



Foreign direct investment, processing trade, and the sophistication of China's exports[☆]

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ABSTRACT

China's export structure has shown a rapid shift towards more sophisticated industries. While some believe that this trend is a result of processing trade and foreign direct investment, the evidence is mixed. This paper examines variations in level of export sophistication across China's manufacturing industries. We find that an industry's level of export sophistication is positively related to the share of wholly foreign owned enterprises from OECD countries and the share of processing exports of foreign-invested enterprises, and negatively related to the share of processing exports of indigenous Chinese enterprises. Evidence from the relative export prices of Chinese goods, which measure within-product export sophistication, shows a similar pattern.

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1. Introduction

China's export structure has shown a rapid shift from labor-intensive industries to capital- and skill-intensive industries.¹ As China builds up its technological capacity and skilled labor force, its exports are expected to be increasingly sophisticated. However, studies find that the level of sophistication of China's exports is already exceptionally high. [Rodrik \(2006\)](#) illustrates a cross-country relationship between the sophistication level of exports and the per capita income; he finds that "China is an outlier in terms of the overall sophistication of its exports: its export bundle is that of a country with an income-per-capita level three times higher than China's" (pp. 3–4). [Schott \(2008\)](#) measures the overlap of a country's exported products with that of OECD countries using the export similarity index (ESI) of [Finger and Kreinin \(1979\)](#); he finds that "China's overlap with the OECD across products is substantial and increasing over time" (p. 9).

Why is China's export sophistication level so exceptionally high? Some believe that it is due to the size and nature of China's processing trade. Processing exports are significant to China's foreign trade, accounting for 55% of China's exports to the world in

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¹ In 1992, more than half of China's manufacturing exports to the U.S. were from "Textiles, apparel, leather and footwear"; this share fell to less than one quarter in 2005. By contrast, "Machinery and equipment; office, accounting and computing machinery" accounted for only 7% in 1992, and its share rose to 26% in 2005. "Electrical machinery; radio, television and communication equipment" accounted for 12% in 1992, and its share rose to 24% in 2005. These two more sophisticated industries now account for half of China's manufacturing exports to the U.S. market ([Xu, 2007, Table 1](#)).

2005 (Ferrantino et al., 2007, p. 10). Moreover, processing exports of Advanced Technology Products (ATP) accounted for more than 92% of China's total ATP exports every year since 1996, and over 95.5% every year since 2002 (Ferrantino et al., 2007, p. 37). Branstetter and Lardy (2006, p. 38) pointed out that "China is able to export huge quantities of electronic and information technology products only because it imports most of the high value-added parts and components that go into these goods." Using production data rather than export data, Van Assche and Gangnes (2008) constructed a product-sophistication index similar to Rodrik's (2006) and argued that their measure is less subject to the influence of processing trade. Applying this measure, they found no evidence that China's electronics *production* activities are exceptionally sophisticated, which implies that Rodrik's (2006) finding of an exceptionally high level of export sophistication in China may be a result of the high sophistication of China's imported parts and components in the processing trade. In a recent study of the characteristics of China's exports, Amiti and Freund (forthcoming) showed evidence of a significant skill upgrade in China's total exports from 1992 to 2005, but no evidence of a skill upgrade after excluding processing exports from total exports.

Foreign direct investment (FDI) is believed to be another important reason for China's exceptionally high level of export sophistication. Exports by foreign invested enterprises (FIEs) accounted for more than half of China's exports since 2001, and more than 85% of China's ATP exports every year since 2003 (Ferrantino et al., 2007, p. 40).² The FDI explanation is reinforced by the role of FIEs in China's processing exports, especially in high-tech processing exports. Branstetter and Lardy (2006, p. 39) pointed out that "most exports of electronic and information products are assembled not by Chinese owned firms but by foreign firms that are using China as an export platform."

Given the strong arguments discussed above, it is important to estimate how significant a role processing trade and FDI play in determining the level of sophistication of China's exports. If they play a major role, then China's exceptionally high level of export sophistication may not imply that China has developed its own technological capacity for producing the highly sophisticated goods that would enable it to compete directly with advanced countries. On the other hand, if they are not major determinants of China's high level of export sophistication, then we need to find out what makes China so special in having the exceptionally high sophistication of exports documented by Rodrik (2006) and Schott (2008). For China's policy makers, it is important to know if domestic human capital has played a positive role in China's rising export sophistication, and if government policies towards FDI and processing trade have promoted the upgrade of China's export structure in ways benefitting China. Thus, research on the determinants of the sophistication of China's exports is of both academic and policy value.

In a recent study, Wang and Wei (forthcoming) investigated the determinants of China's export sophistication level by examining its variations across different cities in China.³ Surprisingly, they found that neither processing trade nor FDI seem to have played an important role in raising China's export sophistication. Instead, they found that improvements in human capital and government policies in the form of tax-favored high-tech zones have been key determinants of China's rising export sophistication.

One reason for Wang and Wei's (forthcoming) surprising finding on the role of FDI may be that they did not distinguish between the FDI from more technologically advanced OECD countries and the FDI from less technologically advanced sources such as Hong Kong, Macao or Taiwan. Without such a distinction, an aggregate measure of FDI may prevent its positive effect on the level of sophistication of exports from being identified. In their assessment of the role of processing trade, Wang and Wei (forthcoming) found that the estimated effect of processing exports on the sophistication level of a Chinese city's exports is actually *negative* for exports produced outside policy zones. Additionally, they found that although the estimated effect of processing exports is positive for exports produced inside policy zones, it is smaller than that of non-processing exports. Wang and Wei (forthcoming) did not distinguish processing exports of foreign firms from those of indigenous Chinese firms. Such a distinction is important as the positive contribution of processing trade to China's rising level of export sophistication is often associated with the processing trade activities of multinational enterprises.⁴

In this paper, we carry out an industry-level analysis that examines variations in level of export sophistication across China's manufacturing industries. In contrast to Wang and Wei's (forthcoming) city-level study which provides an in-depth analysis of the variations in FDI and processing trade across Chinese regions, our industry-level study allows an in-depth analysis of industry variations. Thus the two studies are complementary. Moreover, our data distinguishes between FIEs funded by Hong Kong, Macao and Taiwan (HMT) and those funded by non-HMT (mainly OECD) countries, as well as between processing exports of FIEs and those of indigenous Chinese firms. This allows us to estimate the effects of the distinctive parts of FDI and processing trade, which generates new results contributing to the literature.

To preview our results, we find that *overall* FDI and processing trade have no statistically significant effects on the sophistication of China's exports, which is in line with Wang and Wei (forthcoming). However, once FDI and processing trade are broken down into distinctive parts, two results emerge. First, the presence of wholly foreign owned enterprises (WFOEs) from OECD countries positively affects the export sophistication level of Chinese industries, while the presence of other types of foreign firms has no effect. Second, the export sophistication level of a Chinese industry depends positively on the share of processing exports of FIEs in the industry, and negatively on the share of processing exports of indigenous firms in the industry. Thus, the evidence from our study highlights the importance of dividing FDI and processing trade into different categories in identifying their impacts on the sophistication of China's exports.

² Gilboy (2004, p. 39) reports data that shows the dominance of FIEs in China's advanced industrial exports.

³ Wang and Wei (forthcoming) adopted an export dissimilarity index (EDI) to measure sophistication of China's export structure. They showed that EDI is algebraically equivalent to ESI, which was used by Schott (2008), but the use of EDI (in logarithm) yields better results in their regression analysis.

⁴ Koopman, Wang, and Wei (2008) find that FIEs tend to have higher foreign content in their exports than do indigenous Chinese firms.

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