DOI: 10.6277/TER.2015.433.1

Are Exporters Always More Productive than Nonexporters? The Productivity Paradox of Exporters in China

Bih Jane Liu and Yu-Yin Wu*

In this paper, we provide some evidence that challenges the widespread consensus that exporters outperform nonexporters in productivity. Using Chinese textiles and electronics firms as a case study, we show that Chinese exporters exhibit characteristics different from those in other countries. We also show that, after controlling for firm characteristics and ownership, exporters are less productive than nonexporters when self-selection bias due to the endogeneity of export decisions is considered, a result contradicting the conventional wisdom. Some possible explanations are then provided.

Keywords: labor productivity, exports, self-selection, China
JEL classification: F14, D21, L60

1 Introduction

There is an increasing body of research that addresses concerns about whether exporters outperform nonexporters. Using a regression approach, most studies show that exporters are more productive than nonexporters when the characteristics of firms and industries are controlled for. The export premium, defined as the labor productivity gap between exporters and nonexporters, ranges from 2.2% in Greenaway and Kneller (2004) to more than 50% in Bernard and Wagner (1997), depending upon the productivity measure used and the country studied. Moreover, the productivity distribution

*Department of Economics, National Taiwan University and Chung-Hua Institution for Economic Research.

經濟論文叢刊 (*Taiwan Economic Review*), 43:3 (2015), 269–296。
國立台灣大學經濟學系出版

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of exporters is shown to dominate stochastically that of nonexporters; e.g., in studies of Germany (Arnold and Hussinger, 2005) and UK (Wagner, 2007; Girma, Kneller, and Pisu, 2005). All of these studies point to the unanimous consensus that exporters are more productive than nonexporters. Often, the reasons cited to explain this phenomenon include economies of scale associated with exporting, enhanced learning capabilities via access to an enlarged technology set, and knowledge spillovers from foreign buyers (Chuang and Hsu, 2004; Yasar et al., 2007). Two hypotheses, self-selection and learning-by-exporting, are then tested. Since firms must be productive to compensate for the high sunk costs associated with highly competitive foreign markets, the higher productivity of exporters therefore reflects the self-selection of more efficient producers into a highly competitive export market (Aw, Chung, and Roberts, 2000). The argument is also supported by Melitz (2003) in a theoretical model. Regarding the learning-by-exporting hypothesis, the evidence is mixed. While some studies show that exporting improves productivity; e.g., Baldwin and Gu (2003) for Canadian plants and Castellani (2002) for Italian firms, others suggest insignificant learning-by-exporting effects; e.g., Bernard and Jensen (1999) for US firms, Clerides, Lach, and Tybout (1998) for Colombia, Mexico, and Morocco, and Alvarez and Lopez (2005) for Chilean plants.

In this paper, we provide a case that challenges the widespread consensus that exporters tend to be more productive than nonexporters. By using Chinese firms in the textiles and electronics industries as a case study, we show that the mean value of productivity is smaller for exporters than for nonexporters. Also, the stylized facts about exporters as appears in many studies; i.e., being larger in scale, engaging in more R&D, using more capital-intensive technology, and paying higher wages than nonexporters, may not all apply to Chinese firms in different industries with different ownership types. For example, Chinese exporters tend to adopt less capital-intensive technology than firms that produce solely for domestic markets, especially in textiles.[1] Some exporting firms tend to pay lower wages than nonexporting firms, e.g., state-owned and collective firms in textiles and private firms in electronics. Moreover, when controlling for firms' characteristics (e.g., R&D, wages, years of establishment, and ownership) and taking the endogeneity of export decision into account, exporters are shown to be less pro-

[1]Ma, Tang, and Zhang (2014) also show that Chinese exporters are less capital-intensive than non-exporters during the period of 1998 to 2007.

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ductive than nonexporters, a result that contradicts conventional wisdom. This holds when productivity is measured as total factor productivity or in terms of output, sales, value-added per worker. The result also holds largely at a more disaggregated (3 digit) industry level and ownership types. Such a contradictory result is referred to as the "productivity paradox" of exporters in this paper.

We then offer some possible explanations as to why the productivity paradox occurs in China. We argue that the higher recurring cost associated with nonexporting is a major reason for this contradictory result, which, following the same line of argument espoused by Melitz (2003), helps explain why Chinese firms with lower productivity are able to engage in export activities while those with higher productivity tend to choose domestic sales. Here, the recurring costs refer to the costs related to marketing & management and tax burdens (such as sales tax and value-added tax) that firms have to face every year. Since more than 97% of firms are not new entrants in the domestic or foreign markets, recurring costs may be more relevant than fixed sunk costs in determining an incumbent firm's productivity. Thus, instead of using fixed sunk costs as in Melitz (2003), we compare the recurring costs for exporters and nonexporters. We show that the average recurring costs for nonexporters in many cases are greater than those for exporters. When the recurring costs are included in the labor productivity regression, the extent of productivity paradox reduces in magnitude significantly for textiles and marginally for electronics. This suggests that marketing & management costs and tax burdens are vital factors contributing to the "productivity paradox" phenomenon, especially in textiles. We also discuss some factors that make the logistics cost across provincial sales in China relatively higher than exporting, such as the widespread interregional trade barriers, the lack of national transportation and distribution network, and the difficulties of enforcing adherence to dealer agreements.

We choose textiles and electronics as the focus of our study,[2] because China is a major exporter in both two industries, occupying 19.7% and 13.9% of the world's trade in 2006, respectively. The share of the two industries as a proportion of China's exports has exceeded 50% since 2001; by 2006 it became 57%. These two industries also have distinct characteris-

[2]Textiles here include the upstream textile industry and the downstream apparel industry. The industry code in the survey of Industrial Enterprise Statistics is 17 and 18 for the upstream and downstream textiles, and 40 for electronics.

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tics. While textiles tend to be more labor-intensive and are characterized by highly competitive markets, electronics are more capital and technology intensive and face high entry barriers for new firms. It is therefore interesting to see if the widespread consensus that exporters outperform nonexporters holds for the two industries.

The remainder of the paper is organized as follows. Section 2 presents some statistics that allow us to compare the characteristics of exporters with nonexporters. These data show that exporters are less productive than nonexporters, suggesting that the "productivity paradox" of exporters does exist. Section 3 follows the literature and uses the regression approach to test the proposition of productivity paradox empirically. Section 4 takes firms' export decisions as endogenous and reexamines the proposition. Robustness checks have also been done in this section. Some possible explanations as to why the productivity paradox occurs in China are provided in section 5. The last section concludes.

2 Data and Statistics

Our empirical analysis is based on the firm-level survey on Industrial Enterprise Statistics, complied by China's National Bureau of Statistics in 2006. The survey provides detailed information on firm-level capital, employment, intermediate inputs, production, value added, sales, wages, R&D expenditures, the cost associated with marketing & management, sales tax, and value-added tax. We focus on domestic firms and exclude wholly foreign-owned firms. We then divide firms into six exclusive groups according to the ownership types; i.e., state-owned enterprises (SOE), rural and urban collectives (Collective), shareholding, private domestic firms (Private), shareholding (Shareholding) joint-ventures with domestic firms (JVD) and joint-ventures with foreign firms (JVF). We study two industries, textiles and electronics, using 30,295 and 5,394 observations, respectively.[3]

Table 1 shows that the percentages of Chinese firms engaging in exporting activities are roughly the same for the two industries (35.64% and 35.35%, respectively). However, once firms become exporters, the mean value of export intensity for textiles (0.68) is higher than that for electronics (0.51). Firms with different ownership display rather diverse export propen-

[3]Here, we follow Ma, Tang, and Zhang (2014) and exclude firms with missing variables and employees less than 8. We also exclude firms with sales smaller than exports.

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Table 1: Exporters vs. Non-exporters for Textile and Electronics

	No. of Firms	% of Non-exporting Firms	% of Exporting Firms	Export Intensity For Exporters	Value Share of Exports	% of Exporting Firms with Exports No Less than 10%
Textile	30,929	64.36	35.64	0.68	0.25	89.01
State-owned Firms	262	71.76	28.24	0.45	0.20	83.78
Collectives	737	70.83	29.17	0.70	0.17	89.77
Shareholding	5,208	73.12	26.88	0.67	0.17	86.86
Private	18,401	69.28	30.72	0.68	0.22	87.79
JVDs	2,134	64.29	35.71	0.57	0.19	82.94
JVFs	4,187	30.26	69.74	0.74	0.44	94.08
Electronics	5,394	64.65	35.35	0.51	0.49	81.54
State-owned Firms	134	76.12	23.88	0.26	0.13	62.50
Collectives	132	75.76	24.24	0.59	0.59	93.75
Shareholding	1,096	69.25	30.75	0.52	0.46	80.71
Private	2,233	74.16	25.84	0.49	0.18	77.82
JVDs	661	70.05	29.95	0.34	0.21	72.22
JVFs	1,138	35.76	64.24	0.57	0.59	87.69

sities. In electronics, for example, state-owned firms are among the more home-market oriented groups, with the smallest mean value of export intensity (0.26), and the smallest value share of exports (0.13). Alternatively, JVFs are the most export oriented; the percentage of electronics firms engaging in exporting is the largest (64.24%) among all groups as is the value share of exports (0.57).

As discussed in the previous section, the empirical finding that exporters outperform nonexporters in productivity is widespread (Alvarez and Lopez, 2005; Farinas and Martin-Marcos, 2007). However, this may not be the case as seen in the present study. As shown in Table 2, except for shareholding firms in electronics, exporters are less productive than nonexporters for all ownership groups in both industries, a result that contradicts the conventional wisdom. This holds regardless of whether a firm's TFP (relative to the

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Table 2: Labor Productivity of Exporters vs. Non-exporters

Unit: thousand RMB per worker

	Exporters (1)				Non-exporters (2)				Export Premium [(1)-(2)]/(2), (%)			
	RTFP	LP1	LP2	LP3	RTFP	LP1	LP2	LP3	RTFP	LP1	LP2	LP3
Textile	1.38	260	255	64	1.61	322	315	84	−14.1	−19.3	−19.0	−23.1
State-owned	0.63	160	157	41	0.95	232	227	70	−33.6	−31.3	−31.1	−41.4
Collective	1.46	215	211	57	1.79	320	315	89	−18.8	−32.8	−33.0	−35.8
Shareholding	1.47	248	243	67	1.71	322	314	90	−13.8	−22.8	−22.6	−25.4
Private	1.46	269	264	65	1.62	325	318	82	−9.9	−17.2	−17.1	−20.5
JVD	1.31	266	261	67	1.49	319	311	84	−12.1	−16.4	−16.3	−20.4
JVF	1.23	253	249	63	1.40	314	307	86	−12.3	−19.4	−18.9	−27.1
Electronics	1.59	636	613	144	2.15	494	484	146	−26.3	28.9	26.7	−1.3
State-owned	0.54	252	242	76	1.01	389	385	100	−47.1	−35.1	−37.2	−24.3
Collective	1.31	366	356	113	2.38	454	449	109	−44.9	−19.3	−20.7	3.5
Shareholding	1.49	438	433	112	2.00	394	390	116	−25.5	11.2	11.0	−3.4
Private	1.25	295	286	75	1.99	432	422	117	−37.1	−31.6	−32.3	−35.9
JVD	2.08	493	474	134	2.12	501	486	151	−1.9	−1.6	−2.4	−11.0
JVF	1.82	1,064	1,021	219	3.37	961	945	331	−46.1	10.8	8.0	−33.8

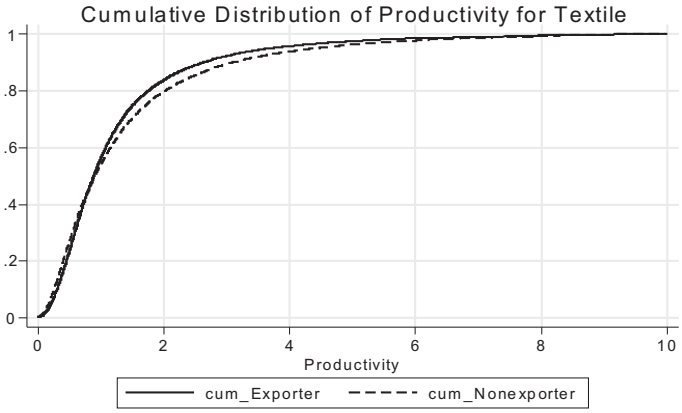
3-digit industry TFP, denoted as RTFP) or a firm's output, sales, and value added per worker (as indicated by LP1, LP2, and LP3). are used as the measure of productivity.[4] In other words, instead of having export premium as alleged by many studies, we find export discount in most cases. The export discounts, measured as RTFP, are 14.1% and 26.3% for textiles and electronics respectively; it is much bigger for some subgroups, e.g., 33.6% and 47.1% for state-owned firms in textiles and electronics. Moreover, as shown in Figures 1a and 1b, the cumulative distribution curve of productivity (measured as RTFP) for nonexporters lies almost completely to the right of that for exporters in textiles or electronics. If we follow a non-parametric approach (e.g., Delgado, Farinas, and Ruano (2002); Girma, Görg, and Strobl (2004)) and use the Kolmogorov-Smirnov test, it can be shown that the cumulative distribution function for non-exporters (F) stochastically dominates that of exporters (G) in textiles regardless of the productivity measure used. Similar results can also be found in most productivity measures in electronics (see Appendix for the test results).[5] These results, which are opposite

[4] See Section 3 for the derivation of RTFP.

[5] Girma, Görg, and Strobl (2004) find that the cumulative distributions for multina-

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(a) Textile



(b) Electronics

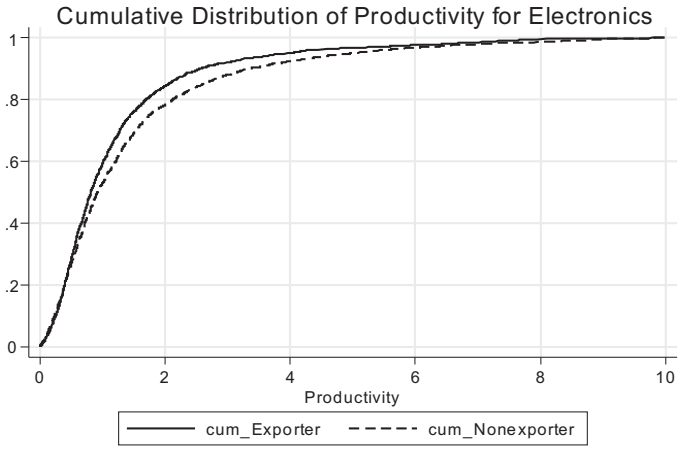


Figure 1: Cumulative Distribution of Productivity

to those found by Arnold and Hussinger (2005) and Delgado, Farinas, and Ruano (2002), do support the above finding that the productivity paradox of exporters exists.

The question then becomes why this productivity paradox of exporters

tionals dominate that of domestic exporters and non-exporters. But they do not find clear difference in productivity between exporters and nonexporters.

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occurs in China. As shown in the literature,[6] there are several stylized facts that refer to exporting firms, including having larger scales, engaging in more R&D activities, using more capital-intensive technology, and paying higher wages than firms that produce solely for the domestic market. However, not all of these stylized features may apply to Chinese firms. Similar to those found in the literature, Chinese exporters are larger in terms of employment and sales (Table 3). But the R&D intensity of exporters may not be greater than that of nonexporters. In electronics, for example, R&D intensity is smaller for exporters than for nonexporters. This holds especially for SOE, Private and JVF. Moreover, Chinese textile exporters tend to adopt technology that is less capital intensive than nonexporters, a finding that runs counter to Tybout (2001) and Baldwin and Hanel (2003). As to the average wage, SOE and Collective exporters pay lower wages than nonexporters in textiles, a finding that also contrasts with the literature. Similarly, Private and JVD exporters in electronics pay, on average, lower wages than nonexporters. The above statistics indicate that Chinese firms display characteristics that are rather distinct from firms in other countries. Whether different characteristics are responsible for the productivity paradox will be tested in the following section.

3 Empirical Models and IV Regression Results

Denote firms by $i = 1, \cdots, N$, and industries by $j = 1, \cdots, J$. Value added by firm i in industry j (Y_{ij}) is produced with labor (L_{ij}) and physical capital (K_{ij}) according to a standard neoclassical production function:

$$Y_{ij} = A_{ij} F_j \left(L_{ij}, K_{ij}\right)$$

where A_{ij} is total factor productivity (TFP); the production function F_j is assumed to be homogeneous of degree 1 and varies across industries.

To test whether the productivity paradox of exporters occurs, we derive a firm's TFP by using a superlative index derived from the translog production function (see Caves, Christense, and Diewert (1982)), Follow Griffith, Redding, and Reenen (2004) we evaluate a firm's TFP relative to a common

[6] See, for example, Aw and Batra (1998), and Aw, Chung, and Roberts (2000) for Taiwanese and Korean firms; Bernard and Jensen (1999) and Bernard and Jensen (2004) for US firms; Bernard and Wagner (1997) for German firms; and Alvarez and Lopez (2005) for Chilean plants.

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Table 3: Characteristics of Exporters vs. Non-exporters for Textile and Electronics

	Exporters					Non-exporters				
	L	Sales	RD %	K/L	Ave Wage	L	Sales	RD %	K/L	Ave Wage
Textile	359	81	0.06	48.9	14.3	176	40	0.03	66.6	13.2
SOE	1,649	209	0.18	81.6	10.5	559	64	0.02	99.0	12.5
Collective	438	80	0.01	45.7	11.6	220	55	0.01	56.3	12.4
Shareholding	363	70	0.03	44.5	13.9	202	44	0.04	65.8	12.7
Private	256	57	0.06	45.2	13.5	147	34	0.03	64.8	13.1
JVD	857	228	0.15	64.5	14.2	237	54	0.06	72.7	13.1
JVF	386	92	0.06	53.5	16.5	254	62	0.04	79.1	16.1
Electronics	618	495	1.18	97.3	21.7	164	56	1.38	81.3	19.9
SOE	1,993	784	2.12	163.3	23.6	351	81	3.07	109.6	21.8
Collective	2,455	1,770	2.28	73.5	22.1	164	63	0.25	66.5	15.7
Shareholding	508	260	1.09	93.9	21.5	192	59	1.33	76.6	20.1
Private	270	72	0.86	56.4	16.0	116	34	1.06	61.2	17.4
JVD	728	386	2.65	75.5	24.2	177	66	2.51	97.3	24.3
JVF	773	897	1.00	135.3	25.4	244	125	1.34	149.7	25.2

Note: Sales are in million RMB. RD is the RD intensity, i.e., the percentage of R&D expenditure relative to sales. K/L is measured as 1000 RMB per worker.

reference point (denoted as RTFP) to make the productivity measures transitive and unit free, where the 3-digit industry TFP (defined as the geometric mean of the TFPs for firms in the 3-digit industry) is used as the common reference point:

$$\mathrm{RTFP}_{ij} = \ln\left(Y_{ij}/Y_j\right) - \sigma_{ij}\ln\left(L_{ij}/L_j\right) - \left(1-\sigma_{ij}\right)\ln\left(K_{ij}/K_j\right) \quad (1)$$

where Y_j, K_j, and L_j are the geometric means of value added, physical capital, and labor in industry j, respectively. The variable $\sigma_{ij} = (\alpha_{ij} + \alpha_{.j})/2$ is the average of firm i's labor share (α_{ij}) and the geometric mean of labor share in industry j ($\alpha_{.j}$).

We assume that RTFP_{ij} is affected by firm i's export status (DEX_{ij}) and characteristics ($\mathrm{Feature}_{ij}$):

$$\mathrm{RTFP}_{ij} = \varphi_0 + \varphi_1\mathrm{DEX}_{ij} + \varphi_2\mathrm{Feature}_{ij} + \varphi_3\mathrm{Industry}_j + \upsilon_{ij} \quad (2)$$

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where DEX is the export dummy, which is 1 when a firm engages in exporting activity and 0 otherwise. We also include Industry to capture industry effects, where Industry_j is the dummy variable for industry j.

Here, the sign of φ_1 (the coefficient of DEX) is the focal point we would like to address. If φ_1 is positive after controlling for other variables, then the conventional wisdom that productivity is higher for exporters than for nonexporters is reconfirmed; if φ_1 is negative, then the productivity paradox is present.

A firm's characteristics (Feature) include its R&D intensity (RD), average wage (Wage), the age since establishment (Age), and the ownership type. According to endogenous growth theory, technological knowledge, which can be generated by R&D efforts, has an important influence on productivity. We therefore expect a firm's R&D intensity to have a positive impact on productivity. Average wage indicates the average labor cost a firm is facing and is hence negatively related to its productivity. But average wage can also represent the skill level of labor employed by a firm. The higher the labor skill, the higher the productivity. The sign of Wage will depend on these two opposite forces. As to the age effect, older firms may have higher productivity as they can improve their production technique through learning-by-doing over time; they can also benefit from greater business experience, longer-term contacts with customers, and easier access to resources (Garnsey, 1998). However, older firms may become less productive as they may not fit in well to the changing business environment or they may become ossified by accumulated rules, routines, and organizational structure. The sign of Age is therefore ambiguous. Instead of using six ownership types as indicated in Table 1, we reclassify firms into three types, i.e., SOE, XSOE, and JV, where Collective, Shareholding, and Private are grouped into XSOE and firms joint venturing with domestic firms (JVD) or foreign firms (JVF) are grouped as JV. Such a regrouping will not change the regression results qualitatively. We also include a dummy variable "*Coast*" in the regression to see whether firms located in the coastal provinces are more productive than firms located in the inland provinces.

Table 5 reports the three regression results, where regression (1) includes only DEX and Industry, regression (2) adds ownership types (SOE and XSOE), and regression (3) adds four more variables related with firm features (RD, Wage, Age, Coast). Since a firm's export status (DEX) may be correlated with RD and Wage, the estimators from OLS regression (3) are inconsistent. We use the instrumental-variables (IV) regression to solve for

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Table 4: Definition and Statistics

	Definition	Textiles		Electronics	
		Mean	Std.	Mean	Std.
DEX	= 1 if exporter; = 0 otherwise	0.36	0.48	0.35	0.48
RTFP	a firm's TFP relative to 3-digit industry TFP	−0.10	1.01	−0.07	1.14
LP1	output per worker (thousand RMB), in log	5.29	0.88	5.51	1.01
LP2	sales per worker (thousand RMB), in log	5.26	0.89	5.49	1.01
LP3	value-added per worker (thousand RMB), in log	3.89	0.91	4.14	1.07
L	Number of workers	241	939	324	1,030
KL	fix assets per worker (thousand RMB)	60	96	87	222
Sales	Sales (thousand RMB)	55	334	211	1,741
Wage	Average wage (thousand RMB), in log	2.50	0.44	2.83	0.57
RD	RD expenditure/Sales	0.04	0.74	1.31	4.44
Age	number of years since establishment	7.97	7.29	9.34	7.97
SOE	= 1 if state-owned firm; = 0 otherwise	0.01	0.09	0.02	0.16
XSOE	= 1 if collective, shareholding, or private firm; = 0 otherwise	0.79	0.41	0.64	0.48
JV	= 1 if joint venture; = 0 otherwise	0.20	0.40	0.33	0.47
Coast	= 1 if located in the coastal province	0.77	0.42	0.57	0.50
RD_IV	Other firms' average R&D intensity in the same 3-digit industry and the province in which a firm is located	0.12	0.27	1.10	1.84
DEX_IV	Other firms' average export density in the same 3-digit industry and the province in which a firm is located, %	32.30	22.36	43.11	28.50
Wage_IV	Other firms' average export density in the same 3-digit industry and the province in which a firm is located, in log	2.60	0.26	3.03	0.45
Industry	Industry dummy at the 3-digit level	–	–	–	–
MK & MA	Marketing and management coast relative to sales, %	6.02	6.42	12.26	11.60
Salestax	Sales tax/sales, %	0.22	0.66	0.25	0.89
VATtax	Value added/sales, %	2.85	2.66	3.38	3.50
Sunkcost	Long-term debt/sales	0.01	0.13	0.05	0.31

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this problem, where the 3-digit industrial averages of other firms' RD and Wage are used as the instrument variables.[7]

Table 5 shows that when industry effects and a firm's ownership type are controlled for (regression (2)), the conventional wisdom holds for textiles. However, the productivity of exporters is actually smaller than that of exporters in electronics, which supports the productivity paradox as discussed in our statistical analysis in section 2. The export premium, defined as the extent to which the productivity of Chinese exporters is greater than that of nonexporters, is positive for textiles (2.27%) but negative for electronics (−16.28%) in regression (2).[8]

To see whether it is the characteristics of Chinese firms that cause the productivity paradox, we add firm-level R&D intensity, average wage, the age since establishment in regression (3) in Table 5 for textiles and electronics, respectively. If DEX turns positive as a result of this, we can then conclude that the productivity paradox stems from the unique characteristics of Chinese firms. Notably, however, this turns out not to be the case for electronics; the results are qualitatively the same as those found in regressions (1) and (2). In fact, the export discount in electronics even increases after controlling for firm features (from −14.94% and −16.28% to −17.53%). For textiles, DEX remains positive but becomes insignificant. The above results suggest that the distinctive characteristics of Chinese firms are not the driving force behind the productivity paradox.

Moreover, Table 5 shows that a firm's R&D intensity is positively related to its productivity in textiles but the effect is insignificant in electronics. This indicates that that R&D is an effective way to increase a firm's competitiveness for textiles but may not be so for electronics. A negative wage effect in textiles shows that higher wage tends to raise a firm's production costs and thus lowers its productivity. But positive wage effect in electronics supports the argument that employing higher skilled labor tends to increase a firm's productivity. The negative age effect implies that the older a firm is, the lower productivity it has, suggesting that productivity tends to erode over time as an older firm tends to become increasingly inert and inflexible.

[7]These instrumental variables are valid for all regressions run in this paper, i.e., they are highly correlated with instrumented variables but uncorrelated or little correlated with μ_i in Equation (3). Also, all regressions are exact identified IV regressions with the number of IVs being the same as the number of endogenous regressors.

[8]Export premium can be calculated as $100(e^{\varphi 1} - 1)$.

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Table 5: Instrumental-Variable (IV) Regressions for RTFP with Exogenous DEX

(a) Textiles

	(1)		(2)		(3)	
	Coef.	(Std.)	Coef.	(Std.)	Coef.	(Std.)
DEX	−0.002	(0.013)	0.022	(0.013)[c]	0.023	(0.015)
SOE			−0.720	(0.064)[a]	−0.582	(0.090)[a]
XSOE			0.142	(0.015)[a]	0.135	(0.020)[a]
RD					0.819	(0.340)[b]
Wage					−0.127	(0.040)[a]
Age					−0.010	(0.001)[a]
Coast					0.019	(0.020)
Industry	yes		yes			
Constant	0.047	(0.077)	−0.072	(0.078)	0.114	(0.102)
Obs.	30,929		30,929		30,929	
Wald Chi2	—				331.36	
R-square	0.002		0.01			
Export Premium	−0.24		2.27		2.35	

(b) Electronics

	(1)		(2)		(3)	
	Coef.	(Std.)	Coef.	(Std.)	Coef.	(Std.)
DEX	−0.161	(0.033)[a]	−0.178	(0.034)[a]	−0.193	(0.036)[a]
SOE			−0.838	(0.104)[a]	−0.553	(0.139)[a]
XSOE			−0.031	(0.034)	0.071	(0.044)
RD					0.013	(0.043)
Wage					0.442	(0.178)[a]
Age					−0.014	(0.002)[a]
Coast					0.017	(0.036)
Industry	yes		yes		yes	
Constant	−0.032	(0.060)	0.007	(0.065)	−1.249	(0.466)[a]
Obs.	5,394		5,394		5,394	
Wald Chi2	—				152.22	
R-square	0.005		0.02			
Export Premium	−14.94		−16.28		−17.53	

Note: Standard error is in parenthesis. a, b, c indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Instrumented variables are RD and Wage, and RD_IV and Wage_IV are their instrument variables (see Table 4 for the definition).
Export premium is calculated as $100(e^{\varphi 1} - 1)$, where φ^1 is the coefficient of DEX.

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Regarding the ownership effect, we use joint-venture firm (JV) as the basis for comparison. Table 5a and 5b show that SOE are less productive than JV. This holds for both textiles and electronics and regardless of whether or not firm features are controlled for. Non-state-owned firms (XSOE), on the other hand, are more productive than JV in textiles. The productivity for firms located in the coastal provinces does not differ significantly from those located in the inland provinces.

4 Endogenous Export Decision

While the productivity equation (2), which takes a firm's export status as a given, is the regression commonly adopted in the literature of productivity, the export premium (the coefficient of DEX) thus obtained may be inconsistent if a firm's export decision (DEX) is endogenous. This occurs when some unobservable exogenous variables (e.g., CEO's ability and vision) affect both export decision and labor productivity such that the error term in the productivity equation (υ_{ij}) is correlated with that in the export-decision equation (φ_{ij}):

$$\mathrm{DEX}^{*}_{ij} = \tau_0 + \tau_1 X_{ij} + \varphi_{ij} \tag{3}$$

where the observed decision is DEX $= 1$, if DEX$^{*} > 0$; DEX $= 0$, otherwise; υ_{ij} and φ_{ij} have a bivariate normal distribution with zero mean, variance ρ, and covariance σ.

To account for the bias, we treat DEX as endogenous and use the average export intensity of other firms in the 3-digit industrial level and the province in which a firm is located (DEX_IV) as the instrument variable. Table 6a reports the results for the export decision (DEX), and Table 6b report the GMM results for the IV regression of RTFP with endogenous DEX.[9]

From Table 6a, it shows that firms with longer years of establishment, in the industry with other firms having higher export intensity and paying lower average wage tend to be more likely to participate in exporting. Compared to JV, SOE and XSOE are less likely to choose exporting. The results are consistent with statistics shown in Table1 and reconfirm that JV are more export oriented, while SOE and XSOE are more home-market oriented in both textile and electronics.

After taking the endogeneity of exporting decision into account, the productivity paradox becomes a significant phenomenon in textiles, too; and

[9]Again, all regressions are exact identified IV regressions.

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Table 6: IV Regression for RTFP with DEX being Endogeneized

(a) Export Decision

	Textiles				Electronics			
	(1a)		(2a)		(3a)		(4a)	
	Coef.	(Std.)	Coef.	(Std.)	Coef.	(Std.)	Coef.	(Std.)
DEX_IV	0.007	(0.0001)[a]	0.006	(0.0002)[a]	0.002	(0.0002)[a]	0.002	(0.0002)[a]
RD_IV			−0.017	(0.010)[c]			0.005	(0.003)
Wage_IV			−0.036	(0.010)[a]			−0.020	(0.017)
Age	0.008	(0.0004)[a]	0.008	(0.0004)[a]	0.005	(0.001)[a]	0.005	(0.001)[a]
SOE	−0.318	(0.030)[a]	−0.331	(0.031)[a]	−0.328	(0.042)[a]	−0.321	(0.042)[a]
XSOE	−0.216	(0.007)[a]	−0.214	(0.007)[a]	−0.230	(0.014)[a]	−0.235	(0.014)[a]
Coast	0.019	(0.006)[a]	0.030	(0.006)[a]	−0.007	(0.013)	−0.014	(0.013)
Industry								
Constant	0.219	(0.009)[a]	0.364	(0.041)[a]	0.372	(0.020)[a]	0.373	(0.055)[a]
No. of Obs.	30,295		30,929		5,394		5,394	
R-square	0.1811		0.1866		0.0807		0.1008	
Adj. R-square	0.1809		0.1861		0.0798		0.0985	

(b) RTFP

	Textiles				Electronics			
	(1b)		(2b)		(3b)		(4b)	
	Coef.	(Std.)	Coef.	(Std.)	Coef.	(Std.)	Coef.	(Std.)
DEX	−0.249	(0.035)[a]	−0.163	(0.065)[a]	−0.904	(0.296)[a]	−1.862	(0.544)[a]
SOE	−0.676	(0.085)[a]	−0.645	(0.091)[a]	−0.866	(0.162)[a]	−1.067	(0.187)[a]
XSOE	0.064	(0.017)[a]	0.095	(0.026)[a]	−0.220	(0.079)[a]	−0.296	(0.118)[a]
RD			0.778	(0.331)[b]			−0.004	(0.056)
Wage			−0.098	(0.042)[b]			0.597	(0.237)[a]
Age	−0.006	(0.001)[a]	−0.008	(0.001)[a]	−0.008	(0.003)[a]	−0.006	(0.003)[b]
Coast	0.016	(0.015)	0.025	(0.020)	−0.091	(0.036)[a]	−0.039	(0.048)
Industry								
Constant	−0.018	(0.027)	0.365	(0.123)[a]	0.543	(0.153)[a]	−1.025	(0.507)[b]
No. of Obs.	30,929		30,929		5,394		5,394	
Wald Chi2	345.45		354.73		93.38		104.56	
Export Premium	−22.04		−15.04		−59.50		−84.47	

Note: Standard error is in parenthesis. a, b, c indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Instrumented variables are DEX, RD and Wage. X_IV is the instrument variable for X (see Table 4 for the definition).
Export premium is calculated as $100(e^{\varphi 1} - 1)$, where φ^1 is the coefficient of DEX.

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the export discount is even bigger in electronics as a result of correcting for the selectivity bias (Table 6b). This suggests that without considering the endogeneity of exporting decision may lead to export premium as the case of textiles shows. The signs of other explanatory variables are largely the same as those from the IV regressions with the export decision taken as a given except that in electronics XSOE becomes less productive than JV.

To see whether export discount occurs for industries at a more disaggregated level or for different ownership types, we run all regressions (with DEX being endogeneized) for 3-digit industries and for SOE, XSOE, and JV. The resulting coefficients of DEX are summarized in Table 7. It shows that the productivity paradox of exporters remains the prominent phenomena for different industries (case (1)). Out of 11 industries examined, 3 industries show positive export premium (only one is significant), while the rest industries display export discounts in which more than half are significant. Export discount also occurs for different ownerships although it is insignificant for SOE.

Cases (3) in Table 7 compare the productivity of firms selling in both domestic and foreign markets (denoted as Mixed firms) with that of non-exporters for textiles and electronics. Cases (4) and (5) compare the productivity of pure exporters (100% export) with that of non-exporters and Mixed firms for the two industries, respectively. The negative signs in cases (3), (4), and (5) still support the productivity paradox discussed above.

We also relief the assumption of constant return to scale and run $\ln y_i$ on $\ln KL_i$, $\ln ML_i$, and $\ln L_i$ to obtain estimators α, β, and σ,[10] where $y(= Y/L)$, $KL(= K/L)$, and $ML(= M/L)$ denote the variables in terms of labor. We then derive TFP by subtracting $\alpha \ln KL_i$, $\beta \ln ML_i$, and $\sigma \ln L_i$ from $\ln y_i$ (i.e., $\text{TFP} = \ln y_i - \alpha \ln KL_i - \beta \ln ML_i - \sigma \ln L_i$). The variables TFP_LP1, TFP_LP2, and TFP_LP3 indicate the TFPs derived from using ln LP1, ln LP2, and ln LP3 as the dependent variable ($\ln y$), respectively. We use TFP_LP1, TFP_LP2, and TFP_LP3 measure of productivity for robustness checks. The regression results are shown in Cases (6) in Table 7, which again support the productivity paradox of exporters in both industries.

The discussions above demonstrate that the productivity paradox occurs in both textiles and electronics when the selection bias related to the export

[10]The production function is constant return to scale if σ is insignificantly different from zero.

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Table 7: Robustness Check for the Signs of DEX

	Textiles		Electronics	
	Coef.	(Std.)	Coef.	(Std.)
(1) By Industry				
Cotton, Wool	−1.19	(0.21)[a]	–	
Linen, Silk	0.68	(0.20)[a]	–	
Made-up	−0.34	(0.20)[c]	–	
Knitting, Weaving	0.10	(0.18)	–	
Apparel	−0.39	(0.09)[a]		
Other Textile Manufacturing	0.19	(0.27)		
ITC	–		−1.89	(1.19)
Broadcast, TV	–		−2.42	(1.14)[b]
Computer, Device	–		−2.00	(0.88)[b]
Component	–		−0.05	(0.46)
HAV and others	–		−0.38	(0.46)
(2) By Ownership				
SOE	−1.51	(1.14)	−2.48	(12.10)
XSOE	−0.24	(0.07)[a]	−1.33	(0.58)[b]
JV	−0.37	(0.12)[a]	−1.06	(0.44)[b]
(3) Mixed vs. Non-exporter	−0.27	(0.06)[a]	−1.14	(0.36)[a]
(4) Pure Exporters vs. Non-exporters	−0.26	(0.08)[a]	−2.91	(1.10)[a]
(5) Pure Exporters vs. Mixed	−4.84	(1.60)[a]	−4.68	(1.71)[a]
(6) Other Productivity Measures				
TFP_LP1	−0.95	(0.07)[a]	−0.34	(0.15)[b]
TFP_LP2	−0.84	(0.06)[a]	−0.25	(0.16)
TFP_LP3	−0.79	(0.05)[a]	−0.68	(0.27)[b]

Note: The IV regressions are similar to those in (1) in Table 6, i.e., DEX is endogeneized and ownership, Age, Coast, and Industry are included as control variables.
a, b, c indicate statistical significance at the 1%, 5%, and 10% levels, respectively.
Mixed firms refer to the firms selling in both domestic and foreign markets.

decision is taken into account. But Chinese firm features are not responsible for the productivity paradox. The question why Chinese nonexporters are more productive than exporters remains to be answered.

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5 Some Possible Explanations

It is often argued that exporters face intense competition and engage in costly cross-border information collection and marketing channel establishment, and that the sunk cost associated with exporting is therefore higher than that related to domestic sales. As suggested by Melitz (2003) and Helpman, Melitz, and Yeaple (2003), this is indeed the main driving force behind the phenomenon that high-productivity firms self-select into exporting. While this widely accepted proposition that exporting is associated with higher sunk cost may hold true for new entrants, it may not be applied to the incumbents that have already entered the domestic or export markets. This is because initial entry costs (sunk costs) is a once-and-for-all cost, which may no longer play an important role in determining incumbent firms' productivity. The recurring costs related to marketing & management and tax burdens (sales tax and value-added tax) that firms have to face every year may be more relevant, and productivity may need to be high enough to cover these costs in order to survive.

In this paper, sample firms have on average 7.97 and 9.34 years of operation experience in China for the industries of textile and electronics, respectively (Table 4); and more than 89% and 81% of exporters in the two industries have at least 10% of sales aiming at export markets (the last column in Table 1). These provide evidence that most firms are not new entrants in the domestic or export markets.[11] We use marketing & management costs, sales tax, and value-added tax as a proportion of sales for the proxies of various types of recurring costs. Table 8 shows that while the mean value of marketing & management cost (MK and MA) is higher for exporters than for nonexporters in all 3-digit industries and ownership types of Chinese firms (except *Made-up*, Apparel, and SOE) in textiles, it is the opposite for electronics as a whole and for most categories except Component. The relatively lower cost of MK and MA for exporters can be explained by the fact that while it is generally true that collecting global information and establishing overseas marketing channels are very expensive, it is also true that an exporter may not have to conduct all of these tasks alone. Many Chinese exporters sell their products directly through large international buyers or indirectly via sourcing agents (middlemen). Gereffi (2002), for example, shows that it is often international buyers, such as large retailers, marketers, and branded

[11] In fact, only 2.99% and 1.84% of textiles and electronics firms are newly established.

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Table 8: Costs Associated with Exporting and Non-exporting

Units: % of sales

	Exporters				Non-exporters			
	MK & MA	Sales Tax	VAT Tax	Sub Total	MK & MA	Sales Tax	VAT Tax	Sub Total
Textiles	6.65	0.23	2.68	6.90	5.67	0.22	2.95	5.92
By Industry								
Cotton & Wool	5.28	0.26	2.41	5.56	4.35	0.20	2.66	4.58
Linen & Silk	4.64	0.28	2.65	4.95	3.78	0.20	2.74	4.00
Made-up	6.50	0.20	2.42	6.73	6.57	0.26	2.89	6.86
Knitting, Weaving	6.73	0.23	2.79	6.99	6.42	0.24	3.29	6.69
Apparel	7.52	0.21	2.79	7.76	8.19	0.25	3.41	8.48
Others	7.57	0.22	3.16	7.82	5.87	0.21	3.41	6.12
By Ownership								
SOE	11.28	0.48	3.27	11.79	15.18	0.79	4.87	16.02
XSOE	6.03	0.24	2.81	6.30	5.35	0.21	2.89	5.59
JV	7.77	0.20	2.40	8.00	7.05	0.23	3.24	7.31
Electronics	11.28	0.22	2.58	11.52	12.81	0.27	3.83	13.12
By Industry								
ITC	15.73	0.23	2.77	15.99	19.03	0.34	4.10	19.41
Broadcast & TV	11.92	0.31	2.60	12.27	15.60	0.27	3.44	15.91
Computer & Device	11.68	0.21	2.29	11.90	14.20	0.27	3.89	14.51
Component	10.27	0.20	2.87	10.50	9.57	0.26	3.83	9.86
HAV	10.57	0.23	2.18	10.82	11.50	0.24	3.52	11.78
By Ownership								
SOE	19.85	0.44	3.20	20.32	23.90	0.50	4.19	24.44
XSOE	10.88	0.25	2.85	11.15	11.52	0.26	3.72	11.82
JV	11.39	0.18	2.28	11.60	15.22	0.27	4.08	15.53

manufacturers that play pivotal roles in setting up a decentralized production network in a variety of exporting countries, among which China is apparently a significant one. Cheng (2001) and Wan and Weisman (1999), on the other hand, demonstrate the crucial role Hong Kong has played as a middleman for China in channeling information and facilitating trade and

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technology connections between China and other countries.[12] In either case, Chinese firms take orders from international buyers and agents, follow their production instructions, usually perform the low-end manufacturing aspects of the value chain, and leave most of the other functions, such as product design, information collection, marketing, and promotion to international buyers and agents. In this case, the costs associated with processing exporting are likely small compared to ordinary exporters or nonexporters who perform many more functions autonomously. A low-productivity firm can therefore become an exporter. This argument is in line with Dai, Maitra, and Yu (2011) which attribute the productivity paradox to the presence of firms that engage in export processing.

Moreover, China has a population of 1.3 billion with very high extent of regional disparity due to the imbalance in economic development across regions. There is also a wide diversity of regional tastes, and Chinese consumers tend to make sharp distinctions between the rural and urban strata. As a result, various marketing channels are needed in different regions, thus making market expansion much more difficult for firms competing for the domestic market in China than exporting via international agents. This implies that China is a country more like Europe than the United States, the latter of which represents a remarkably homogeneous marketplace (Kotler, 2001). This helps justify why the cost of marketing and management can be greater for nonexporters than for exporters in China, especially in electronics.

Nonexporters in China tend to have higher tax burdens than exporters (Table 8). This is due to the fact that unlike exporters who are allowed to use imported inputs free of duty and receive the rebate on some of the value-added tax when goods are finally sold overseas, nonexporters must incur import duty on the use of imported inputs and pay value-added tax on all the goods sold domestically.[13] Similarly, nonexporters must pay sales tax (equivalent to consumption tax) for all goods sold in the domestic market while exporters are free of sales tax when goods are exported abroad.[14]

[12]The share of China's outward processing exports that are re-exported through Hong-Kong is 82.5%, 79.5%, 79.3%, 79.3%, and 80.7% from 2002 to 2006, respectively.

[13]The fact that the gap in the tax burden between the two groups is wider for electronics than for textiles can be explained by the longer production processes; hence, the higher value-added tax burden involving electronics. This provides one element of justification as to why the export discount is larger for electronics than for textiles.

[14]When value-added tax (VAT) was implemented in China in 1984, sales tax was also

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In addition to the above costs, there are also some other factors that may make domestic sales more costly than exporting. For example, although China is now gradually establishing an integrated transportation infrastructure, shipping long distance by road can be very expensive and time consuming.[15] Although China's logistics sector is growing at an extraordinary speed, its operational inefficiency, which is exacerbated by transportation bottlenecks, regulatory constraints, and local barriers to entry (Young, 2000), makes the logistics across provinces very costly in China.[16] According to EIU, the percentage of the logistic cost as a factor of GDP in China was 18% in 2006, which is much higher than in Japan (11%), the United States (8%), and EU (7%). Unlike Western economies, where firms abide by commercial laws and regulations, China faces the difficulties of cementing and enforcing adherence to dealer agreements (Kotler, 2001), which increase the risk and cost of doing business in China.

Considering all of the above costs together show that the recurring costs associated with domestic sales tend to be higher than those associated with exporting, especially in electronics (Table 8). Thus, the same line of argument used in Melitz (2003) will produce a proposition opposite to that of the conventional wisdom; i.e., nonexporters tend to be high-productivity firms while exporters tend to be low-productivity firms, which support our empirical results.

To show whether the recurring costs are indeed the factors contributing to the productivity paradox, we include various types of the recurring costs to the same regressions used in Table 6. We also use a firm's long-term investment (relative to sales) as a proxy for the sunk costs of the incumbent. From Table 9a and 9b,[17] it shows that all three types of the recurring costs tend to have negative impact on productivity directly, but the export dis-

imposed on some items in order to keep the total tax burden (the sum of value-added tax and sales tax) similar to that before the tax reform in order to assure the government's revenues.

[15]The cost of transportation as a proportion of total logistics costs (including transportation, management, and storage) is 63%, 56%, 59%, 56% and 56% for 2002–2006, respectively. See China Federation of Logistics and Purchasing, 2007.

[16]For example, a bottle of Beijing's Yanjing beer was once sold at equivalent of 18 cents in Beijing but $1 in Sichuan province (Gilley, 2001; Li, Qiu, and Sun, 2003). Also mentioned by some Taiwanese firms upon interview, the shipping cost from Taiwan to China by sea in many cases is cheaper than that from one province to another via Chinese highways, as there are too many inland toll booths.

[17]The full results are available upon request.

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count associated with the estimator of DEX becomes smaller for textiles and electronics as compared to those in (2b) and (4b) in Table 6. This supports the view that the recurring costs contribute to the occurrence of productivity paradox. When sunk cost is included in the regression, the above results do not seem to change much (see Table 9b). This implies that for the incumbents, recurring costs is more relevant than sunk cost in explaining the productivity paradox.

6 Concluding Remarks

In this paper, we challenge the unanimous consensus that exporters outperform nonexporters in productivity. By using textiles and electronics industries in China as a case study and endogenized firms' export decisions, we show that exporters are less productive than nonexporters, a result that is opposite of the conventional wisdom. The export discount is much higher in electronics than in textiles regardless of the productivity measures used. By applying the argument shown by Melitz (2003), we argue that the contradictory results stem from the fact that the higher recurring costs (including marketing & management cost, sales tax, and value-added tax) tend to be associated with domestic sales but not exporting. The following factors may also help explain the productivity paradox: China's large regional disparity and wide diversity of consumer tastes as well as the distortions and market imperfections, such as the lack of an integrated national transportation and distribution network, interprovincial protection, and difficulties associated with enforcing adherence to commercial laws and regulations. In contrast, as part of the international supply chain, many Chinese exporters sell goods abroad through international buyers and agents. This results in a relatively lower exporting cost; hence, lower productivity is required for an exporter because less effort is needed to cultivate overseas markets.

This paper is along the same line as some recent studies based on Chinese firm-level data such as Lu, Lu, and Tao (2010), Dai, Maitra, and Yu (2011), Lu (2012), and Ma, Tang, and Zhang (2014), in which some evidence and explanations of the productivity paradox are also provided. Lu, Lu, and Tao (2010) take firms' export decisions as given and show that among China's domestic firms, exporters are more productive than nonexporters. This is in contrast to our findings that the productivity paradox does occur in electronics when export decisions are taken as given and in both textiles and electronics when export decisions are endogenized. Different from

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Table 9: IV Regressions for RTFP with Recurring costs, Tax Burden, and Sunk Costs

Case (a) Without Sunk Costs

	Textiles		Electronics	
	Coef.	(Std.)	Coef.	(Std.)
DEX	−0.121	(0.062)[b]	−1.834	(0.519)[a]
SOE	−0.344	(0.092)[a]	−0.893	(0.190)[a]
XSOE	0.083	(0.025)[a]	−0.266	(0.110)[b]
RD	0.774	(0.327)[b]	0.056	(0.066)
Wage	0.0001	(0.040)	0.671	(0.207)[a]
Age	−0.007	(0.001)[a]	0.001	(0.003)
Coast	−0.016	(0.020)	−0.020	(0.049)
MK & MA	−0.029	(0.002)[a]	−0.031	(0.009)[a]
Salestax	−0.080	(0.017)[a]	−0.059	(0.034)[a]
VATtax	−0.035	(0.003)[a]	−0.044	(0.012)[a]
Industry	yes		yes	
Constant	0.461	(0.120)[a]	−0.834	(0.477)[c]
No. of Obs.	30,929		5,394	
Wald Chi2	1,007.97		203.45	
Export Premium	−11.42		−84.02	

Case (b) With Sunk Costs

	Textiles		Electronics	
	Coef.	(Std.)	Coef.	(Std.)
DEX	−0.120	(0.062)[b]	−1.831	(0.522)[a]
SOE	−0.344	(0.092)[a]	−0.877	(0.193)[a]
XSOE	0.079	(0.024)[a]	−0.265	(0.110)[b]
RD	0.765	(0.324)[b]	0.062	(0.067)
Wage	−0.002	(0.040)	0.682	(0.207)[a]
Age	−0.006	(0.001)[a]	0.002	(0.003)
Coast	−0.014	(0.020)	−0.012	(0.049)
MK & MA	−0.028	(0.002)[a]	−0.031	(0.009)[a]
Salestax	−0.076	(0.017)[a]	−0.055	(0.033)[c]
VATtax	−0.035	(0.003)[a]	−0.045	(0.012)[a]
Sunkcost	−0.443	(0.113)[a]	−0.350	(0.083)[a]
Industry	yes		yes	
Constant	0.458	(0.120)[a]	−0.880	(0.474)[c]
No. of Obs.	30,929		5,394	
Wald Chi2	1,030.01		228.69	
Export Premium	−11.32		−83.98	

Note: The recurring costs include MK & MA, Salestax and VATtax, which refer to a firm's marketing & management, sales tax, and value added tax relative to its 4-digit industry average. Sunk cost here refers to a firm's long-term investment relative to its sales.

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our focus on recurring costs, Lu (2012) extends the model by Melitz (2003) and shows that factor intensity matters: for the labor abundant country, the productivity paradox is more likely to occur in labor-intensive sectors than in capital-intensive sectors. In this paper, the negative correlation (−0.3413) between export premiums derived from regressions and capital-labor intensities for the 3-digit industries seems to weakly support Lu's argument. Nevertheless, further studies are still needed. Dai, Maitra, and Yu (2011) and Ma, Tang, and Zhang (2014), on the other hand, attribute the productivity paradox to the presence of firms that engage in export processing (Dai, Maitra, and Yu, 2011). Since processing exporters tend to have lower marketing & management costs and tax burden, which according to our study, contributes to the productivity paradox, our results therefore are consistent with these findings.

Appendix 1: Kolmogorov-Smirnov Test for Non-exporters vs. Exporters

F vs. G	$F \leq G$		$G \leq F$		$F = G$	
Textile:						
RTFP	0.0368	(0.000)[a]	−0.0504	(0.000)[a]	0.0504	(0.000)[a]
LP1	0.0019	(0.949)	−0.1057	(0.000)[a]	0.1057	(0.000)[a]
LP2	0.0020	(0.944)	−0.1045	(0.000)[a]	0.1045	(0.000)[a]
LP3	0.0019	(0.958)	−0.1153	(0.000)[a]	0.1153	(0.000)[a]
Electronics						
RTFP	0.0115	(0.720)	−0.0932	(0.000)[a]	0.0932	(0.000)[a]
LP1	0.0178	(0.571)	−0.0243	(0.232)	0.0243	(0.459)
LP2	0.0178	(0.456)	−0.0230	(0.271)	0.0230	(0.531)
LP3	0.0062	(0.910)	−0.0525	(0.001)[a]	0.0525	(0.001)[a]

Note: RTFP is the productivity index relative to 3-digit industry TFP, and LP1, LP2, and LP3 are output, sales, and value added per worker.
F and G refer to the cumulative distribution of productivity for nonexporters and exporters, respectively. Figures in parentheses are P-values.
Superscript a indicate significance at 1% confidence interval.

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投稿日期: 2012年3月22日, 接受日期: 2014年4月7日

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出口商之生產力較非出口商高? 中國大陸製造商之分析

劉碧珍
國立台灣大學經濟系
吳玉瑩
中華經濟研究院

既有之理論或實證文獻多認爲出口廠商的生產力較非出口商高, 本研究利用中國大陸紡織成衣與電子業製造商的研究卻發現相反的結果。不僅中國出口商所顯示的特性, 與多數文獻的發現不相一致, 且在控制廠商特性及所有權, 並考慮廠商自我選擇效果之情況下, 出口商的生產力顯著低於內銷廠商。本文將此一現象稱作出口商生產力的矛盾。此一矛盾現象在利用多種不同勞動生產力衡量方式之情況下仍然存在。本研究亦就造成此一現象之可能原因, 提出一些解釋與佐證。

關鍵詞: 勞動生產力, 出口, 自我選擇, 中國大陸
JEL 分類代號: F14, D21, L60

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