Exporting wage premium in the exporting sector: evidence from manufacturing firms in China

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Wage Premium in the Exporting Sector:

Evidence from manufacturing firms in China[†]

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Abstract

This paper investigates whether exporting firms pay average higher wages than non-exporting firms by analyzing a large sample of Chinese manufacturing firms in 2004. Through rigorous exercises involving robust regressions, quantile regressions and nonparametric matching estimators, we find that the wage premium of exporting activities is not a prevailing phenomenon in China. It is unevenly distributed among firms with different ownerships, export-orientations and locations. Overall, exporters located in coastal regions but Guangdong province are more likely to pay higher average wages than nonexporters, while those producing in Guangdong offer a lower pay.

Key words: Exporters, Wage premium, Manufacturing, China

JEL classification: F16; J31; L6

Contents

1 Introduction

The rise in inequality, whether measured in income, wages, or wage premia, has been observed in both developed and developing countries over the last three decades (Wood, 2002; Goldberg and Pavcnik, 2007). According to the prediction of the traditional Hecksher-Ohlin theory, the opposite should be expected to happen in developing countries following major trade reforms. This contradiction has led many economists to drop trade as a candidate for explaining rising inequality and look for other factors, such as skill-biased technological change, immigration, unions and others. However, recent evidence at the firm level and developments of theoretical models incorporating firm heterogeneity of firms and workers and labour market imperfections have renewed research on this important link between trade and inequality (e.g. Egger and Kreickemeier, 2009; Helpman et al., 2010).

One of the most important insights from the recent studies is that the potential effect of trade on wage inequality is reflected in the wage gap between exporters and nonexporters. A large number of studies with firm level data from different countries have shown the existence of *exporter wage premia*, that is, exporting firms pay higher wages than firms supplying the domestic market only.[1] As pointed out by Baumgarten (2010), this wage gap can affect total wage inequality over time via two channels. First, the share of employment at exporting firms may change due to the expansion of existing exporters or the entry of new exporters. Second, the size of the wage differentials itself may change because of increasing internationalization. Therefore, examining the wage differentials between exporters and nonexporters could help us understand the role of trade openness in the widening wage inequality.

[1] For a survey of the literature, see Schank et al. (2007).

Although the exporter wage premia have been found in many countries, there is little information about Chinese enterprises. The present paper aims to fill this gap by exploring whether exporters pay average higher wages than nonexporters in China. The empirical analyses are based on a very rich enterprise census dataset covering all Chinese manufacturing enterprises in 2004. China is particularly interesting since it is not only the largest developing country with abundant low-cost labour but also a major trading nation in the world. Since the implementation of the ‘open-door’ policy in the early 1980s, China’s exports grew from $14 billion in 1979 to $1,578 billion in 2010, while the ratio of exports to GDP increased from 0.06 to 0.26. In 2010, China overtook Germany to become the largest merchandise exporter. Since 1979, along with the rapid growth in national income and export volume, China also has witnessed rising wage inequality (Xu and Li, 2008). According to a recent report by OECD (2010), the Gini coefficient of per capita income in China between 1993 and 2008 increased by 24%, which was higher than that in India (16%), South Africa (4.5%) and OECD countries (5.5%).

This study contributes to the growing literature on the exporter wage premium. It differs from previous studies in two ways. First, we provide new evidence from the perspective of a large open developing country at the firm level. As much of the existing empirical research has been carried out either in developed countries or small developing countries, a case study of Chinese firms would be unique and hence add to the existing literature. Second, we pay particular attention to the role of firms’ ownership and location in analysing exporter wage premium. In the existing papers, multinational enterprises of different country origin and locally owned enterprises of different ownership are treated as a whole. In contrast, this study breaks down the data by ownership of foreign and domestic investors and allows for the exporter wage premium to vary across firms of different ownership. We also carefully consider the influence of firms' location on the premium, for we believe that firms located in different provinces could behave differently due to variations in resource endowments and local government policies.

Our empirical regressions reveal the following three main findings. First, exporting firms except for those from Hong Kong, Macau and Taiwan (HMT) are more likely to pay higher average wages than their nonexporting counterparts in general, although the magnitude of the wage gap varies according to the distribution of wages as demonstrated by the results of quantile regressions. Second, the wage premia of exporters are more likely to be associated with firms producing for both foreign and domestic markets while those exporting only tend to pay a lower average wage. Third, exporting firms located in east China are more likely to offer a wage premium, while those based in Guangdong offer lower average wages than nonexporters. It is also found that exporting firms operating in Jiangsu province pay higher average wages than nonexporting firms.

The remainder of the paper is structured as follows. Section 2 presents a review of the theoretical concepts and empirical literature. This is followed by a discussion of the modeling issues. The data issues and preliminary analysis are described in Section 4 with Section 5 discussing the empirical results. The final section presents the conclusion.

2 Literature Review

2.1 Theoretical concepts

The theoretical explanation for the effect of trade on wages and wage disparity originates from the standard Hecksher-Ohlin trade model or more precisely the Stopler-Samuelson theorem. The latter implies that trade increases income inequality in rich countries and reduces income inequality in poor countries. This conclusion is at odds with the reality. Many economists recently thus try to relax the assumptions of the traditional trade models, such as frictionless labour markets, identical firms, homogenous workers and free mobility of workers within a country.

The new theories based on the heterogeneous firm trade model by Melitz (2003) provide insights into the effect of trade on income and wage inequality. One of the theories is the so-called fair-wage model along the lines of Akerlof and Yellen (1990). Egger and Kreickemeier (2009) introduced labor imperfections into a heterogeneous-firm trade model by means of a fair wage-effort mechanism. In their framework, workers care about receiving ‘fair wages’ and whether the wages are considered to be fair by workers depends on the economic success of the firm where they are working. The fair-wage preferences lead workers to feel entitled to be paid higher wages when they work at more productive and profitable firms. Otherwise, workers would withhold their efforts. Exporting firms that are more productive and profitable than nonexporting firms then pay higher wages in the equilibrium. The equilibrium of this framework hence features wages that differ from firm to firm, and also, in general, positive unemployment.

A second heterogeneous-firm approach to trade and wage inequality was proposed by Helpman, Istkhoki and Redding (2010). They introduced searching and matching frictions and employer screening into the Melitz-type model. In their framework, because of hiring cost, workers outside a firm are not perfect substitutes for workers currently employed, and employed workers are able to bargain for a share of profits. Workers are ex-ante homogenous but receive a firm-specific ability draw. The complementarities between employees’ abilities and firm productivity provide the incentive for firms to screen workers. More productive firms which would select to export screen more intensively to exclude those with lower ability and hence have workforces with higher average ability. Since higher-ability employees are more costly to replace, more productive firms thus need to pay higher wages. Trade liberalization would allure more productive firms into exporting, which further enhances their incentive to screen workers. Based on this logic, exporters would have workforce with higher average ability than nonexporters and hence pay higher wages.

Another related approach is explored by Davis and Harrigan (2007), who offer a shirking model. They use the monitoring approach of Shapiro and Stiglitz (1984). If a worker has distaste for effort and firms imperfectly monitor worker's effort, higher wages make the threat of being fired when caught shirking more credible. In their approach, firms differ from each other not only in the marginal product of labor as in Melitz model, but also in the probability of detecting a shirking worker in any on period. This implies that the average wage paid varies from firm to firm, with firms that are good at catching shirkers paying low wages and firms that are bad at catching shirkers paying high wages. Accordingly, if a worker's effort is more valuable to or less perfectly monitored by an exporting firm, this model will also offer an underlying mechanism for an export wage premium. For example, Verhoogen (2008) proposes the quality-upgrading mechanism linking trade and wage inequality in developing countries. It states that more productive exporters produce higher-quality goods than less productive nonexporters, and they pay higher wages to maintain a higher-quality workforce. The other possibility is that modern technologies are worse at monitoring effort than traditional technologies, and hence the exporting-induced adoption of modern technologies hypothesized by Yeaple (2005) leads to higher efficiency wages.

2.2 Empirical evidence

The exporter wage premium has been supported by a large body of empirical literature on both developed and developing countries although the estimated premium varies across the countries. For example, there is empirical evidence from the United States (Bernard and Jensen 1995), Germany (Bernard and Wagner 1997), and the United Kingdom (Greenaway and Yu 2004). The derived positive wage premia in these studies range from 2.6% to 6.4%. In these empirical exercises, the authors all ran the regressions of average annual wage against the exporter status, controlling for capital per worker, firm size, age, location and other firm-specific characteristics.

The studies on developing nations also show positive wage premia and the premia appear to be larger than those in developed countries. For instance, Alvarez and Lopez (2005) find an exporter premium of 21% for average wages in Chile. Similarly, Van Biesebroeck (2005) finds exporter wage premia for Sub-Saharan African nations are statistically significant and about 40% for average wages after controlling for country, year, industry, location and plant size. However, some authors point out that the preceding studies could overstate the wage premia without controlling for individual worker characteristics or skill structure of workforce within firms (Munch and Skaksen, 2008). This is because the wage gap between exporters and nonexporters may result from either exporting activities or the different types of employment between them.

More recent models are able to differentiate the exporter wage premia for workers with different skill levels or take employment characteristics into account. Tsou et al. (2006) found positive exporter wage premia for skilled workers and a negative export-wage premium for unskilled workers in Taiwanese manufacturing firms. Hansson and Lundin (2004) also found wage premia for skilled workers in Swedish manufacturing firms. A growing number of studies use matched employer-employee data to control for worker attributes in addition to firm characteristics in analysing exporter wage premia. For instance, Schank, Schnabel, and Wagner (2007) used a large dataset linking manufacturing firms and workers from Germany between 1995 and 1997 and they showed that the wage premia become smaller when observable and unobservable characteristics of the employees and workplaces were controlled for. They also found a higher exporter wage premium for blue collar workers than that for white collar workers. Munch and Skaksen (2008) linked the exporter wage premia to the use of human capital in Danish exporting firms and found the existence of exporter wage premia only in the export-intensive firms with workers who have higher levels of education. Breau and Rigby (2006), in contrast, failed to find wage premia of exporting firms in Los Angeles of the U.S. after controlling for worker characteristics such as age, gender, education, race, and nationality.

Despite the fact that China has experienced a sharp increase in wage inequality, its causes at the micro level are underdocumented. Using Chinese urban household survey data, Zhao (2001) investigates the effects of foreign direct investment on wage inequality. Using a sample of 1,500 firms in five cities in China for the period 1998-2000, Xu and Li (2008) attribute the county's fast growing income inequality to the rising demand for skilled labour. They show that export expansion had a negative direct effect on skill demand and a positive indirect effect via skill-biased technologies. The net effect is estimated to account for 5% of the rising skill demand of the sampled firms. In a recent paper, Chen et al. (2011) investigate the link between foreign direct investment and inter-firm wage inequality. Their results imply that the wage level and growth rate in multinationals are significantly higher than those in domestic firms. Furthermore, their findings show that the presence of foreign-invested enterprises discourages wage growth in domestic firms, and thus enlarges the wage gap between foreign and domestic firms.

3 Modeling Issues

3.1 The Model

We aim to test whether exporting firms pay higher average wages than nonexporting firms. Following the best practice in the literature, we consider a standard Mincerian wage function:

$$\begin{aligned} w_i = {} & \alpha + \beta_1 Exp_i + \beta_2 For_i + \beta_3 Exp_i \times For_i \\ & + \beta_4 LP_i + \beta_5 Size_i + \beta_6 Age_i + \beta_7 KL_i \\ & + \beta_8 Fem_i + \beta_9 Skill_i + \sum \delta_j Province_{ij} + \sum \vartheta_k Industry_{ik} + \varepsilon_i \end{aligned} \quad (1)$$

where w_i denotes the logarithm of the average wage in enterprise *i*. Exp_i denotes the firm's exporting status, which equals one if its records show positive exports in 2004 and zero otherwise. For_i is an ownership dummy that is equal to one if the firm is foreign-funded (including Hong Kong, Macau and Taiwan-funded), taking domestic firms as the base group. To capture the differences in exporter-wage premia among foreign firms and domestic firms, we add an interaction term between exporting status and foreign firms. LP_i is the labour productivity, which is defined as the logarithm of output per worker. $Size_i$ is the logarithm of total assets of enterprise *i*. Age_i represents the firm's business history since its establishment. KL_i is the capital-labour ratio which is defined as the net value of fixed assets divided by the number of employees in firm *i*. Fem_i is the share of the number of female workers over the total number of employees. $Skill_i$ is the skill composition of the employees in enterprises *i*, and is measured by three variables: the proportion of employees with a graduate education (18 years of education and over), the proportion of employees with a college education (16 years of education), and the proportion of employees with a high school education (12 years of education). According to the existing studies, Fem_i is expected to have a negative impact on the average wage and the skill composition has a positive impact due to the skill premium (Chen et al., 2011). Province_{ij} is a province dummy that is equal to one if enterprise i is located in province j , and zero otherwise, and is supposed to capture region-specific wage differentials. Industry_{ik} is an industry dummy that is equal to one if firm *i* operates in industry *k*, and zero otherwise, and is expected to reflect industry-specific wage differentials. α is a constant and ε_i is the error term.

3.2 Estimation Issues

Given firm level cross-sectional data considered here, we first use Ordinary Least Squares (OLS) to estimate the wage equation (1). We are aware that adopted regression analysis might not be appropriate because of possible omitted variable biases (Wooldridge, 2000, p.91). Therefore, the results of OLS regression analyses should be interpreted with caution. The estimated coefficient $\hat{\beta}_1$ represents the wage premium of domestic exporters, while the sum of the estimated coefficients $(\hat{\beta}_1 + \hat{\beta}_3)$ measures the wage differentials between foreign exporters and foreign nonexporters. The above analysis could suggest a relationship between wage level and exporting status.

However, we notice that the main concern of the OLS regressions is that the average wage gap is not representative of the wage differentials among different quantiles of the wage distribution. For instance, if more talented and high-ability workers would tend to be hired by exporting firms, average wage of exporting firms would be driven up and the export-wage premia would be overestimated. To identify the effects of unobservable ability of workers on wages, the use of quantile regression analysis has become increasingly popular in labour economics particularly in studies of wage differentials with respect to education, gender and working condition (Choi and Jeong, 2007). Following this practice, we use quantile regressions to examine the possibility that the impact of exporting activities on average wages could vary as the distribution of the dependent variables (wages) changes.

The quantile regression was first introduced by Koenker and Bassett (1978). In contrast to the OLS method which provides information only about the effect of regressors on the conditional mean of the dependent variable, the results of quantile regression analysis give parameter estimates at different quantiles, τ . Thus, the results of quantile regressions could give us a more detailed picture of the exporter wage premium in China. Formally, our quantile regression model is:

$$\begin{aligned} & w_i = \beta_\tau^{'} X_i + u_{\tau i} \\ & \text{with } Q_\tau(w_i \mid X_i) = \beta_\tau^{'} X_i \quad (i = 1, 2, \dots, n) \end{aligned} \tag{2}$$

where w_i is the vector of log wage, $\beta_\tau^{'}$ is a (K$\times$1) parameter vector, X_i is a (K$\times$1) vector of covariates, $u_{\tau i}$ stands for the error term and $Q_\tau(w_i \mid X_i)$ denotes the τ^{th} conditional quantile of w_i given X_i. Note that $Q_\tau(u_{\tau i} \mid X_i) = 0$ for all *i*. For a given τ, the quantile regression estimator of β_τ is a solution to

$$\min_\beta \frac{1}{n} \left\{ \sum_{w_i \geq \beta_\tau^{'} X_i} \tau \left| w_i - \beta_\tau^{'} X_i \right| + \sum_{w_i < \beta_\tau^{'} X_i} (1-\tau) \left| w_i - \beta_\tau^{'} X_i \right| \right\} \tag{3}$$

As τ increases from 0 to 1, one can trace the whole distribution of w_i condition on X_i. The coefficient estimates of a quantile regression denote the effect of covariates on the distribution of the regressor at the corresponding quantile, thus giving us a means to compare distributions.

A further issue is related to the possible endogeneity problem of the exporting activity. The orthogonal assumption between exporting dummy and the error term in the OLS estimator could be violated if some omitted variables lead export participation and average wage to move in the same direction. The most convenient way to control for the omitted variable is to use panel data approaches (fixed effect or random effect) by assuming the omitted variables are time-invariant and hence treating them as part of the error term. However, it is impossible here due to the use of cross-sectional data. An alternative way to deal with endogeneity is to find instrument variables (IVs) that are assumed to be orthogonal to the error term. Unfortunately, in most cases, these IVs are either hard to come by or they are weakly correlated with the endogenous variables. Although Arellano and Bond (1991) suggested using GMM-style IVs out of endogenous variables, we still cannot use this method to deal with cross-sectional data. Nevertheless, we can make use of a non-parametric matching method to find the wage differentials between exporting firms and nonexporting firms. The method compares the average wages of exporters with those 'matched' nonexporters. Matching is based on the similarity in observed characteristics of the firms. One of the main advantages of the matching method is that it does not require the specification of any functional form of the outcome equation and is therefore not susceptible to misspecification bias. [2]

4 Data and Descriptive Statistics

The data used in this paper is drawn from the First National Economic Census conducted by National Bureau of Statistics of China in 2004. To the best of our

[2] Please see Abadie et al. (2004) for the details about matching method and STATA module.

knowledge, the census provides the most comprehensive cross-sectional enterprise data available in China. The basic statistics included in this dataset are summarized in the *China Economic Census Yearbook* (National Bureau of Statistic of China, 2006). We only have access to the data for the manufacturing sector, and our analysis thus focuses on this sector only. The database not only covers the whole population of Chinese manufacturing firms but also provides rich information for each firm, such as export sales, geographic location, the year of establishment, ownership, total assets, and total employment. More importantly, it reports detailed information about the workforce by education and gender, which enables us to examine the impact of skill intensity and gender structure on average wages. After cleaning the observations with missing values for the key variables, we obtained a sample of 879 thousands firms for our analysis.

[Insert Table 1 here]

Table 1 reports the summary statistics for the variables employed in this paper together with a breakdown by exporting status and types of ownership. Exporting firms on average pay 15.3% higher than nonexporting firms. Yet, it is shown that the foreign exporters pay less than nonexporters when we break the whole sample into domestic firms and foreign firms. However, the average wages of foreign firms are found to be much higher than those of domestic firms. The descriptive statistics also reveal that exporters are larger than nonexporters in terms of total employment, sales and total assets. With respect to the capital-labour ratio, exporters are on average more capital-intensive while foreign exporters are less capital-intensive. Surprisingly, we notice that, contrary to the popular perception, exporting firms are shown to be less productive in terms of output per worker. One possible explanation is that most exporters in China tend to specialize in labour-intensive activities. When comparing the employment structure, we notice that exporters tend to employ more female workers. Both domestic and foreign exporters have employed less skilled labour in terms of the educational attainments of their employees, although the differences among local firms are rather small.

[Insert Figure 1 here]

An overview of the distribution of the exporting firms by their export intensity, measured by the ratio of the value of exports over that of sales, is presented in Figure 1. In our sample, only 5.5 per cent of the firms were involved in exporting activities. However, over a half of the exporting firms sold 100 per cent of their outputs abroad. This number is even higher for foreign firms (66%) and a little bit lower for domestic firms (43%). This distribution is significantly different from the manufacturing firms in the United States. Bernard et al. (2003) reports that two-thirds of the US exporters sell less than 10 per cent of their output overseas, and fewer than 5% of them export more than 50 per cent of their outputs.

[Insert Figure 2 and Figure 3 here]

Are exporter wage premia systematically different across the industries and regions? Figures 2 and 3 provide the answer. It is shown that exporter-wage premia measured as the mean differences in log wages between exporters and nonexporters exist in all industries and vary moderately. While the largest wage gap is observed in the tobacco industry, the smallest seems to be in the leather and cultural product manufacturing sector. At the provincial level, there is substantial variation in the wage gap. The largest wage gap between exporters and nonexporters is observed in Beijing, the capital city, which is followed by Yunnan province, a major tobacco production center in the country. However, exporting firms pay less than nonexporting firms in

Guangdong province. The latter is the largest manufacturing center in China and accounts for over one third of the country's total exports. These findings may imply that the variations in exporter-wage premia are highly correlated with firms' location rather than the industries which the firms are associated with.

5 Empirical Results

5.1 Baseline regressions

Table 2 reports the baseline regression results. The dependent variable is the logarithm of the average wage for each firm. The Huber-White sandwich estimator was used to correct for possible heteroskedasticity. Regression (1) in Table 2 reports results from a simple model with three explanatory variables, namely, export dummy, foreign firms dummy and their interaction term. The benchmark category is the domestic non-exporters. The coefficient of export dummy is positive and significant, and the positive sign indicates that *ceteris paribus* domestic exporters pay higher wages than domestic nonexporters. The coefficient on foreign enterprises dummy is also positive and statistically significant at 1% level. Thus there is a foreign wage premium. These results are consistent with the finding of the existence of a significant foreign wage premium in previous studies (Lipsey and Sjoholm, 2004; Chen et al., 2011). The coefficient of the interaction term between export dummy and foreign firms dummy is significantly negative and its absolute value is larger than the coefficient of export dummy, indicating that the foreign exporters pay less than foreign nonexporters.

[Insert Table 2 here]

In regression (2), we include four control variables: labour productivity, firm size, firm age and capital intensity. The adjusted R-squared increase substantially. The coefficients of the export dummy, foreign dummy and their interaction term decrease a little, which provides evidence that firms characteristics account for part of the wage gap between exporting firms and non-exporting firms. Given that wage levels vary enormously across industries and regions, we introduce 28 two-digit industry dummies and 30 provincial dummies alternatively in regressions (3)-(5). The wage gap changes marginally once we control for the industrial influences, while it changes dramatically after controlling for the firms' locations.

Our conclusions drawn from regressions (1)-(5) may be spurious. An exporting firm could pay higher due to intensive employment of skilled workers. To take this issue into consideration, we extend the specification to control for the skill composition and the share of female workers. The estimation results are reported in columns (6) and (7) in Table 2 and the main findings remain the same. The proportion of skilled labour has a significantly positive effect on wages, suggesting that more skill-intensive firms have higher average wages. The proportion of female workers is negatively associated with the average wage level. This confirms again that there is a significant gender wage differential in China. For other firm characteristics, namely, the labour productivity, size, age and capital intensity are positively related to wage levels, indicating that larger, older and more productive and capital-intensive firms offer higher wages. In column (7), we run a robust regression to handle the possible influence of outliers.[3] But the results do not change. Domestic exporters on average pay 2.4% more than nonexporters, while foreign exporters pay 3.8% less than nonexporters.

[3] We have used the "robust regression" employed by Stata command "rreg". It works iteratively first by performing a regression calculating weight based on residuals and then using these weights for further regressions until changes in weights drop to a certain level. Hamilton (2008, p.253) states "Robust regression methods aim to achieve almost the efficiency of OLS with ideal data and substantially better than OLS efficiency in non-ideal (for example, non-normal errors) situations".

The classification between domestic firms and foreign firms may be overly simplistic in China. As it is well known, foreign firms in China are divided into two groups, namely, those originated from Hong Kong, Macau, and Taiwan (thereafter, HMT) and those originated from western countries, mainly OECD countries (thereafter, OECD). These two groups differ enormously in terms of motivation and investment behaviour. The HMTs are concentrated in light industries and textile projects using labour-intensive technology, while OECD investors are more interested in the market-seeking type of investment motivated by their ability to provide differentiated products to Chinese market. Within domestic ownership category, state-owned enterprises (thereafter, SOE) behave quietly differently from non-state owned enterprises (thereafter, Non-SOE). It is argued that SOEs enjoyed higher earnings than the non-SOEs due to the government's support and protection of the former. [4]

To examine the exporter-wage premia across different ownership categories, we classify the sampled firms into eight categories: OECD exporters and nonexporters, HMT exporters and nonexporters, SOE exporters and nonexporters, and Non-SOE exporters and nonexporters. The results from this set of regressions with the non-SOE nonexporters as the base group are reported in Table 3. It is shown that exporter-wage premia do not exist among HMT-invested firms. HMT exporters on average pay 7% less than HMT non-exporters. This may also explain why exporters in Guangdong province generally pay less than nonexporters. Among the sampled firms, we find that 57% of the HMT-invested firms are located in Guangdong and they account for 56.6% of the exporting firms there.

[Insert Table 3 here]

[4] Buckley, Wang and Clegg (2007) provide useful discussions of the different characteristics of firms with different ownerships.

5.2 Results of the quantile regressions

The advantage of the quantile regressions over the OLS method has been well documented. First, quantile regressions are more robust to the outliers than the OLS. Second, the quantile regressions can provide parameter estimates at different quantiles, not just the conditional mean. Therefore, it provides information on the variation in the effect of independent variables at different quantiles. It is worthy to mention that quantile regressions are not the same as the application of the OLS method to the subsets of the data produced by dividing the whole sample into different percentiles of the independent variables. For each quantile regression, the whole sample is used with some observations being weighted more than others.

Before running our regressions we tested the normality of the wage variable. We used the skewness and kurtosis tests of D'Agostino et al. (1990) to statistically show (at the 1 per cent level of significance) that the dependent variable is positively skewed and leptokurtic (skewness=55.41 and kurtosis=16634.11). Skewness and kurtosis tests for the natural logarithm of average wage also show statistically significant departures from normality; the p-values of the skewness and kurtosis tests are smaller than 0.01. These results show that the distribution of the dependent variable significantly departs from normality and justify our choice of the quantile regression method.

To explore the differences in exporter wage premium across the groups with different ownership, we also divide the whole sample into eight groups as in Table 2, taking domestically-oriented non-SOEs as the base group. Thus the exporter wage premium for each group equals the difference in the coefficients of exporters dummy and nonexporter dummy. If the coefficient of the exporter dummy is greater than that of the nonexporter dummy, it provides evidence that exporting firms pay higher wages than nonexporting firms. Otherwise, it indicates the exporters pay less. In Table 4, we reported the results of quantile regressions at the following five quantiles: 0.10, 0.30, 0.50, 0.70 and 0.90. The null hypothesis that the coefficients are equal across and between pairs of quantiles is rejected at the significance level of 5 per cent. It thus can be concluded that there are statistically significant differences among the estimated quantile regression parameters.

[Insert Table 4 here]

Comparing the coefficients of the exporter dummies and nonexporter dummies, we first notice that exporter wage premia are present across the entire conditional wage distribution among the OECD firms, SOEs and non-SOEs except for the HMT firms as shown in Table 5. Second, the wage premium of SOE exporters is relatively large but it decreases as one moves from the lowest quantile to the highest quantile of the conditional wage distribution. This means that SOEs with lower wages have higher wage premia of exporting activities. The exporter wage premia of SOEs are more pronounced at the lower tail of the conditional wage distribution. Third, the HMT exporters always show a wage discount ranging from -2.8 to -16.0 per cent as one moves up to the upper tail of the conditional wage distribution. Finally, it is shown that OECD exporters and non-SOE exporters always have positive wage premia but the premia remain relatively stable across quantiles varying between 1 and 5 per cent. To investigate the sensitivity of the findings observed in Tables 4 and 5, additional quantile regressions were run and the estimated coefficients at these quantiles are graphically presented in Figure 4. These plots indicate that the patterns observed in Tables 4 and 5 are robust to changes in the quantiles.

[Insert Table 5 and Figure 4 here]

5.3 Robustness Checks

5.3.1 Alternative measurement of variables

In the preceding sections, we only use the average wage as the dependent variable. It is common knowledge that Chinese firms also pay employees non-wage benefits such as payment for unemployment insurances, medical care insurance, old-age pension funds and housing subsidies, we thus use the total income measured as the sum of basic wage and non-wage benefits as the dependent variable in this section.

Besides using the alternative measurement of the dependent variable, we also consider using different measurement of exporting activity according to their export intensities. We have noticed that about half of the exporting firms sold all of their outputs overseas. It is expected to see some differences in wages between those exported partly and fully. Therefore, we divided the exporting firms into two categories: full exporters with 100 percent export intensity (the ratio of exports in total sales) and partial exporters with export intensity less than 100 percent, and then run the regressions using the sub-samples. Before we run the regression, we compare the wage gap between exporters and nonexporters conditional on their export intensities. Figure 5 shows that the wage premia, measured as the differences in the mean of the natural log of wages between exporters and nonexporters, vary considerably with the export intensity. The figure illustrates that exporter wage premium is larger for firms with lower export intensity than that with higher exporter intensity. Except for the non-SOEs, the premium falls and eventually becomes negative for other types of firms.

[Insert Figure 5 and Table 6 here]

The results in Column (1) of Table 6 show that the previous findings are robust to the alternative measurement of the dependent variable. Chinese workers working in exporting firms with the exception of HMT firms could have higher income than those working in nonexporting firms. However, when we redefined the exporters according to their export intensity, we found firms selling in both domestic and foreign markets pay higher average wages than non-exporting firms. But, if the exporters are restricted to those selling all their output abroad, the exporter wage premium marginally exists among non-SOEs.

5.3.2 Exporter wage premium: the role of firms' location

Given the vastness of the Chinese territory, it seems unlikely that exporting firms located in the coastal provinces behave the same as those located in the interior regions.[5] In fact, the coastal regions have been the main source of exports and main recipients of FDI due to their convenient location, better infrastructure and superior business environment. Among the coastal regions, the geographic distribution of trade and FDI has also been highly uneven. So in our second robustness check, we compare the exporter wage premium in different regions. The full sample is first split into the coastal region and interior region. Then the coastal region is further divided into Guangdong Province and other coastal provinces (non-Guangdon). The estimation results are reported in Table 7.

[Insert Table 7 here]

The results for the firms located in the coastal region are similar to those from the baseline regressions. Exporting firms except for the HMT exporters pay higher average wages than nonexporting firms. However, we find that the wage premium of HMT exporters in the interior region also becomes positive. For the exporting firms producing in Guangdong province, however, only SOEs show positive exporter wage

[5] The coastal region includes Beijing, Fujian, Guangdong, Hainan, Hebei, Jiangsu, Liaoning, Shandong, Shanghai, Tianjin and Zhejiang. The interior region includes all other provinces.

premia and other three types of firms show a negative wage premium. Meanwhile, we find that the exporting firms in "other coastal" provinces (non-Guangdong) show a similar pattern as those located in the interior region and tend to pay higher wages than non-exporting firms.

What makes Guangdong so special? This result may be attributed to its position in China's foreign trade and its mode of exporting. In the last two decades, this province contributed to over a third of China's total exports. Whether it is a toy or electronic gadget, if a product bears the 'Made in China' mark there is a fair chance it comes from Guangdong. However, more than two thirds of the provinces' exports are processed goods from textiles to machinery, and profit margins are very small. Another characteristic is that exporting was mainly carried out by multinationals through the processing trade. In 2004, processing trade generated 76 per cent of the province's exports and it also accounted for 44.4 per cent of the country's processing trade exports. Compared with those focusing on the domestic market, exporting firms would take full advantage of the low cost and abundant labour resources in China and hence pay lower wages.

5.3.3 Export wage premium: the results of matching estimators

The literature on matching methods is vast and growing. In this part, we apply the Abadie-Imbens bias-corrected matching estimator to do a robustness check. The advantage of the matching methods is that they can eliminate sample selection bias by formally controlling for the non-random selection problem and avoid the specification of the functional form because they are nonparametric techniques (Abadie et al., 2004). In this paper, we refer to the exporting activity as "treatment", to the exporting firms as the “treatment group”, and to the nonexporting firms as the “control group”.[6] However, we cannot observe both outcomes for the same individual with and without treatment at the same time. The matching approach is one possible way to find the control group, which helps to tackle this selection problem. Its basic idea is to find in a large group of non-participants those individuals who are similar to the participants in all relevant pre-treatment characteristics.

[Insert Table 8 and Figures 6-9 here]

Given the strong influence of firms’ location on the wage level, we matched exporters with nonexporters using observed firm characteristics within each province. The average treatment effects of exporting on the average wage for each province are reported in Table 8 and also illustrated in Figures 6-9. Figure 6 shows that the wage premia of OECD exporters only exist in four coastal provinces (Hebei, Shandong, Jiangsu and Zhejiang) and three ethnic minority regions (Tibet, Ningxia and Guizhou). Figure 7 illustrated the existence of wage premium for HMT exporters. We can find that HMT exporters in Jiangsu, Zhejiang and Fujian are more like to pay higher wages than their nonexporting counterparts, while those producing in Guangdong province offer lower wages to workers. For state-owned enterprises, the positive exporter wage premium only holds for those located in Jiangsu province. It may suggest that exporting activity does not affect the wage level of SOEs. In Figure 8, we find that non-SOE exporters located in east China and northeast China pay more to workers than nonexporters, while they pay less when they are in Guangdong province. An explanation of this result is that firms with different ownerships located in difference provinces were conducting different mode of exports.

[6] All of the analysis is implemented by the use of the nnmatch module in STATA (Abadie et al, 2004). This programme estimates the average treatment effects either for the overall sample or for the subsample of treated or control units using nearest neighbour matching estimators.

6 Conclusion

Using the firm-level census data of Chinese manufacturing industries in 2004, this paper examines the wage premium of exporting activity. In addition to using robust regressions, we also employ quantile regressions and non-parametric matching estimators. Moreover, we carefully consider the role of firms' ownership, export intensity and location in determining the exporter wage premium. Our main empirical results may be summarized as follows. First, exporting firms except for those from Hong Kong, Macau and Taiwan (HMT) are more likely to pay average higher wages than their nonexporting counterparts in general, although the size of wage gap varies according to the distribution of wages as demonstrated by the results of quantile regressions. Second, the wage premia of exporters are more likely to be associated with firms that supply both foreign and domestic markets, while the firms that shipped all their products abroad tend to pay lower. Third, exporting firms located in east China are more likely to offer a wage premium while those producing in Guangdong tend to offer lower wages than nonexporters. Among all the cases, workers in Jiangsu province could benefit from firms' exporting activities as all exporting firms operating in the province pay higher average wages than nonexporting firms.

Overall, our results show that exporter wage premium is not a consistent phenomenon in China. This may imply that the relationship between globalization and wage inequality within a country is far more complex. The benefit of globalization is unequally distributed among firms and provinces, which would inevitably cause wage inequality both between and within regions. We note that for decades Chinese government has been promoting FDI inflows and exports to stimulate economic growth. However, the distributional effect of trade liberalization might not be positive.

This study has a number of limitations which represent opportunities for further research. The first one is related to the cross-sectional nature of the study which relies on one single year data (2004). It is thus impossible to discuss the direction of causality between wages and exporting decision. We do not know whether exporters pay higher wages because they are exporters or they paid higher wages before they started exporting. If data are available in the future, a longitudinal approach should be adopted so that the time dimension and dynamics of exporter wage premium could be considered. Second, due to the limited scope of the data, we can only discuss wage premium at the firm level (average wage premium). Further work is needed to investigate wage gaps between workers in different sectors, namely, the exporting and non-exporting sectors.

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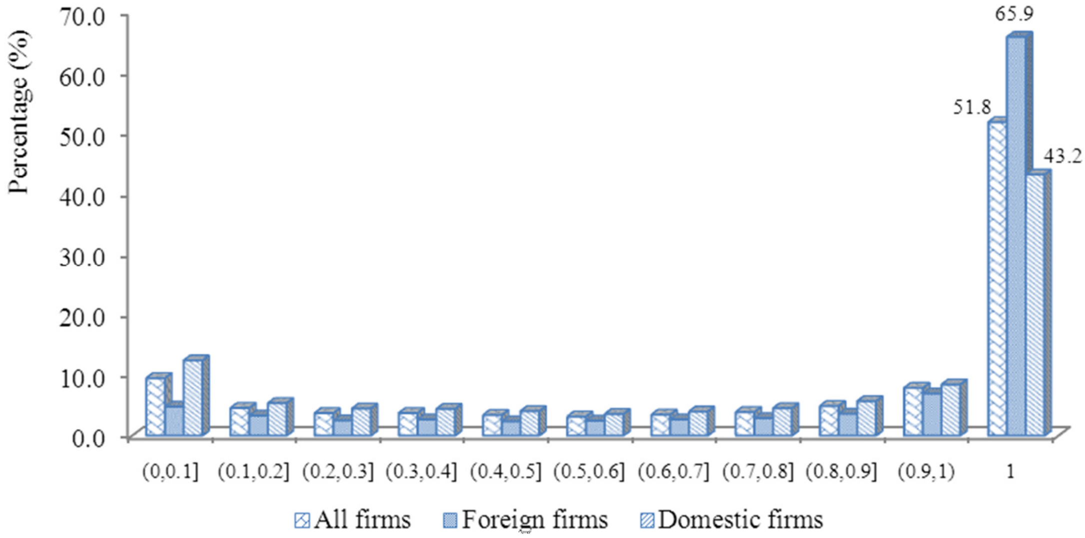
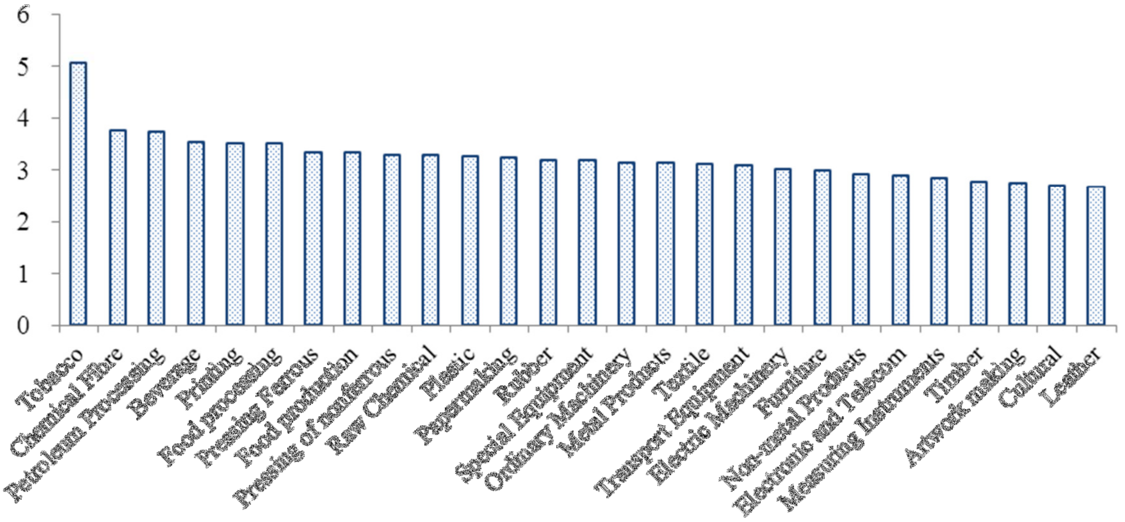
Figure 1.Distribution of exporters by export intensity



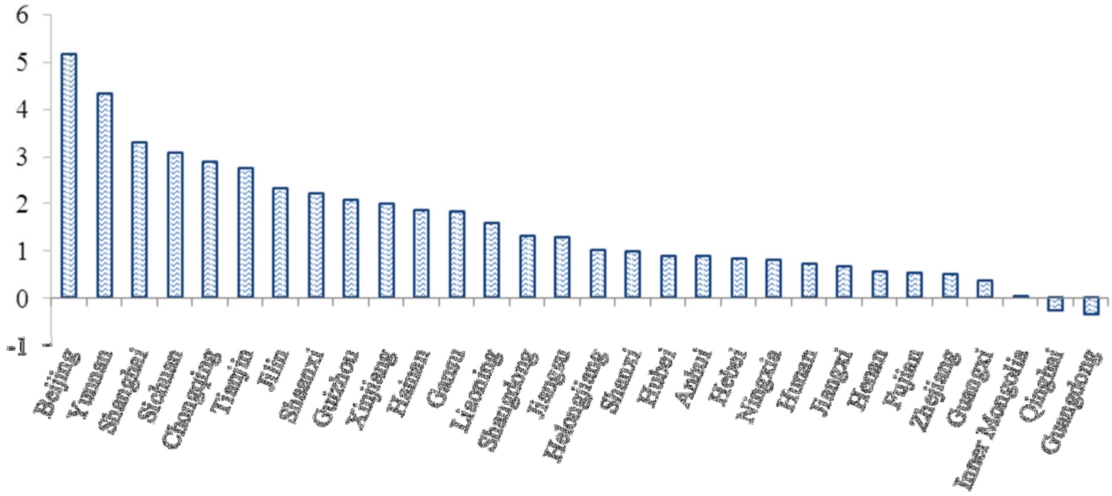
Source: Authors' work based on 2004 Chinese Manufacuring Census.

Figure 2.Exporter-wage premia across sectors



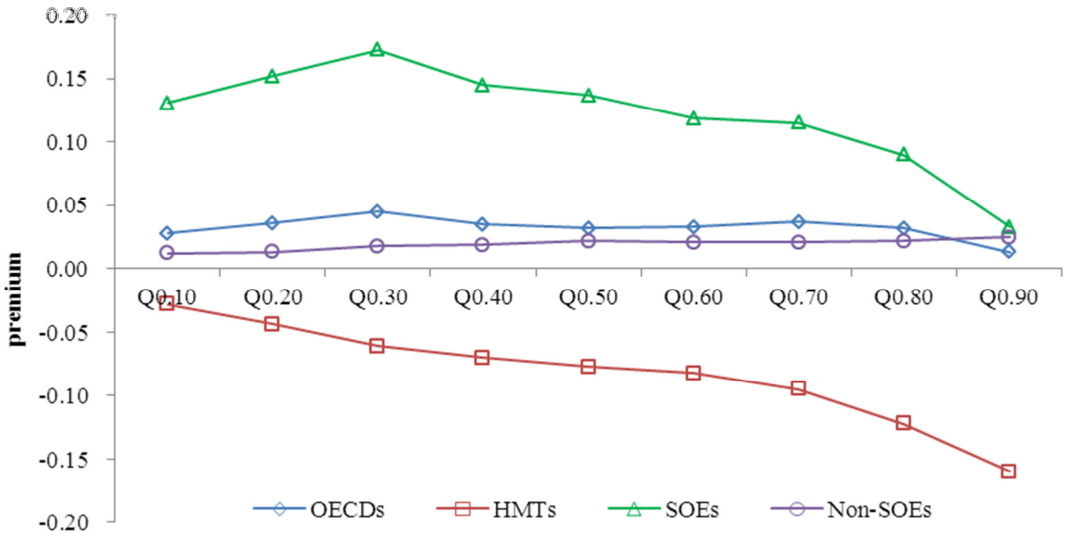
Note: Wage premium=average wage of exporters-average wage of nonexporters
Source: Authors' work based on 2004 Chinese manufacturing census.

Figure 3.Exporter-wage premia across regions



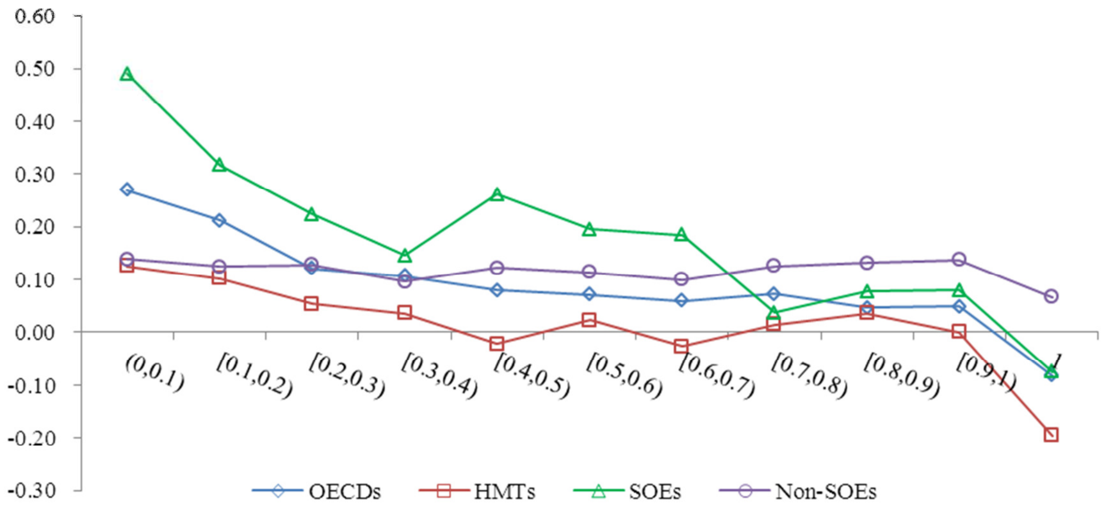
Note: Wage premium=average wage of exporters-average wage of nonexporters
Source: Authors' work based on 2004 Chinese manfuacturing census.

Figure 4 Exporter wage premium along quantiles



Source: Authors' work.

Figure 5 Exporter wage premium along the export intensity



Source: Authors' work.

Figure 6 OECD Exporter Wage Premium across the Country

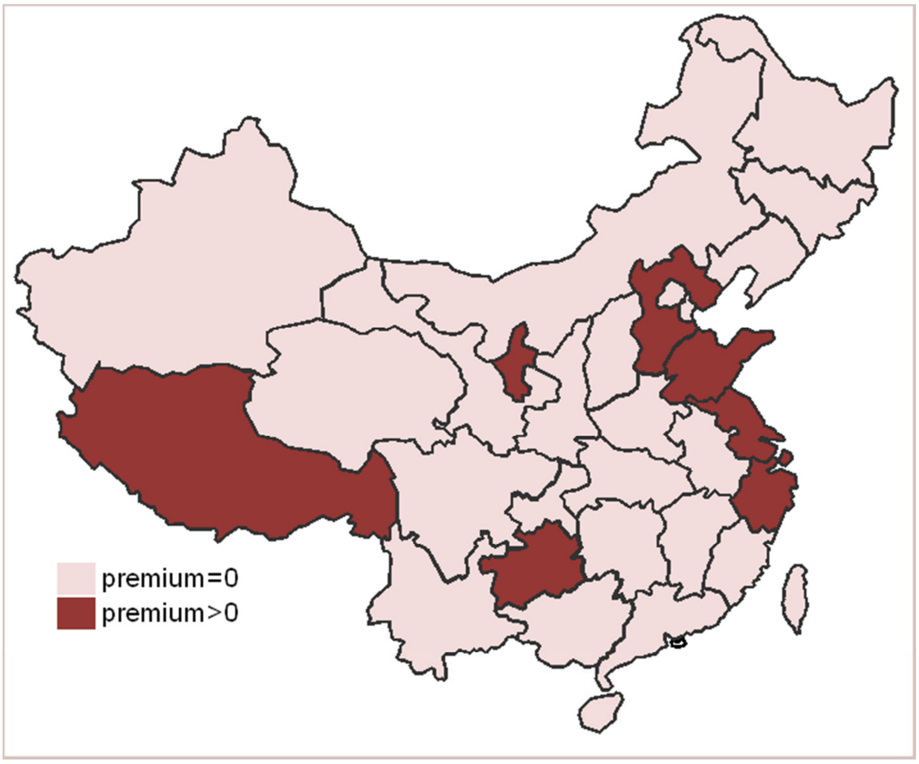


Figure 7 HMT Exporter Wage Premium across the Country

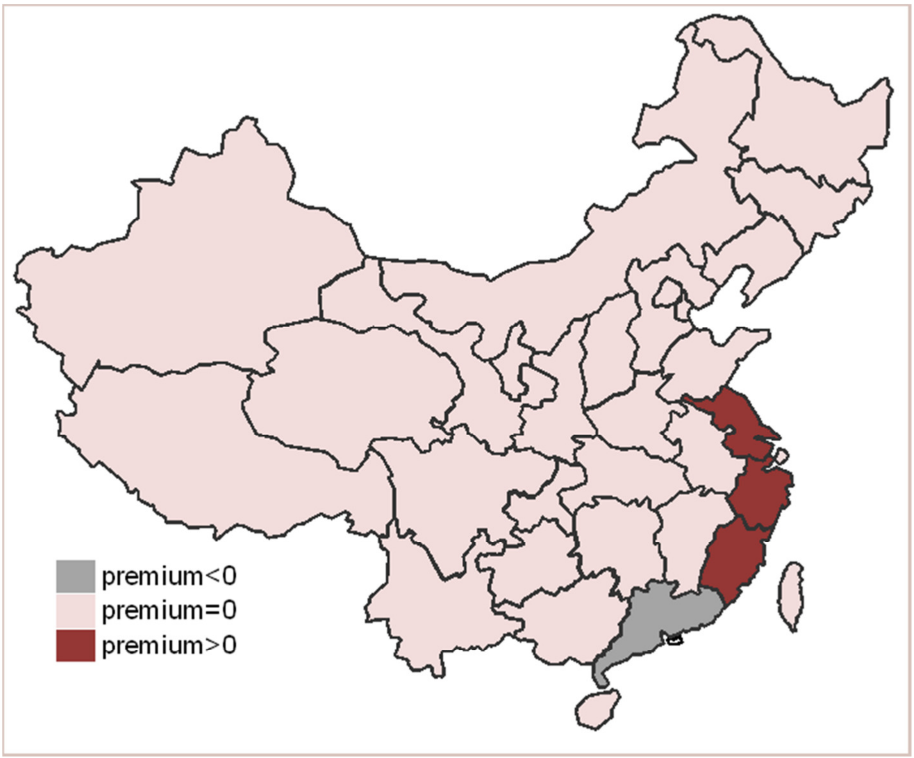


Figure 8 SOE Exporter Wage Premium across the Country

Figure 9 Non-SOE Exporter Wage Premium across the Country

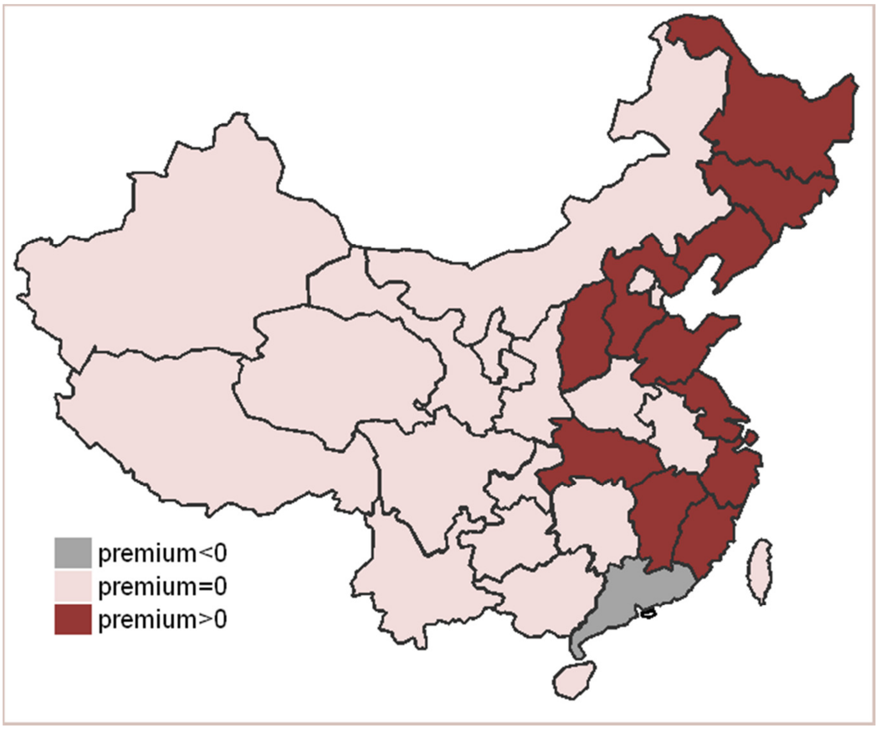


Table 1 Descriptive statistics of the sample

	Whole sample		Domestic firms		Foreign firms	
	Exporter	**Nonexporter**	**Exporter**	**Nonexporter**	**Exporter**	**Nonexporter**
Average wage (thousands of	9.824* (7.119)	8.518* (5.727)	9.506* (6.771)	8.438* (5.578)	10.339* (7.623)	11.681* (9.402)
Number of employees	85* (378)	26* (64)	92* (476)	26* (64)	72* (87)	41* (52)
Sales (thousands of	15,722* (309,437)	2,453* (31,177)	23,542* (393,027)	2,457* (31,567)	3,014* (8,399)	2,320* (3,657)
Gross capital (thousands of	20,147* (341,777)	2,679* (30,238)	28,797* (433,140)	2,577* (30,461)	6,092* (37,975)	6,700* (19,182)
Capital-labor ratio	59* (171)	50* (354)	45 (142)	47 (270)	83* (208)	162* (1,470)
Labour productivity	94* (157)	115* (382)	108* (174)	116* (386)	71* (119)	97* (140)
Firm age (*year*)	7.0 (8.1)	6.9 (7.3)	7.2* (9.5)	7.0* (7.3)	6.6* (4.7)	5.9* (4.6)
Share of female workers	0.517* (0.250)	0.353* (0.255)	0.515* (0.257)	0.350* (0.255)	0.520* (0.240)	0.432* (0.246)
Share of postgraduate	0.003* (0.021)	0.002* (0.023)	0.002 (0.018)	0.002 (0.023)	0.004* (0.025)	0.009* (0.044)
Share of college	0.083* (0.141)	0.075* (0.156)	0.069* (0.128)	0.072* (0.152)	0.107* (0.156)	0.190* (0.234)
Share of high-school	0.280* (0.228)	0.291* (0.263)	0.271* (0.228)	0.289* (0.263)	0.295* (0.228)	0.339* (0.252)
Observations (N)	48,572	841,582	30,069	820,627	18,503	20,955

Source: Chinese manufacturing cenus 2004 (National Bureau of Statistics of China) and authors' calculations.

Note: Reported values are means (except for the last row), with the standard devisations in parentheses. Significance level (* p<0.01) refer to t tests with the null hypothesis that the mean differences between two groups (exporters vs. nonexporters) is equal to zero.

Table 2 Baseline regressions: OLS regressions

	Dependent variable: ln(average wage)						
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Export dummy	0.116***	0.086***	0.074***	0.023***	0.028***	0.032***	0.024***
	(0.0025)	(0.0024)	(0.0024)	(0.0023)	(0.0023)	(0.0023)	(0.0019)
Foreign firms	0.252***	0.234***	0.214***	0.179***	0.175***	0.151***	0.118***
	(0.0039)	(0.0038)	(0.0038)	(0.0037)	(0.0036)	(0.0035)	(0.0023)
Exp*For	-0.200***	-0.136***	-0.129***	-0.093***	-0.093***	-0.072***	-0.062***
	(0.0059)	(0.0055)	(0.0054)	(0.0053)	(0.0053)	(0.0052)	(0.0037)
Labour productivity		0.126***	0.127***	0.117***	0.119***	0.117***	0.092***
		(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0003)
Firm size		0.045***	0.035***	0.040***	0.035***	0.032***	0.033***
		(0.0005)	(0.0005)	(0.0004)	(0.0004)	(0.0004)	(0.0003)
Firm age		-0.005***	0.0001	0.008***	0.008***	0.012***	0.008***
		(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0004)
Capital intensity		-0.005***	0.002***	0.001***	0.005***	0.003***	0.004***
		(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0003)
Female share						-0.066***	-0.070***
						(0.0020)	(0.0016)
Graduate share						0.553***	0.410***
						(0.0282)	(0.0149)
College share						0.260***	0.212***
						(0.0036)	(0.0024)
High-school share						0.025***	0.023***
						(0.0017)	(0.0013)
Industry dummies	No	No	Yes	No	Yes	Yes	Yes
Province dummies	No	No	No	Yes	Yes	Yes	Yes
Constant	2.031***	1.216***	1.081***	1.447***	1.352***	1.347***	1.474***
	(0.0005)	(0.0034)	(0.0040)	(0.0049)	(0.0052)	(0.0052)	(0.0036)
N	890,154	890,154	890,154	890,154	890,154	890,154	890,154
adjusted $R^{2.}$	0.012	0.131	0.162	0.222	0.235	0.244	0.269

Note: The coefficients in Columns (1)-(6) are estimated using OLS methods. Standard errors in parentheses are corrected for heterogeneity. The coefficients in Column (7) are estimated using robust regression. *** indicate a significance level at 1%.

Table 3 Basic wage equation: the role of ownership

	Dependent variable: ln(average wage)						
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
OECD exp	0.290***	0.271***	0.254***	0.237***	0.238***	0.230***	0.191***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.004)
OECD nonexp	0.289***	0.263***	0.246***	0.232***	0.227***	0.195***	0.155***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)	(0.003)
HMT exp	0.095***	0.141***	0.109***	0.034***	0.034***	0.039***	0.022***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)
HMT nonexp	0.224***	0.221***	0.198***	0.142***	0.138***	0.122***	0.093***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.003)
SOE exp	0.557***	0.300***	0.283***	0.305***	0.286***	0.267***	0.281***
	(0.018)	(0.015)	(0.014)	(0.014)	(0.014)	(0.013)	(0.009)
SOE nonexp	0.256***	0.152***	0.152***	0.180***	0.173***	0.150***	0.143***
	(0.007)	(0.006)	(0.060)	(0.006)	(0.006)	(0.006)	(0.003)
Non-SOE exp	0.099***	0.081***	0.069***	0.014***	0.020***	0.024***	0.018***
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Firm features	No	Yes	Yes	Yes	Yes	Yes	Yes
Female and	No	No	No	No	No	Yes	Yes
Industry	No	No	Yes	No	Yes	Yes	Yes
Province	No	No	No	Yes	Yes	Yes	Yes
N	890,154	890,154	890,154	890,154	890,154	890,154	890,154
adjusted R^2	0.018	0.133	0.164	0.225	0.238	0.247	0.274

Note: Firm features including labour productivity, size, age and capital intensity; Female and skill share represented the female share of the total employees, the share of workers with graduate degrees, the share of workers with college degrees and the share of workers with high-school certificates.

The coefficients in Columns (1)-(6) are estimated using OLS methods. Robust standard errors are reported in parentheses. The coefficients in Column (7) are estimated using robust regression. *** indicates a significance level at 1%.

Table 4 Results of quantile regressions

	Dependent variable: ln(average wage)				
	Q 0.10	**Q 0.30**	**Q 0.50**	**Q 0.70**	**Q 0.90**
OECD exp	0.082***	0.155***	0.201***	0.264***	0.367***
	(0.006)	(0.004)	(0.005)	(0.005)	(0.008)
OECD nonexp	0.054***	0.110***	0.169***	0.227***	0.354***
	(0.005)	(0.004)	(0.004)	(0.004)	(0.006)
HMT exp	0.001	0.005	0.019***	0.045***	0.087***
	(0.005)	(0.004)	(0.004)	(0.004)	(0.006)
HMT nonexp	0.028***	0.061***	0.096***	0.140***	0.247***
	(0.005)	(0.004)	(0.004)	(0.004)	(0.006)
SOE exp	0.096***	0.233***	0.282***	0.350***	0.400***
	(0.013)	(0.010)	(0.011)	(0.012)	(0.017)
SOE nonexp	-0.035***	0.060***	0.145***	0.235***	0.367***
	(0.005)	(0.004)	(0.004)	(0.004)	(0.006)
Non-SOE exp	0.012***	0.018***	0.022***	0.021***	0.025***
	(0.003)	(0.002)	(0.022)	(0.003)	(0.004)
Firm features	Yes	Yes	Yes	Yes	Yes
Female and skill share	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes	Yes	Yes
Constant	1.099***	1.361***	1.461***	1.593***	1.864***
	(0.005)	(0.004)	(0.005)	(0.005)	(0.007)
N	890,154	890,154	890,154	890,154	890,154
Rseudo R^2.	0.124	0.121	0.161	0.152	0.142

Note: Firm features including labour productivity, size, age and capital intensity; Female and skill share represented the female share of the total employees, the share of workers with graduate degrees, the share of workers with college degrees and the share of workers with high-school certificates.

Table 5 Exporter wage premium across quantiles

	Q 0.10	Q 0.30	Q 0.50	Q 0.70	Q 0.90
OECDs	0.028	0.045	0.032	0.037	0.013
HMTs	-0.028	-0.061	-0.077	-0.095	-0.160
SOEs	0.131	0.173	0.137	0.115	0.033
Non-SOEs	0.012	0.018	0.022	0.021	0.025

Note: The exporter wage premium equals the differences in the estimated coefficients on exporters and nonexporters at the different quantiles.

Table 6 Robustness results: alternative measurement of variables

	Ln(income)			Ln(wage)	
	Whole sample	**Partial exporter**	**Full exporter**	**Partial exporter**	**Full exporter**
OECD exp	0.211***	0.269***	0.170***	0.245***	0.154***
	(0.004)	(0.006)	(0.005)	(0.006)	(0.005)
OECD nonexp	0.170***	0.170***	0.171***	0.155***	0.155***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
HMT exp	0.040***	0.136***	0.001	0.122***	-0.018***
	(0.003)	(0.006)	(0.004)	(0.006)	(0.004)
HMT nonexp	0.103***	0.101***	0.102***	0.091***	0.092***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
SOE exp	0.309***	0.330***	-0.032	0.301***	-0.013
	(0.009)	(0.009)	(0.035)	(0.009)	(0.034)
SOE nonexp	0.144***	0.143***	0.146***	0.143***	0.146***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Non-SOE exp	0.021***	0.025***	0.012***	0.021***	0.012***
	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
Firm features	Yes	Yes	Yes	Yes	Yes
Female and skill share	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes
Province dummies	Yes	Yes	Yes	Yes	Yes
Constant	1.432***	1.435***	1.436***	1.492***	1.492***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
N	890,154	864,977	866,759	864,977	866,759
R^2	0.281	0.283	0.275	0.276	0.268

Note: Firm features including labour productivity, size, age and capital intensity; Female and skill share represented the female share of the total employees, the share of workers with graduate degrees, the share of workers with college degrees and the share of workers with high-school certificates.

All the coefficients are estimated using robust regression. *** indicates a significance level at 1%.

Table 7 Robustness results: Coastal vs. Interior region

	Dependent variable: ln(average wage)			
	Coastal region (1)	**Interior region (2)**	**Guangdong (3)**	**Non-Guangdong (4)**
OECD exp	0.190***	0.129***	0.046***	0.197***
	(0.004)	(0.017)	(0.009)	(0.005)
OECD nonexp	0.161***	0.092***	0.070***	0.165***
	(0.003)	(0.009)	(0.009)	(0.004)
HMT exp	0.011***	0.064***	-0.029***	0.199***
	(0.003)	(0.021)	(0.004)	(0.007)
HMT nonexp	0.093***	0.056***	0.029***	0.175***
	(0.003)	(0.010)	(0.006)	(0.005)
SOE exp	0.302***	0.265***	0.456***	0.300***
	(0.011)	(0.014)	(0.029)	(0.013)
SOE nonexp	0.211***	0.099***	0.219***	0.219***
	(0.015)	(0.005)	(0.014)	(0.005)
Non-SOE exp	0.015***	0.029***	-0.018***	0.055***
	(0.002)	(0.005)	(0.005)	(0.002)
Firm features	Yes	Yes	Yes	Yes
Female and skill	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Province dummies	Yes	Yes	No	Yes
Constant	1.466***	1.197***	1.486***	1.298***
	(0.004)	(0.011)	(0.011)	(0.004)
N	609,383	280,771	86,367	523,016

Note: Firm features including labour productivity, size, age and capital intensity; Female and skill represented the female share of the total employees, the share of workers with graduate degrees, the share of workers with college degrees and the share of workers with high-school certificates.

The benchmark category is non-state-owned enterprises (Non-SOEs) that did not exported. Numbers in parentheses are standard errors. The estimates are from the estimations of robust regressions. *, ** and *** represent statistical significance at 10%, 5% and 1% levels, respectively.

Table 8 Robustness results: matching results

Province code and name	OECD exporters (1)	HMT exporters (2)	SOE exporters (3)	Non-SOE exporters (4)
	Dependent variable: ln(average wage)			
11.Beijing	0.038	0.005	0.148	0.008
12.Tianjin	0.118*	0.182	0.129	-0.035
13.Hebei	0.152***	-0.093	0.106	0.032**
14.Shanxi	-0.062	-0.255	0.129	0.153***
15.Inner Mongolia	-0.117	0.280	0.413	-0.062
21.Liaoning	0.164	-0.035	0.148*	0.067***
22.Jilin	0.032	-0.066	0.202*	0.100**
23.Heilongjiang	-0.222	0.293	0.084	0.111**
31.Shanghai	0.089***	0.051	0.031	0.043***
32.Jiangsu	0.094***	0.042**	0.151**	0.027***
33.Zhejiang	0.062***	0.068***	0.038	0.008**
34.Anhui	0.064	0.152	0.119	0.012
35.Fujian	0.055*	0.049**	-0.050	0.020**
36.Jiangxi	0.119	0.046	0.104	0.064***
37.Shangdong	0.074***	0.041	0.063	0.054***
41.Henan	-0.139	-0.025	0.084	-0.005
42.Hubei	-0.168	0.058	0.061	0.096***
43.Hunan	0.249	-0.117	0.039	0.019
44.Guangdong	0.0001	-0.095***	0.058	-0.021***
45.Guangxi	-0.094	0.181*	-0.47	0.007
46.Hainan	0.449	-0.156	0.939*	-0.077
50.Chongqing	0.306*	0.186	0.107	-0.026
51.Sichuan	0.192	0.048	-0.007	0.043
52.Guizhou	0.494***	0.272	0.091	-0.023
53.Yunnan	0.089	-0.051	0.101	0.017
54.Tibet	0.095***	*N.A.*	*N.A.*	*N.A.*
61.Shaanxi	0.079	*N.A.*	0.144	0.026
62.Gansu	0.253	0.371	0.303	-0.037
63.Qinghai	*N.A.*	*N.A.*	*N.A.*	0.350
64.Ningxia	0.601***	*N.A.*	0.055	0.085
65.Xinjiang	*N.A.*	*N.A.*	0.298	-0.054

Note: Matching variables include labour productivity, firm size, firm age, capital-labour ratio, female share, graduate share, college share, and high-school share. The number of matches is two. ***, **, * denotes the significance level at 1%, 5% and 10%, respectively.