Exporting behavior of foreign affiliates: Theory and evidence

Jiangyong Lu [a], Yi Lu [b], Zhigang Tao [c,*]

[a] *Peking University, China*
[b] *National University of Singapore, Singapore*
[c] *University of Hong Kong, Hong Kong*

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ABSTRACT

Firms have increasingly conducted different stages of production in different countries. In particular, they may set up operations in low-cost countries (those operations are referred to as foreign affiliates in those countries) either as platforms for export or serving the growing markets there. What is the exporting behavior of foreign affiliates? In this paper, using data from China, we find that among foreign affiliates exporters are less productive than non-exporters. We then offer a theoretical explanation by incorporating into the standard firm heterogeneity model the possibility that firms could have different stages of production in different countries.

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1. Introduction

Since mid-1990s, there has been increasing evidence suggesting that exporting behavior varies significantly across firms even after controlling for industry effects (see, for example, Bernard and Jensen, 1995, 1999). A unanimous finding in the literature is that exporters are more productive than non-exporters (called *export premium*), e.g., Bernard and Jensen (1995, 1999, 2004) for the study of the United States; Bernard and Wagner (1997) for the study of Germany; Clerides et al. (1998) for the study of Columbia, Mexico and Morocco; and Greenaway and Kneller (2004) for the study of the United Kingdom. A dominant theoretical explanation for the export premium result is based on the existence of fixed costs of exporting, under which more productive firms self-select to become exporters (e.g., Bernard et al., 2003; Melitz, 2003; and Bernard et al., 2007b).[1]

However, almost all the existing studies implicitly focus on the exporting behavior of *domestic firms*, or at least they do not explicitly differentiate domestic firms from *foreign affiliates* (foreign-invested

firms operating in those countries).[2] As transport and communications costs decrease, firms have increasingly conducted different stages of production in different countries. In particular, firms may set up their production plants in low-cost countries such as Brazil, China, India, and Russia as their export platforms, which is referred to as vertical foreign direct investment (or FDI) in the literature (e.g., Hummels et al., 2001; Yeaple, 2003; Yi, 2003; Grossman et al., 2006; Ekholm et al., 2007).[3] As a result, a significant percentage of export from those low-cost countries is made by foreign affiliates in the countries. Is the exporting behavior of foreign affiliates similar to that of domestic firms? In this paper, we fill the void by investigating empirically the exporting behavior of foreign affiliates using data from China, and then offer a theoretical explanation for the empirical findings.[4]

China offers an ideal setting to investigate this issue. Between 1979 and 2005, China has attracted more than US$1285 billion FDI (China

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[1] Some recent studies, however, show that there also exists learning from exporting (e.g., Blalock and Gertler, 2004; Van Biesebroeck, 2005; De Loecker, 2007).

[2] Baldwin and Gu (2003) and Kneller and Pisu (2004) are two exceptions, using data from Canada and UK respectively, but neither has found any significant difference between domestic firms and foreign affiliates. Presumably, the sample sizes of foreign affiliates in these two countries are not large enough.

[3] It should be pointed out that foreign multinationals may also have direct investment in those countries to serve the growing markets there, and such investment is referred to as horizontal FDI in the literature (Markusen, 2002).

[4] Here exporting behavior refers to how foreign affiliates with different productivity choose to set up different stages of production in different countries and the associated export status.

Statistical Yearbook, 2006). Meanwhile, China was the second largest exporter in the world in 2007 (The World Factbook, 2007). More importantly, much of China's export has been made by foreign affiliates, not China's domestic firms (Manova and Zhang, 2008).

Our dataset comes from annual surveys of manufacturing firms conducted by the National Bureau of Statistics of China for the period of 1998 to 2005. We find that among China's domestic firms, exporters are indeed more productive than non-exporters, similar to the unanimous finding in the existing literature. Surprisingly, for foreign affiliates in China, exporters are found to be less productive. Moreover, we find that, among foreign affiliates, those selling all their output in China have the highest productivity, followed by those having sales in China and also exporting some of their output, and finally those exporting all their output. These findings remain robust to a number of sensitivity checks, such as an alternative measure of productivity, an alternative estimation method, an alternative definition of foreign affiliates, exclusion of outlying observations, inclusion of firm size as an additional control variable, and estimation of productivity separately for domestic firms and foreign affiliates.

We next construct a simple model to explain the exporting behavior of foreign affiliates. It is a standard $2 \times 2 \times 2$ trade model à la Grossman et al. (2006), with two sectors (i.e., homogenous good sector and differentiated goods sector), two factors (i.e., skilled labor and unskilled labor), and two countries (i.e., China and the United States). Similar to Melitz (2003)'s setting, firms differ in their productivity, which is drawn from a common distribution. There are two vertically-related stages of the production process, i.e., design and manufacturing. The United States has a cost advantage in design whereas China has a cost advantage in manufacturing. For simplicity, we assume there is a negligible transport cost for shipping the design product to the manufacturing plant, thereby the design stage is always located in the United States. But the transport cost for shipping the final product to an abroad market is non-trivial, thereby firms can choose to set up their manufacturing plant in either the United States, or China, or both. Firms can also choose to sell their output in the United States, or China, or both. There is a fixed cost for setting up a manufacturing plant in any of these two countries, and also a fixed cost of selling in any of these two markets.

Under this framework, there are nine possible strategies in organization choice and market orientation, i.e., manufacturing plant in either the United States, or China, or both, and selling in either the United States, or China, or both. We can show that in equilibrium there are four strategies corresponding to the three types of foreign affiliates observed in our dataset: foreign affiliates selling all their output in China, those exporting all their output, and those having sales in China and exporting some of their output. The comparison among these four strategies in terms of their productivity offers an explanation for the puzzling exporting behavior of foreign affiliates (i.e., exporters have lower productivity than non-exporters among foreign affiliates).[5] Intuitively, the choice among the different strategies depends on the trade-off between fixed costs and production efficiency (determined by the size of the markets and the unit cost of production). Compare, for example, the strategy of exporting all their output with the strategy of having sales in China and exporting some of their output. The latter strategy gains an extra market (i.e., the market in China) but needs to incur a fixed cost of selling in China. Clearly the more productive foreign affiliates choose the latter strategy given the trade-off between fixed costs and market size.

Our paper builds upon a large literature of firm heterogeneity and trade. What differentiates our paper from the literature is its focus on the exporting behavior of foreign affiliates, which are increasingly prevalent in today's global economy. We show that the relation between productivity and exporting behavior for foreign affiliates is just the opposite of the unanimous finding in the literature which focuses on domestic firms. Theoretically, by incorporating into the standard firm heterogeneity model (Melitz, 2003) the possibility that firms could set up different stages of production in different countries à la Grossman et al. (2006), we are able to obtain richer predictions on the relation between productivity and exporting behavior.

The remainder of the paper is structured as follows. Section 2 describes data, and Section 3 presents our empirical findings. In Section 4, we offer a theoretical model to explain our empirical findings. The paper concludes with Section 5.

2. Data and descriptive statistics

Our data is from annual surveys of manufacturing firms conducted by the National Bureau of Statistics of China for the period of 1998 to 2005. These annual surveys covered all state-owned enterprises, and those non-state-owned enterprises with annual sales of five million Chinese currency (about US$650,000) or more. The data provides detailed information on firms' identification, operations and performance, including firm ownership and export, which are of special interest to this study. As reported in Table 1a, the number of manufacturing firms with valid information of total output and export varies from over 140,000 in the late 1990s to over 243,000 in 2005. The percentage of China's total exports contributed by firms in our dataset was just below 70% in late 1990s, and was as high as 76% in 2005, indicating that our data set is highly comprehensive.

The focus of this study is on the exporting behavior of foreign affiliates. According to the classification of the National Bureau of Statistics of China, foreign affiliates are firms in which 25% or more equity shares are held by foreign multinationals.[6] We use this definition of foreign affiliates in most of our analysis. As a robustness check, we also use firm's ownership type reported in the dataset to define foreign affiliates. Specifically, there are five types of ownership: state-owned firms, collectively-owned firms, joint-stock companies, privately-owned firms, and foreign-invested firms. We treat firms with foreign-invested ownership type as foreign affiliates.

As shown in Table 1b, over the period of 1998 to 2005, an average of 27.14% of China's manufacturing firms (including both domestic firms and foreign affiliates) exported. Foreign affiliates are much more export-oriented than do domestic firms: 62.95% of foreign affiliates are exporters whereas the corresponding number for domestic firms is 18.68%. The difference between these two types of firms in export intensity is even greater: the percentage of export in total output hovered around 10.48% for China's domestic firms over the sample period, whereas that for foreign affiliates increased from 39.23% in 1998 to 44.60% in 2005.[7] Taken together, the percentage of China's total export by foreign affiliates increased from 59.66% in 1998 to 70.98% in 2005, showing that foreign affiliates are the main driver behind the spectacular rise of China's export.

Exporting behavior of China's manufacturing firms varies significantly across its geographic areas.[8] As shown in Table 1c, foreign

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[5] Our framework can also show that, for domestic firms in China, it is the more productive ones that export, which is consistent with our empirical findings and in line with the predictions of other theoretical models in the literature.

[6] Our main results remain robust if firms from Hong Kong, Macau and Taiwan are excluded from the sample.

[7] From the 2002 U.S. census of manufacturers, it is found that 20% of U.S. manufacturing plants exported and the exporters shipped 15% of their output abroad (Bernard et al., 2007a). The percentage of exporters in the French manufacturing industries is also 20%, though the export intensity is lower at 10% (Eaton et al., 2004).

[8] During the sample period, China's administrative boundaries and consequently its county, city, or even provincial codes experienced some changes. For example, new counties were established, while existing counties were combined into larger ones or even elevated to cities. From 1998 to 2005, the number of counties in China increased from 2496 to 2862 (a total of 366), while the number of changes in the county codes was 648. From 1998 to 2005, the number of prefecture-level cities or above increased from 231 (4 municipalities, 15 vice provincial cities, and 212 prefecture-level cities) to 287 (4 municipalities, 15 vice provincial cities, and 268 prefecture-level cities). Using the 1999 National Standard (promulgated at the end of 1998 and called GB/T 2260-1999) as the benchmark codes, we convert the regional codes of all the firms to these benchmark codes to achieve consistency for the regional codes in the whole sample period.