'Special Economic Zone' corresponds to the length of years after the geographic location of the firm has been an economy zone (allows the cooperation with foreign economies under the Chinese 'open door policy'). 'Year' contains the period of 2002-2005.

Table 2: Descriptive Statistics(World Bank Dataset)

Variable	Mean	Std. Dev.	N
Treated	0.15	0.36	7111
Sales	180768.39	2834873.81	7110
Input	69890.92	337602.11	4810
Employment	559.75	3026.44	7096
Labor Productivity	5936.3	270484.63	7037
Sales Per Worker	5890.72	269377.11	7095
Capital	144413.11	1225381.46	6895
Investment	15327.76	177761.91	7105
Expenditure on Research and Development	1377.84	16699.39	6995
Manufacture	0.68	0.47	7111
Institution	0.16	0.36	7111
Appoint	0.25	0.44	7109
Manager government	0.06	0.23	7109
Manager Education	0.06	0.25	7109
Manager Nationality	0.05	0.21	7109
Manager Community Party	0.22	0.42	7109
Year	2001	0.82	7111

Notes: This descriptive statistics comes from World Bank Dataset that draws from those small and medium companies. 'Treated' is a dummy variable equal to one when the firms are exporters rather than non-exporters; 'Sales' and 'Sales per worker' are measured by 1,000 Renminbi; 'Capital' is measured by 1,000 Renminbi that contains a set of Buildings; Production machinery and equipment (excluding IT); Cars, vans and trunks. 'Investment' is value of new investment on building; production machinery and equipment (excluding IT); cars, vans and trunks. 'Expenditure of Research and Development' is measured by 1,000 Renminbi. 'Manufacture' is a dummy variable equal to one when the firm is in manufacturing rather than service company; 'Institute' is a dummy variable equal to one when the firm has a long term relationship with university or other research institution; 'Manager government' is a dummy variable equal to one if the general manager has ever appointed as government officials before he was appointed as the general manager. 'Manager Education' is a dummy variable equal to one if the general manager has obtained a degree from foreign countries, rather than mainland China institutions. 'Manager Nationality' is a dummy variable equal to one if the general manager is the foreigner (includes HK, Macao, Taiwan citizens). 'Manager Community Party' is a dummy variable equal to one if the general manager is party member.

Table 3: Geographic Location of the Top Thousand Chinese Firms

Geographic Location	Number of Firms	Percent
Guangdong Province	130	13.00
Jiangsu Province	111	11.10
Shandong Province	103	10.30
Zhejiang Province	61	6.10
Liaoning Province	45	4.50
Hebei Province	44	4.40
Henan Province	30	3.00
Fujian Province	29	2.90
Shanxi Province	28	2.80
Sichuan Province	24	2.40
Hubei Province	22	2.20
Heilongjiang Province	19	1.90
Anhui Province	19	1.90
Hunan Province	18	1.80
Shaanxi Province	14	1.40
Jilin Province	13	1.30
Yunnan Province	12	1.20
Gansu Province	9	0.90
Jiangxi Province	8	0.80
Guizhou Province	5	0.50
Heinan Province	4	0.40
Qinghai Province	4	0.40
Shanghai Municipality	100	10.00
Beijing Municipality	89	8.90
Chongqing Municipality	16	1.60
Tianjin Municipality	19	1.90
Guangxi Antonomous Region	8	0.80
Inner Mongolia Antonomous Region	10	1.00
Xinjiang Antonomous Region	5	0.50
Ningxia Antonomous Region	1	0.10
Tibet Antonomous Region	0	0.00
Total	1000	100.00

Notes: This geographic locations of firms comes from Orbis data set for the top thousand Companies in China. China is administratively divided into 23 provinces, 5 autonomous regions, 4 centrally administrative municipalities and 2 special administrative regions (SAR: Hong Kong and Macao) These top 1000 companies only based on Mainland China, therefore firms from Hong Kong, Macao and Taiwan were not included in the sample.

Table 4: **Exporting and Total Factor Productivity**

	TFP(OLS)	TFP(FE)	TFP growth rate(OLS)	TFP growth rate(FE)
	(1)	(2)	(3)	(4)
$\sqrt{}$treated	.017	-.012	.002	-.019
	(.014)	(.021)	(.017)	(.047)
labor	.066***	.057***		
	(.013)	(.013)		
capital	.035***	.030**		
	(.006)	(.013)		
interinput	.836***	.871***		
	(.022)	(.011)		
lnwage	.133***	.046***		
	(.017)	(.011)		
laborg			.363**	.478***
			(.168)	(.146)
capitalg			.780***	.760***
			(.291)	(.288)
interinputg			11.529***	11.366***
			(.387)	(.199)
wageg			.029**	.023
			(.014)	(.017)
zone	-.018***		.013***	.002
	(.005)		(.004)	(.009)
Obs.	1999	1999	1424	1424
R^2	.926	.933	.875	.876

Notes: The result comes from Orbis data set that mainly draws from those large companies. 'Treated' is a dummy variable equal to one when the firms are exporters rather than non-exporters; 'labor' is the average cost of labor unit in log; 'Capital' is a set of land, building, plant and machinery, transport equipment, leased assets, and other property in log; 'interinput' is the log of the intermediate input(the sum of materials and energy). 'Zone' corresponds to the length of years after the geographic location of the firm has been an economy zone (allows the cooperation with foreign economies under the Chinese 'open door policy'). 'laborg' is the difference of growth rate of labor cost; 'Captialg' is the difference of growth rate of capital; 'interinputg' is the difference of growth rate of input. Significance levels: *: 0.10; **: 0.05; ***: 0.01.

Table 5: **Exporting and Performance, evidence from OLS estimates**

	Profit Margin	Gross Profit Margin	Sales	Employment	Wage
	(1)	(2)	(3)	(4)	(5)
$\sqrt$treated	-.926*	-1.830	.139***	.466***	.070**
	(.518)	(2.388)	(.038)	(.055)	(.032)
lnemployees	-1.265***	-1.350***	.079***		-.310***
	(.252)	(.403)	(.024)		(.016)
lnassets	2.425***	4.084***	.573***	.607***	.380***
	(.315)	(.429)	(.021)	(.026)	(.016)
zone	.110	-.047	-.009	.063***	.101***
	(.162)	(.175)	(.016)	(.018)	(.016)
year	-.187	-.592	.188***	-.116***	.005
	(.253)	(.960)	(.022)	(.028)	(.018)
Obs.	2006	2012	2012	2012	2004
R^2	.12	.078	.576	.501	.47

Notes: The result comes from Orbis data set that mainly draws from those large companies. 'Treated' is a dummy variable equal to one when the firms are exporters rather than non-exporters; 'lnemployees' corresponds to the number of employees in log; 'lnassets' refers to the total asset that is a sum of fixed and infixed asset; 'Zone' corresponds to the length of years after the geographic location of the firm has been an economy zone (allows the cooperation with foreign economies under the Chinese 'open door policy'); 'year' contains the period of 2002-2005. Significance levels: *: 0.10; **: 0.05; ***: 0.01.

Table 6: **Exporting and Performance, evidence from Fixed Effect estimates**

	Profit-margin	Gross-Profit-Margin	Sales	employee	wage
	(1)	(2)	(3)	(4)	(5)
$\sqrt$ treated	-1.142	-.972	.079	.013	.073
	(.781)	(3.625)	(.048)	(.048)	(.049)
lnemployees	-.589	-1.714	.453***		-.359***
	(.455)	(1.975)	(.026)		(.027)
lnassets	1.855***	-2.207	.665***	.644***	.229***
	(.569)	(2.637)	(.035)	(.031)	(.036)
zone					
year	-.019	.710	.134***	-.046***	.136***
	(.168)	(.780)	(.010)	(.010)	(.011)
Obs.	2006	2012	2012	2012	2004
R^2	.012	.002	.659	.279	.27

Notes: The result comes from Orbis data set that mainly draws from those large companies. 'Treated' is a dummy variable equal to one when the firms are exporters rather than non-exporters; 'lnemployees' corresponds to the number of employees in log; 'lnassets' refers to the total asset that is a sum of fixed and infixed asset. Significance levels: *: 0.10; **: 0.05; ***: 0.01.

Table 7: **Exporting and Performance Growth Rate, evidence from OLS estimates**

	Profit Margin	Gross Profit Margin	Sales	Employment	Wage
	(1)	(2)	(3)	(4)	(5)
$\sqrt{}$treated	-.416	-.035	-.018	-.020	-.005
	(.808)	(.081)	(.036)	(.029)	(.035)
employeesg	1.559	-.074	.655***		-.309***
	(1.068)	(.076)	(.115)		(.038)
assetsg	-.395	.059	.619***	.629***	.209***
	(.975)	(.104)	(.084)	(.068)	(.044)
zone	-.140	-.005	-.001	.012**	.037***
	(.114)	(.010)	(.011)	(.005)	(.007)
year	.628*	.004	.014	.011	-.010
	(.350)	(.032)	(.021)	(.016)	(.019)
Obs.	1426	1438	1438	1440	1431
R^2	.094	.018	.52	.358	.106

Notes: The result comes from Orbis data set that mainly draws from those large companies. 'Treated' is a dummy variable equal to one when the firms are exporters rather than non-exporters; 'Employeesg' refers to the growth rate of employment. 'assetg' refers to the growth rate of the total asset that is a sum of fixed and infixed asset; 'Zone' corresponds to the length of years after the geographic location of the firm has been an economy zone (allows the cooperation with foreign economies under the Chinese 'open door policy'); 'year' contains the period of 2002-2005. Significance levels: *: 0.10; **: 0.05; ***: 0.01.

Table 8: **Exporting and Performance Growth Rate, evidence from Fixed Effect estimates**

	Profit Margin	Gross Profit Margin	Sales	Employment	Wage
	(1)	(2)	(3)	(4)	(5)
$\sqrt{}$treated	-2.608**	-2.002	-.004	-.027	.048
	(1.080)	(5.867)	(.098)	(.094)	(.092)
employeesg	-.023	-2.325	.745***		-.296***
	(.428)	(2.095)	(.035)		(.033)
assetsg	1.518***	.766	.632***	.664***	.234***
	(.445)	(2.399)	(.057)	(.031)	(.054)
Obs.	1435	1440	1438	1440	1431

Notes: The result comes from Orbis data set that mainly draws from those large companies. 'Treated' is a dummy variable equal to one when the firms are exporters rather than non-exporters; 'employeesg' refers to the growth rate of employment; 'assetg' refers to the growth rate of the total asset that is a sum of fixed and infixed asset. Significance levels: *: 0.10; **: 0.05; ***: 0.01.

Table 9: Estimates from Matched Samples

Measurements	√Coefficient	T ratio	N(Exporters)	N(Non-Exporters)
TFP	-0.009	-0.11	1316	632
Profit Margin	-1.648	-1.77	1339	634
Gross Profit Margin	-2.808	-0.57	1343	635
Sales	0.132	1.49	1343	635
Employee	0.013	0.10	1343	635
Wage	-0.100	-1.41	1343	631
TFP(growth rate)	0.046	0.80	977	425
Profit Margin(growth rate)	-0.436	-0.36	967	427
Gross Profit Margin(growth rate)	-0.039	-0.37	975	428
Sales(growth rate)	0.016	0.29	975	428
Employee(growth rate)	-0.028	-0.55	976	430
Wage(growth rate)	0.021	0.44	975	426

Notes: The table is the outcomes from one to two propensity score matching. The sample draws from that Orbis data set of those large companies; 'Treated' is a dummy variable equal to one when the firms are exporters rather than non-exporters; 'TFP' , 'Sales', 'Employees' and 'Wages' are all measured as log values.

Table 10: Estimates from Matched Samples

Measurements	√Coefficient	T ratio	N(Exporters)	N(Non-Exporters)
TFP	0.099	1.00	1040	5697
Labor Productivity	0.128	1.83	1033	5654
Sales per worker	0.122	1.73	1040	5697
Employment	-0.022	-0.32	1040	5698
TFP (growth rate)	-0.007	-0.20	718	3653
Labor Productivity (growth rate)	-0.003	-0.07	711	3604
Sales per worker (growth rate)	-0.015	-0.35	718	3653
Employment(growth rate)	0.002	0.08	719	3660

Notes: The table is the outcomes from Kernel propensity score matching that comes from firm samples in World Bank Dataset. 'Treated' is a dummy variable equal to one when the firms are exporters rather than non-exporters; 'TFP', 'Labor Productivity', 'Sales Per Worker' and 'Employment' are all measured as log values.

Table 11: **Exporting and Performance, evidence from OLS estimates**

	TFP	Labor Productivity	Sales Per Workers	Employment
	(1)	(2)	(3)	(4)
$\sqrt{}$treated	.120***	.122***	.120***	.144***
	(.031)	(.033)	(.031)	(.036)
lninput	.530***	.526***	.530***	.141***
	(.012)	(.012)	(.012)	(.009)
lncapital	.142***	.149***	.142***	.318***
	(.012)	(.013)	(.012)	(.011)
lninvestment	.038***	.039***	.038***	.033***
	(.005)	(.005)	(.005)	(.005)
lnrd	.029***	.030***	.029***	.030***
	(.005)	(.005)	(.005)	(.005)
lnemployment	.282***	-.725***	-.718***	
	(.018)	(.019)	(.018)	
lnage	-.143***	-.158***	-.143***	.250***
	(.017)	(.018)	(.017)	(.017)
institution	.108***	.099***	.108***	.100***
	(.035)	(.035)	(.035)	(.034)
manufacture	-.250	-.193	-.250	-.061
	(.189)	(.167)	(.189)	(.126)
appoint	-.143***	-.145***	-.143***	.088***
	(.029)	(.030)	(.029)	(.032)
managergov	.077	.107**	.077	.004
	(.054)	(.053)	(.054)	(.070)
Obs.	4648	4617	4648	4648
R^2	.879	.729	.74	.7
F statistic	845.439	233.506	253.666	287.345

Notes: The result comes from World Bank Dataset that mainly focuses on small and medium companies. 'Treated' is a dummy variable equal to one when the firms are exporters rather than non-exporters; 'lninput' refers to the log of the production cost, such as cost of material, cost of engine, however, except cost of labor; 'lncapital' is the log of the capital that a sum of Production machinery and equipment (excluding IT); Cars, vans and trunks; 'lninvestment' refers to the log of new investment on building; production machinery and equipment (excluding IT); cars, vans and trunks; 'lnrd' is the log of the expenditure on Research and Development; 'lnemployment' refers to the log of the employment; 'lnage' refers to the age of the firm in log; Institute' is a dummy variable equal to one when the firm has a long term relationship with university or other research institution; 'Manufacture' is a dummy variable equal to one when the firm is in the manufacturing rather than service company; 'Managergover' is a dummy variable equal to one if the general manager has ever appointed as government officials before he was appointed as the general manager. Significance levels: *: 0.10; **: 0.05; ***: 0.01.

Table 12: **Exporting and Performance, evidence from Fixed Effect estimates**

	TFP	Labor Productivity	Sales Per Workers	Employment
	(1)	(2)	(3)	(4)
$\sqrt{}$treated	.119**	.111*	.119**	.043
	(.055)	(.062)	(.055)	(.042)
lninput	.436***	.426***	.436***	.073***
	(.012)	(.013)	(.012)	(.009)
lncapital	.033*	.020	.033*	.086***
	(.019)	(.022)	(.019)	(.014)
lninvestment	.005	.009*	.005	-.001
	(.004)	(.004)	(.004)	(.003)
lnrd	.024***	.024***	.024***	.004
	(.008)	(.009)	(.008)	(.006)
lnemployment	.181***	-.838***	-.819***	
	(.024)	(.026)	(.024)	
lnage	.249***	.226***	.249***	.397***
	(.075)	(.084)	(.075)	(.057)
institution	-.017	.015	-.017	.032
	(.039)	(.044)	(.039)	(.030)
Obs.	4648	4617	4648	4648
R^2	.387	.386	.444	.071
F statistic	192.491	189.303	243.064	25.713

Notes: The result comes from World Bank Dataset that mainly focuses on small and medium companies. 'Treated' is a dummy variable equal to one when the firms are exporters rather than non-exporters; 'lninput' refers to the log of the production cost, such as cost of material, cost of engine, however, except cost of labor; 'lncapital' is the log of the capital that a sum of Production machinery and equipment (excluding IT); Cars, vans and trunks; 'lninvestment' refers to the log of new investment on building; production machinery and equipment (excluding IT); cars, vans and trunks; 'lnrd' is the log of the expenditure on Research and Development; 'lnemployment' refers to the log of the employment; 'lnage' refers to the age of the firm in log; Institute' is a dummy variable equal to one when the firm has a long term relationship with university or other research institution. Significance levels: *: 0.10; **: 0.05; ***: 0.01.

Table 13: **Exporting and Performance, evidence from GMM(IV) estimates**

	TFP	Labor Productivity	Sales Per Workers	Employment
	(1)	(2)	(3)	(4)
$\sqrt{}$treated	.648***	.654***	.648***	-.516***
	(.181)	(.185)	(.181)	(.195)
lninput	.524***	.521***	.524***	.149***
	(.012)	(.013)	(.012)	(.010)
lncapital	.131***	.138***	.131***	.335***
	(.012)	(.014)	(.012)	(.013)
lninvestment	.036***	.038***	.036***	.036***
	(.005)	(.005)	(.005)	(.005)
lnrd	.027***	.027***	.027***	.034***
	(.005)	(.005)	(.005)	(.005)
lnemployment	.268***	-.738***	-.732***	
	(.018)	(.019)	(.018)	
lnage	-.125***	-.139***	-.125***	.233***
	(.018)	(.019)	(.018)	(.019)
institution	.104***	.095***	.104***	.109***
	(.036)	(.036)	(.036)	(.035)
manufacture	-.660***	-.649***	-.660***	-.185
	(.130)	(.131)	(.130)	(.143)
appoint	-.109***	-.110***	-.109***	.046
	(.031)	(.032)	(.031)	(.034)
managergov	.076	.113***	.076	.005
	(.056)	(.054)	(.056)	(.071)
Obs.	4648	4617	4648	4648
R^2	.872	.715	.725	.677
F statistic	780.394	222.088	240.064	254.343

Notes: The result comes from World Bank Dataset that mainly focuses on small and medium companies. 'Treated' is a dummy variable equal to one when the firms are exporters rather than non-exporters; 'lninput' refers to the log of the production cost, such as cost of material, cost of engine, however, except cost of labor; 'lncapital' is the log of the capital that a sum of Production machinery and equipment (excluding IT); Cars, vans and trunks; 'lninvestment' refers to the log of new investment on building; production machinery and equipment (excluding IT); cars, vans and trunks; 'lnrd' is the log of the expenditure on Research and Development; 'lnemployment' refers to the log of the employment; 'lnage' refers to the age of the firm in log; Institute' is a dummy variable equal to one when the firm has a long term relationship with university or other research institution; 'Manufacture' is a dummy variable equal to one when the firm is in the manufacturing rather than service company; 'Managergover' is a dummy variable equal to one if the general manager has ever appointed as government officials before he was appointed as the general manager. Instrumental variables are 'Manager Nationality' and 'Manager Education' 'Manager Education' is a dummy variable equal to one if the general manager has obtained a degree from foreign countries, rather than mainland China institution. 'Manager Nationality' is a dummy variable equal to one if the general manager is the foreigner (includes HK, Macao, Taiwan citizens). Significance levels: *: 0.10; **: 0.05; ***: 0.01.

Table 14: **Exporting and Performance Growth Rate, evidence from Ordinary Least Square estimates**

	TFP	Labor Productivity	Sales Per Workers	Employment
	(1)	(2)	(3)	(4)
$\sqrt{}$treated	.002	.010	.002	.015
	(.025)	(.028)	(.025)	(.025)
ginput	.398***	.397***	.398***	.048***
	(.029)	(.031)	(.029)	(.012)
gcapital	.049**	.015	.049**	.067***
	(.021)	(.049)	(.021)	(.022)
ginvestment	-.0001	.005	-.0001	-.003
	(.004)	(.005)	(.004)	(.003)
grd	.024**	.025**	.024**	-.007
	(.011)	(.012)	(.011)	(.013)
gemployment	.103***	-.924***	-.897***	
	(.020)	(.028)	(.020)	
lnage	-.030**	-.029*	-.030**	-.049***
	(.012)	(.015)	(.012)	(.009)
institution	-.005	.015	-.005	-.006
	(.024)	(.029)	(.024)	(.027)
manufacture	.125	.120	.125	-.148**
	(.128)	(.130)	(.128)	(.068)
appoint	-.031	-.023	-.031	-.034**
	(.022)	(.027)	(.022)	(.017)
managergov	.006	-.0004	.006	-.007
	(.043)	(.044)	(.043)	(.047)
Obs.	3042	3002	3042	3045
R^2	.319	.443	.492	.041
F statistic	9.378	41.842	59.945	5.236

Notes: The result comes from World Bank Dataset that mainly focuses on small and medium companies. 'Treated' is a dummy variable equal to one when the firms are exporters rather than non-exporters; 'glninput' refers to the growth rate of the cost of production, such as cost of material, cost of engine, however, except cost of labor; 'glncapital' is the growth rate of the capital that is a sum of Production machinery and equipment (excluding IT); Cars, vans and trunks; 'glninvestment' refers to the growth rate of some new investments on building; production machinery and equipment (excluding IT); cars, vans and trunks; 'glnrd' is the growth rate of the expenditure on Research and Development; 'glnemployment' refers to the growth rate of the employment; 'lnage' refers to the age of the firm in log; 'Institute' is a dummy variable equal to one when the firm has a long term relationship with university or other research institution; 'Manufacture' is a dummy variable equal to one when the firm is in the manufacturing rather than service company; 'Managergover' is a dummy variable equal to one if the general manager has ever appointed as government officials before he was appointed as the general manager. Significance levels: *: 0.10; **: 0.05; ***: 0.01.

Table 15: **Exporting and Performance Growth Rate, evidence from Fixed Effect estimates**

	TFP	Labor Productivity	Sales Per Workers	Employment
	(1)	(2)	(3)	(4)
$\sqrt{}$treated	.030	.015	.030	.111
	(.122)	(.141)	(.122)	(.125)
ginput	.343***	.347***	.343***	.011
	(.017)	(.020)	(.017)	(.018)
gcapital	.049	-.040	.049	.033
	(.031)	(.039)	(.031)	(.032)
ginvestment	-.006	.0008	-.006	-.006
	(.005)	(.006)	(.005)	(.005)
grd	.022**	.023*	.022**	-.025**
	(.011)	(.013)	(.011)	(.011)
gemployment	.032	-.999***	-.968***	
	(.025)	(.029)	(.025)	
lnage	-.604**	-.450	-.604**	-.065
	(.254)	(.298)	(.254)	(.261)
institution	-.114	-.070	-.114	-.003
	(.084)	(.098)	(.084)	(.086)
Obs.	3042	3002	3042	3045

Notes: The result comes from World Bank Dataset that mainly focuses on small and medium companies. 'Treated' is a dummy variable equal to one when the firms are exporters rather than non-exporters; 'glninput' refers to the growth rate of the cost of production, such as cost of material, cost of engine, however, except cost of labor; 'glncapital' is the growth rate of the capital that is a sum of Production machinery and equipment (excluding IT); Cars, vans and trunks; 'glninvestment' refers to the growth rate of some new investments on building; production machinery and equipment (excluding IT); cars, vans and trunks; 'glnrd' is the growth rate of the expenditure on Research and Development; 'glnemployment' refers to the growth rate of the employment; 'lnage' refers to the age of the firm in log; 'Institute' is a dummy variable equal to one when the firm has a long term relationship with university or other research institution. Significance levels: *: 0.10; **: 0.05; ***: 0.01.