Export Orientation and Technical Efficiency: Clothing Firms in China

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Based on 287 of the largest clothing manufacturing firms in southern China in terms of output value, we employed data envelopment analysis to estimate the technical efficiency of the sample firms. A regression analysis was conducted to examine the effects of export orientation on technical efficiency. Our results suggest a U-shaped relationship between export ratio and technical efficiency. The specific nature of the industry in Guangdong province can explain that clothing firms with a high degree of sales in the domestic market or with a high level of export orientation experience a higher level of technical efficiency than those firms trying to conquer both the local and the overseas markets. Copyright © 2010 John Wiley & Sons, Ltd.

INTRODUCTION

In the era of globalization, many firms have adopted an export-oriented strategy to seek organic growth through active participation in the international market. Internationalization allows firms to become more familiar with the activities of their international competitors and also affords them greater access to new market opportunities (Ungson \textit{et al.}, 1997; Qian, 2002). The pursuit of an export-oriented strategy is considered fundamental for firms' competitiveness in the long term (Karagozoglu and Lindell, 1998), as exporters tend to be more productive through learning-by-exporting than non-exporters (Aw and Hwang, 1995; Aw \textit{et al.}, 2000; Mengistae and Pattillo, 2004). The successful management of export business also demonstrates a firm’s ability and adaptability to an open economic system (Toulan, 2002). By following an export-oriented strategy, firms are also able to exploit the possible advantages of economies of scale and gain cost advantages (Kim \textit{et al.}, 1993). Furthermore, keen competition in the international market obliges firms to meet international standards and high customer expectations in terms of product quality and choices, driving them to upgrade their technological capabilities and thus their competitiveness (Toulan, 2002). Among others, two recent studies have given empirical reviews to demonstrate that export-oriented enterprises perform better than non-exporters (Farinas and Martin-Marcos, 2007; Wagner, 2007). Li (2008) produced empirical results supporting that higher level of internationalization for the US manufacturing multinational enterprises is associated with improved performance measured by technical efficiency.

However, export-oriented firms may experience a number of potential issues that can have negative impacts on their performance. These drawbacks

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range from the dependency of the potentially violate market demand on foreign countries to other social and political constraints. The volatility of market demand can be the consequence of the ever-changing trend of products in foreign markets and the subsequent short life cycles of their products. For firms that are unable to respond to such market dynamic, they will fail to gain in performance from the involvement in the foreign markets (Toulan, 2002). For firms with a high level of foreign involvement, they may suffer other drawbacks that reduce the potential benefits of an export-oriented strategy (Grant, 1987), for example, dependency on the foreign market. Firms implementing an export-orientation strategy can also encounter other uncertainties, such as technical and non-technical barriers of trade induced from the rise of protectionism in foreign markets, lack of understanding of the consumers' culture in foreign markets and the complex operational environments across different countries as a result of political and economic factors, and the subsequent increase in operational costs (Li and Kleiner, 2001; Sambharya, 1996). Furthermore, managers can face higher transaction costs with a higher level of export activities. Therefore, there seems to be no definitive conjecture regarding the relationship between export orientation and performance.

It is interesting to examine the empirical evidence on relationship between the export orientation and the performance of manufacturing sectors in China, being the 'workshop of the world' in the 21st century. Exports have played an important role for export-oriented firms in the coastal regions of southern China during the rapid economic development since 1979. A significant proportion of Chinese firms has become internationalized in varying degrees in terms of exportation, as demonstrated by the massive penetration of Chinese products in the world market. That is, China is the largest exporter of toys, apparel, home electric and electronic appliances, and others. China has been the largest exporting country for textile and apparel products in the world since 1995. In 2007, the export value of clothing from China reached US$115.2 billion, which accounted for 10.0% of the country's merchandise export value (NBS, 2008). A large proportion of these apparels was exported to the European Union and North American countries, which purchased a staggering 71.7% of the global import value of clothing in 2007 (WTO, 2008). Clothing firms in Guangdong province are one of the most important labor-intensive and export-oriented manufacturing centers in China, accounting for 29.5% of the country's total clothing exports in 2007. Most existing studies on Chinese textile and clothing industry are about the impacts of the World Trade Organization (WTO) accession, for example, Yang and Zhong (1998), Zhong and Yang (2000), Yeung and Mok (2004), and others. The potential impact of export orientation on clothing firms' performance in China, an investigation with potentially important implications, is not included in the literature.

An investigation on the technical of clothing firms in Guangdong province provides not only empirical evidence for us to examine the effects of export orientation on firms' performance, but also some insights into the policy implications of the export-oriented strategy. For instance, should Chinese clothing firms follow the export-oriented industrialization path as implemented by East Asian countries since the 1960s? Is there a simple linear relationship between the export-oriented strategy and the efficiency of Chinese clothing firms?

In the next two sections, we will present the methodology and data sources used in this study. These will be followed by the presentation of the results of the empirical study. Finally, we will highlight the major findings of this study and their implications in the concluding section.

METHODOLOGY AND DATA

There are two common methods of estimating the performance of firms in terms of technical efficiency, namely, non-parametric data envelopment analysis (DEA) and stochastic frontier analysis (Coelli et al., 2005). DEA has several attractive features (Coelli et al., 2005; Baccouche and Kouki, 2003).

- In contrast to the parametric stochastic frontier model, the DEA method does not require the prior specification of a functional form for the production function. The stochastic frontier model imposes the specification of a distributional form
(usually truncated normal, half normal, exponential, or gamma distributions) of the inefficiency error term. According to Baccouche and Kouki (2003), the degree of measured technical inefficiency is sensitive to the postulated assumptions of the distributional form of the error term. Similar comments were also made by Dong and Putterman (1997, p. 196) who observed that ‘...the estimates of technical efficiency are quite sensitive to the assumption about the distribution and pattern of the one-sided error component.’

- Rather than focusing on population averages, DEA concentrates on the revealed ‘best-practice’ frontiers. It uses a ‘data-oriented approach’ to evaluate the performance of each decision-making unit (DMU) in production. Each DMU is separately analyzed, and those with the ‘best practice’ are identified. A frontier of the units with the best practice is constructed. DEA then evaluates the technical efficiency of comparable DMUs relative to the best practice frontier. If a DMU’s input–output combination lies on the best practice frontier, then it is regarded as efficient. If the input–output combination lies below the frontier, then it is considered inefficient.

However, DEA is not totally free from any deficiencies. First, the DEA approach does not account for the measurement error and statistical noise that may influence the shape and position of the frontier. Secondly, it does not allow for conventional tests of hypotheses, which are typical of the econometric approach. From the above discussion, we consider DEA an appropriate method to estimate the potential impacts of export orientation on the technical efficiency of clothing firms.

In this study, we employ the non-parametric DEA approach to estimate the technical efficiency of the sample firms. It would be more interesting to examine the cost efficiency, which includes technical and allocative efficiency. However, due to the limitation of the data set that lacks the price information of inputs, we are not able to study the cost efficiency of the sample firms in our study. In a DEA analysis, it is generally assumed that there are n DMUs that use m quantities of various inputs to produce s outputs. The notation is as follows:

\[ x_{ij} = \text{input } i \ (i = 1, \ldots, m), \quad \text{DMU } j \ (j = 1, \ldots, n), \]

\[ y_{rj} = \text{output } r \ (r = 1, \ldots, s), \]

\[ a_{ij} = \text{non-negative weights that are attached to the inputs and outputs of DMU } j. \]

In empirical applications of DEA, appropriate efficiency measures based on input orientation or output orientation should be chosen according to the objectives of the studies. In our study, we assume that firms are often given a fixed quantity of resources and are asked to produce as much output as possible. Hence, we use an output orientation approach in our estimation. After all, the orientation in DEA is not fundamental. Coelli et al. (2005, p. 180) noted, ‘... in many instances, the choice of orientation has only a minor influence upon the scores obtained...’ We use \( F(x, y) = \max \phi \) to represent the output-oriented Farrell efficiency score, which denotes the maximum possible expansion of output for DMU j.

We now consider the following output-oriented DEA model with the maximization of \( \phi \) subject to

\[
\begin{align*}
(i) \quad \sum_{j=1}^{n} a_{ij} y_{rj} & \geq \phi y_{rj}, \quad r = 1, \ldots, s, \\
(ii) \quad \sum_{j=1}^{n} a_{ij} x_{ij} & \leq x_{ij}, \quad i = 1, \ldots, m, \text{ and} \\
(iii) \quad a_{ij} & \geq 0, \quad j = 1, \ldots, n.
\end{align*}
\]

The model assumes constant returns to scale (CRS), as discussed in the pioneering work of Charnes et al. (1978). This assumption is only appropriate when all DMUs are operating at an optimal scale. However, more often than not, a DMU will not be operating at an optimal scale for various reasons such as imperfect competition and financial constraints. Banker et al. (1984) therefore extended the CRS DEA model to account for variable returns to scale (VRS). Mathematically, if the condition of \( \sum_{i=1}^{m} a_{ij} = 1 \) is added, then the VRS are imposed. We assume the VRS in this study. The efficiency measure defines a technical efficiency score that varies between zero and one.

Regression

As the technical efficiency ranges between zero and one, the distribution of efficiency is truncated above unity. If the ordinary least-squares (OLS)
method was applied, then the parameter estimates would be biased. The usual method for handling this problem is to use a limited dependent variable model; thus, we employ the Tobit model (Tobit, 1958). The specification of the equation is as follows (see Table 1 for the notation of variables):

\[
\text{TE} = \alpha_0 + \alpha_1 \text{Export} + \alpha_2 \text{Export}^2 + \alpha_3 \ln(\text{Sales}) \\
+ \alpha_4 \text{Tangibility} + \alpha_5 (\text{Capital/labor ratio}) \\
+ \alpha_6 \text{Dummy}_\text{foreign}
\]

(1)

Before proceeding to a discussion on the empirical results, we give a brief description of the data and the variables involved in the regression model.

Data

With the help of the Department of Statistics at Jinan University in Guangzhou, China, we obtained a data set that contains data on the top 300 clothing manufacturers by output value in Guangdong province in 2002. Observations with missing outputs or inputs were deleted, leaving a sample of 287 firms. In terms of gross output value, the sample firms accounted for 49% of the clothing manufacturing sector in Guangdong. In terms of scale of employment, about 51% of the sample firms (146 cases) employed more than 500 workers. The variables that we used in the DEA are defined in Table 1. \( y \) is the value added of firm \( i \), and the two inputs are the total number of employees \( (L) \) and the net value of fixed assets as capital \( (K) \). All the variables with monetary figures in Table 1 are measured in 1000 yuan.

Variables in the Regression Model

Export orientation is commonly measured by the ratio of foreign sales to total sales, or export ratio (Grant, 1987; Ramaswamy, 1995; Qian, 1996; Annavarjula and Beldona, 2000). The export ratio is useful to show the extent to which a firm's revenues are dependent on international markets. Most empirical studies find a positive relationship between export orientation and performance (see Gomes and Ramaswamy, 1999; Qian, 1996, 2002, among others), but some studies suggest an insignificant or negative relationship (e.g., Kumar, 1984; Riahi-Belkaoui and Ahajjar, 2002; Fu, 2005; Kuivalainen, 2006). The aim of this study is to revisit the issue by employing a different approach from previous studies, which do not consider the role of technical efficiency in production. A similar empirical study is rare in the existing literature. On the one hand, firms with export-oriented strategy have advantages of internationalization, economies of scale, and technological progress. On the other hand, they have drawbacks such as complex and changeable circumstances, managerial and cultural conflicts, exchange rate risks, and export control among others. To describe the potential nonlinear relationship between export ratio and performance, and to capture the positive and negative export effects, the squared term of export ratio is included in the model. To isolate the relationships between export orientation and efficiency, it is essential to introduce into the model other independent variables that are likely to affect efficiency. Among the various firm attributes that are shared by manufacturing firms, we chose four representative firm-attribute factors as control variables in the model: size, tangibility, capital/labor ratio, and ownership.

Control Variables

Firm size is a key determinant of firm performance. Large firms are believed to have the advantages over small firms in that they can negotiate favorable prices for inputs, obtain better

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description of variable</th>
</tr>
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<tbody>
<tr>
<td>( Y )</td>
<td>Value added</td>
</tr>
<tr>
<td>( L )</td>
<td>Total number of employees</td>
</tr>
<tr>
<td>( K )</td>
<td>Net value of fixed assets</td>
</tr>
<tr>
<td>( TE )</td>
<td>Technical efficiency</td>
</tr>
<tr>
<td>Export</td>
<td>Ratio of exports to total sales</td>
</tr>
<tr>
<td>Size</td>
<td>Log of sales</td>
</tr>
<tr>
<td>Tangibility</td>
<td>Ratio of fixed assets to total assets</td>
</tr>
<tr>
<td>Capital/labor ratio</td>
<td>Ratio of total assets to total number of employees</td>
</tr>
<tr>
<td>Dummy_foreign</td>
<td>Dummy variable for foreign-invested firms</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>( Y )</td>
<td>28830</td>
<td>40685</td>
</tr>
<tr>
<td>( L )</td>
<td>824</td>
<td>1274</td>
</tr>
<tr>
<td>( K )</td>
<td>19417</td>
<td>65176</td>
</tr>
<tr>
<td>TE</td>
<td>0.346</td>
<td>0.222</td>
</tr>
<tr>
<td>Export</td>
<td>0.606</td>
<td>0.442</td>
</tr>
<tr>
<td>Size</td>
<td>11.458</td>
<td>0.570</td>
</tr>
<tr>
<td>Tangibility</td>
<td>0.262</td>
<td>0.200</td>
</tr>
<tr>
<td>Capital/labor ratio</td>
<td>150.734</td>
<td>611.726</td>
</tr>
</tbody>
</table>

Number of firms = 287. All the above variables with monetary figures are measured in 1000 yuan.

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market coverage and exposure, and better adapt to organizational and technical changes. However, it is also likely that an expanding scale may result in greater managerial complexity. The positive relationship between a firm's size and technical efficiency is well documented in the literature, noticeably by Pitt and Lee (1981). Similarly, Page (1984) and Seale (1990) found that large firms are able to enjoy the advantages of scale economies and hence are more efficient in production. However, some studies have found that the size-efficiency relationship is negative for large firms and positive for small firms (Biggs et al., 1996). In our study, we measure the size of a firm by log of sales (among others, see Wei et al., 2002; Qian, 2002). Boardman and Vining (1989) acknowledged that the size variable proxied by log of sales not only reflects economies of scale but also to some extent the market power of firms. In general, we expect a positive relationship between size and efficiency.

On cash management in a company, a higher tangibility of assets means a smaller working capital and consequently a smaller treasury, which denotes poor managerial ability to lead a company (Weill, 2008). In contrast, intangible assets (such as a patent process or design and management skills) represent competitive strengths that will give rise to superior rates of profitability (Qian, 2002). The ratio of fixed assets to total assets thus serves as an appropriate measure of tangibility, and we expect tangibility and firm performance to be negatively correlated.

Capital intensity measured by the ratio of capital expenditure to the number of employees in the firm is included as a control variable. Firms with a higher level of capital intensity are expected to have more potential variability in their utilization of capital. As the rental cost of unused capital can be high, it is expected that firms will have an incentive to use their production resources efficiently (Jung 1991). Lim (1980) and Sheehan (1997) found empirical evidence that firms with a higher level of capital intensity perform better.

Ownership is used as a control variable in the model because foreign firms are usually expected to accumulate greater management experience and construct a better organizational structure than domestic firms, although they also face the difficulties of unfamiliar circumstances and tend to pursue operational objectives rather than profits (Pitt and Lee, 1981; Wei et al., 2002). We broadly divide our sample firms into two categories: foreign-invested and locally invested firms. Due to complex operational circumstances, conclusions on the nature of the relationship between ownership and efficiency frequently differ (Pitt and Lee, 1981), and it is therefore important to explore the influence of ownership on efficiency in the Chinese manufacturing industry.

RESULTS OF THE EMPirical ANALYSIS

The Data Envelopment Analysis Program (DEAP 2.1) was used to calculate the technical efficiency of the clothing manufacturing firms in our sample. The average score of the sample firms is 34%, which is considered on the low side compared with other estimates. Wadud (2004) found that the average technical efficiency of Australian clothing firms were between 41 and 45% in 1995–1998. After computing the technical efficiency, we then proceeded to test whether export orientation improved technical efficiency by estimating Equation (1) using the Tobit method. The results of the estimation are presented in Table 2. To overcome the possible problem of heteroscedasticity, we carried out a likelihood ratio test against the null hypothesis of homoscedasticity and re-estimated the Tobit model assuming the variance of the error term to be a function of capital/labor ratio. The log likelihood function of the re-estimated model is 82.920 and that of the original Tobit model is 82.736. The likelihood ratio statistic is therefore 0.368, which is smaller than the 5% critical value for the chi-squared

<table>
<thead>
<tr>
<th>Table 2. Estimates of the Effects of Export Orientation and the Control Variables on the Technical Efficiency of Clothing Firms in Guangdong, 2002</th>
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</thead>
<tbody>
<tr>
<td><strong>Intercept</strong></td>
</tr>
<tr>
<td><strong>Export</strong></td>
</tr>
<tr>
<td><strong>Export²</strong></td>
</tr>
<tr>
<td><strong>Size</strong></td>
</tr>
<tr>
<td><strong>Tangibility</strong></td>
</tr>
<tr>
<td><strong>Capital/labor ratio</strong></td>
</tr>
<tr>
<td><strong>Dummy_foreign</strong></td>
</tr>
<tr>
<td><strong>Log likelihood function</strong></td>
</tr>
<tr>
<td><strong>Number of observations</strong></td>
</tr>
<tr>
<td><strong>Pseudo R²</strong></td>
</tr>
</tbody>
</table>

The t-values are in parentheses. Significant at *10%, **5%, ***1%.

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distribution with one degree of freedom. Thus, the null hypothesis of homoscedasticity cannot be rejected. The result of the pseudo $R^2$ suggests that about 47% of the variation in technical efficiency between the sample firms can be explained by variations in export orientation and the control variables.

To investigate the impact of strategic variable on technical efficiency, we check the coefficients of the Tobit model. The measurement of export is proxied by the ratio of export sales to total sales. It can be viewed as a proxy for a firm’s dependence on overseas markets for sales revenues. To cater to the possible nonlinear relationship between export and technical efficiency, the square of export ratio is also included in the list of regressors. The inclusion of the quadratic term of export in the Tobit model is mainly supported by two statistical facts: the significant coefficient of export$^2$ and the results of the log-likelihood ratio test (LR). Let us set the null hypothesis $H_0$ in that the coefficient of export$^2$ is zero, and the restricted log-likelihood function is 80.713. Our nonlinear Tobit model is an unrestricted model with a log-likelihood function of 82.736. The LR statistics is 4.046, which is distributed as the chi-square distribution with one degree of freedom and is greater than the 5% critical value of 3.841. Hence, the null hypothesis is rejected. The squared export term should be added.

The coefficient of export variable was estimated to be $-0.275$ and that of the squared term of export was $0.248$, both being significant at the 5% level. The results suggest a $U$-shaped relationship between export ratio and technical efficiency. The signs of export and export$^2$ suggest that firms with a high degree of sales to the domestic market or with a high level of export orientation experience higher technical efficiency. As such, it is important for us to estimate the turning point of the $U$-shaped curve. The point of inflection can be computed by taking the partial deviation of our Tobit model with respect to export as follows:

$$d(\text{TE})/d(\text{Export}) = 2(0.248 \times \text{Export}) - 0.275$$

Setting the above partial deviation to be zero, the inflection point of export is determined to be 0.554. In other words, technical efficiency begins to decline when the ratio of export sales to total sales varies from 0 to 0.554, and technical efficiency reverts to an upward trend when the export ratio changes from 0.554 to 1. In our sample, there are 168 firms with export ratios exceeding 0.554, which means 59% of the sampling firms could improve their technical efficiency by enlarging their export businesses. For firms with export ratios less than 0.554, however, further expansion of domestic market would improve their technical efficiencies. Besides, export orientation can have positive impacts on technical efficiency for firms with a large portion of sales to international market, while firms that try to develop the domestic and overseas markets simultaneously perform less efficiently. From the prospective of technical efficiency, it appears that the optimal strategy for Chinese clothing firms is to focus on one market, that is, either the domestic or the overseas market rather than splitting the firms’ resources or efforts to target both domestic and international markets.

To obtain further indication of the relationship between export and technical efficiency illustrated by the Tobit model, we extend our empirical study from the base model by performing the following group-wise analysis. We attempt to compare the average TE of various groups of firms categorized in terms of export ratio. We divide the firms into four groups by export ratio equally and then compare the means of technical efficiency of the two extreme groups. As we have no reason to assume that the distribution of technical efficiency is normal, the non-parametric Wilcoxon test is performed. The null hypothesis is that the distributions of the efficiency measures are the same for the two extreme groups. As shown in Table 3, the mean rank of firms with export ratios between 0 and 0.25 is 130.09, while that of the contrasted group is 121.15; this gap is not significant. It suggests that the two extreme groups exhibit nearly the same level of technical efficiency. The earlier Tobit model illustrates a significant $U$-shaped relationship between export and technical efficiency. By comparing the two extreme groups from the degree of export ratio, there is no obvious disparity of performance between them. The results suggest that the technical efficiency gap between firms targeting their major products to the domestic market and firms focusing on the overseas market is not significant. As long as firms focus on a specific market, whether domestic or overseas, they can obtain their advantages on performance in terms of technical efficiency, compared with firms diverting their resources and efforts to both domestic and overseas markets.

The above finding does not correspond with the common conjecture of a positive relationship.
between export and efficiency. The empirical study illustrates that the role of export on technical efficiency depends on the attributes of a firm's market orientation. Among the previous studies, Gomes and Ramaswamy (1999) and Qian (1996, 2002) supported the positive role on efficiency, with Lopez (2009), particularly highlighting that the positive productivity effects largely occur at the firm level before rather than after it enters into the international market, that is, firms improve their productivity to develop an export market. Bernard and Jensen (1999) and Aitken et al. (1997) rejected the linear positive relationship between export and efficiency, considering it too simplistic. In addition, Pu (2005) performed an empirical study on the industry level in China in which the results showed that there was no evidence to suggest significant productivity gains at the industry level resulting from exports. Yeung and Mok (2002) suspected that the negative relationship between exports and efficiency may be partly attributable to the high transaction costs of exportation that result from the ambiguity, complexity, and inflexibility of government policies in the labor, capital, and product markets. For instance, the government departments that oversee export activities demand that companies submit detailed documentation, such as inventories and daily records of the value and quantity of raw materials, following the rules for the verification of imports and exports. Quite often, compliance to these rules imposes a tremendous administrative cost on daily operations, and thus offsets part of the profits (and lowers the efficiency) of export-oriented firms. Moreover, the recent proliferation of international standards can be another reason that may increase the costs of export-oriented clothing firms, thus having negative effects on their technical efficiency. The number of technical barriers notifications from the WTO members (largely from major trading partners such as the US and the European Union members) to China has increased by 50% within 4 years to 895 in 2006. According to the Ministry of Commerce, it is estimated that more than 15% of Chinese exporters and 18 of the 22 major categories of exports are affected by these technical barriers of trade, with a direct loss of exports at US$69.1 billion in 2005. This is equivalent to more than 9% of China's total value of exports. The amount spent on the measures to deal with these technical barriers of trade, such as retooling their production lines to conform with the ISO14000, WRAP, and the REACH certifications, reached US$21.7 billion in 2005 (China Daily, 14 December 2006; 26 December 2006: 2; see also Yeung and Mok, 2004, 2005).

To reconcile our U-shaped finding with the inverted U-shaped relationship between performance and multinationality in the literature, we further divide the sample by firm sizes and export ratios. According to the Small- and Medium-sized Enterprises Regulations of the People's Republic of China implemented since 2003, a small-sized enterprise is a firm that employs less than 300 workers, with a sales value below 30 million yuan and a total assets value of less than 40 million yuan. Should one focus on the small-sized firms (Table 4), one would find out that 88.51% of our sampled small-sized firms sell three quarters or more of their outputs either in the domestic market (67 of such firms) or in the overseas market (87 of such firms). Coupled with the earlier U-shaped findings, one would infer that these highly export-oriented or domestic market-oriented small-sized firms have higher level of efficiency than their small-sized counterparts that are trying to conquer both the domestic and overseas markets simultaneously. Different from the literature in which the inverted U-curve finding is largely based on the empirical evidence from transnational...
Table 4. Export Ratios and Small-Sized Firms

<table>
<thead>
<tr>
<th>Export ratio</th>
<th>Number of firms in the export range</th>
<th>Number of small-sized firms</th>
<th>Share of small-sized firms in the export range (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low export: 0-0.250</td>
<td>93</td>
<td>67</td>
<td>72</td>
</tr>
<tr>
<td>Medium export: 0.251–0.750</td>
<td>39</td>
<td>29</td>
<td>52</td>
</tr>
<tr>
<td>High export: 0.751–1.000</td>
<td>155</td>
<td>87</td>
<td>56</td>
</tr>
<tr>
<td></td>
<td>287</td>
<td>174</td>
<td>61</td>
</tr>
</tbody>
</table>

Small-sized firms are those firms employing less than 300 workers, with a sales value below 30 million yuan and a total assets value of less than 40 million yuan.

corporations (TNCs) in developed countries, such as various industrial sectors in the US in the case of Gomes and Ramaswamy (1999), the majority of our sample clothing firms in Guangdong province are labor-intensive and low-value-added manufacturers (or sub-contractors in the case of export-oriented firms) with wafer-thin profit margins. As most of these small-sized firms have very limited resources, it is better for them to focus their resources in the marketing and product development in either the local or the overseas market. Most small-sized clothing firms targeting the local market focus on low-end products and largely compete on price alone (South China Morning Post, 4 March 2008). Hence, they have to minimize the costs, and this could result in a relatively higher technical efficiency. This is also the case for the export-oriented small-sized subcontractors in Guangdong province. Our findings clearly illustrate the specific nature of the clothing industry in southern China.

In summary, when firms’ exports take up only a moderate but not dominant portion of their total sales, the costs of transaction to handle various bureaucratic procedures in exportation as well as to meet the ever-demanding technical barriers of trade are considerably high compared with the possible benefits of internationalization through a moderate degree of export orientation. Beyond a turning point, the marginal returns of higher level of export orientation may exceed the marginal costs of exportation, and the net effects of export orientation enter a positive efficiency territory. Therefore, a firm reaching a relatively high level of exportation may be able to manage information and to concentrate their resources to engage in the international market while reaping the benefits of internationalization. This helps explain why the association between export orientation and technical efficiency is evidenced to be U-shaped in our sample firms.

We now turn to the assessment of the effects of the four control variables of firm size, tangibility, capital/labor ratio, and ownership on technical efficiency. The estimated results show that large-sized firms are relatively more efficient than their smaller counterparts. The finding suggests that large firms take advantage of the scale economies. The coefficient of the tangibility variable is negative and significant. This is the expected result, which shows that a higher tangibility of assets is likely to denote a poor managerial ability to lead a company, resulting in poor efficiency (Weill, 2008). The coefficient of the control variable of capital/labor ratio is positive and significant, which suggests that the capital intensity measured by the capital/labor ratio has a positive effect on efficiency. However, the estimator of the coefficient of the foreign-invested firm dummy variable is negative, although weakly significant at the 10% level, which indicates that the foreign-invested clothing firms in our sample are less efficient than their locally invested counterparts. This is somewhat unexpected, given that foreign-invested firms are normally expected to have better knowledge of advanced technology, management skills, and research and development capability. This unexpected finding may be reconciled by the fact that a significant proportion of foreign-invested clothing firms in Guangdong province focuses on the low-value-added portion of the value chain and concentrate on labor-intensive manufacturing processes rather than on product design, innovation, and development (Hang Seng Bank, 2004). This is especially the case in a number of clothing firms originating from Hong Kong that generate a lion’s share of their profits through the less-restricted export quotas assigned by the US government according to the Agreement on Textiles and Clothing (Yeung and Mok, 2004). This result is consistent with the finding of

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Wei et al. (2002) that wholly foreign-owned firms in China are less productive than firms with other types of ownership.

CONCLUSION

In this study, we empirically examined the effects of export orientation on the technical efficiency of 287 largest (by output value) clothing manufacturing firms in Guangdong province in southern China. Our findings support the general observation made by Steinfeld (2004), stating that Chinese enterprises have integrated into the global economy but in a 'shallow manner': the manufacturing sector focuses on producing low-value-added homogeneous products. Instead of a simple linear relationship between export-orientation strategy and efficiency at the firm level, our results suggest a U-shaped relationship between export ratio and technical efficiency. This implies that firms with a high degree of sales to the domestic market or with a high level of export orientation experience higher technical efficiency. The findings are further supported by the results of a group-wise comparison in the two extreme groups of firms in terms of the degree of export ratio.

The unexpected finding of our study can be reconciled by the specific nature of the clothing industry in southern China. Different from the existing literature, which largely draws on the empirical evidence from TNCs in developed countries, such as in Gomes and Ramaswamy (1999), a significant proportion of the clothing firms in Guangdong province is comprised of small- and medium-sized labor-intensive firms (or sub-contractors in the case of export-oriented firms), with product lines commanding a low price and with a wafer-thin gross profit margin at about 8% or even less (South China Morning Post, 14 January 2008). It is thus logical for these firms to specialize in marketing and product development in either the domestic or overseas market rather than to deploy their scarce resources to try to conquer both the local and overseas markets prematurely.

This interesting finding creates a dilemma for export-oriented clothing firms in southern China in the ongoing global recession after the financial tsunami in September 2008, particularly with the subsequent significant decline in orders on non-essential items in major exporting markets in Europe and North America. To counter the declining exports, a number of export-oriented firms have turned their attention to the domestic market. However, there could be limited room for some firms to maneuver due to the product and consumer taste specificities, where product sizes and styles are market specific. Thus, these products are unlikely to sell in other markets than in the designated ones. This is well illustrated by the stockpiles of 'oversized' cashmere sweaters in China due to cancelled orders or minor irregularities alleged by overseas buyers. As the sweaters are tailored for customers' sizes in America and Europe, Chinese manufacturers cannot sell the rejected shipments locally other than those with 'S' (small) sizes (International Herald Tribune, 20 June 2009). To penetrate the local market where consumers are generally reluctant to pay extra for relatively unknown brands, firms have to develop different designs at lower costs or even new product lines. This illustrates the difficulties in market reorientation experienced by export-oriented clothing firms in southern China. Expensive investment may be required to explore the local market, which typically has very thin profits margins due to extremely keen competition. Should this be the case for other export-oriented manufacturing sectors in provinces other than Guangdong, then the small- and medium-sized Chinese firms may encounter an uphill battle to develop the local market.

We must obviously offer the caveat that this empirical study is based on a single year of data from the clothing industry in Guangdong province, and that given the disparity in regional growth and local endowment, further research is needed before we can generalize our findings to other regions in China.

NOTES

1. Dividing the firms into four groups by export ratio equally is actually somewhat arbitrary. To perform a sensitivity test, we conducted the same quantitative analysis by dividing the firms into eight groups. The results are materially indifferent, and thus they are not presented here.

2. Lundvall and Battese (2000) consider that intermediate inputs are a variable highly correlated with output than are labor and capital. Hence, they regard intermediate inputs as a good size variable.

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a robust check, we also conducted the analysis using log of intermediate inputs. The results are not materially affected except that the squared term of 'Export' is mildly insignificant. We give no further discussion of the results to streamline the exposition of the study.

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