# INFLUENCE OF FOREIGN EXPORT SPILLOVERS TO EXPORT SCOPE AND PRICE: EVIDENCE FROM CHINESE ELECTRONICS EXPORTERS

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Abstract

*Using a matched firm-transaction dataset on Chinese electronics industry, we provide one of first attempts to examine whether foreign direct investment (FDI) enhances the export prospects of domestic firms in terms of export scope and price. Using measures of export spillovers from FDI constructed at region/industry level, our results find little evidence of export spillovers on the export variety of domestic firms, which is contrary to the conventional wisdom. Furthermore, we find both spillover indicators are negatively correlated with the unit value exported by domestic firms. This finding suggests that technology-advanced foreign firms may increase the price competition and force indigenous firms to adopt a low-price strategy or target on middle-quality products, leading to a lower unit value of export. The adverse influence is particularly relevant to processing trade rather than ordinary trade. Export spillovers effects of FDI on export scope and price are found to vary between private firms and state-owned enterprises.*

JEL Classification: F1, F14
Key words: Export spillover, Export scope, Export quality, Unit value, FDI

1. Introduction

Attracting foreign direct investment (FDI) is a critical economic development strategy among most developing countries as it not only creates jobs and contributes to greater outputs but also generates spillover effects through various channels.[1] Extensive research on FDI spillovers have focused on FDI's productivity impact on local firms, and majority of the research suggests a positive effect.[2] For countries adopting an export-led growth model, such as China, FDI might play a particularly important role in facilitating exports (Zhang and Song, 2000; Sun, 2001). The idea behind such a strategy is that multinational enterprises (MNEs) have better knowledge and marketing channels in international markets, thereby inducing a positive spillover on domestic firms' export performance.

China takes advantage of cheaper labor and adopts various policy measures to attract FDI and export labor-intensive as well as final assembly products. Entry into World Trade Organization (WTO) in 2001 further enabled China to integrate into the global system, becoming the so-called "World's Factory." China's share in international trade has ballooned from approximately 1.7% in 1990 to 12.56% in 2011, overtaking the US as the world's largest trade economy. However, Amiti and Freund (2010) argue that exports from foreign-owned enterprises (FOEs) are less relevant to economic growth across provinces in China after controlling for domestic exports — an assertion that casts suspicion on the role of FOEs in promoting domestic firms' exporting behaviors. Is there an export spillover effect from FDI to domestic firms' export behaviors? This is an important and interesting issue for China.

Similar to the productivity spillover effect seen from FDI, there are several channels through which positive export spillovers can occur. The presence of foreign firms may affect the export decisions and performance of domestic firms through increasing

[1] Blomström and Kokko (1998) propose th
ree main channels of productivity spillover: labor mobility, competition effect, and demonstration effect.
[2] See a review in Wooster and Diebel (2010).

competition and/or information externalities. Foreign affiliates may enter the local market competitively, forcing domestic firms to become more productive, and thus begin to export. Extensive theoretical and empirical research demonstrates that exporting entails sunk costs (Melitz, 2003; Bastos and Silva, 2010), proximity to foreign firms may be conducive to export spillovers in cases of knowledge transfer about foreign markets to domestic firms (Aitken *et al*., 1997). Information related to export opportunities can also spread across markets and industries (Rauch and Watson, 2003; Kneller and Pisu, 2007). Alternatively, negative export spillovers from FDI might occur if the presence of foreign firms increases the costs of labor or other factor inputs, making marginal domestic firms less likely to export or by lowering the export share of continuing exporters. Foreign firms may also bring a congestion effect if they overcrowd the utilization of local infrastructure or services necessary for access to international markets, thus raising export costs for domestic firms. Therefore, whether FDI generates a positive or negative export spillover effect remains an open empirical issue.

From the perspective of global production fragmentation, export-platform FDI is the main phenomenon in China's electronics industry. For example, Foxconn, Apple's main manufacturer, is an example of a typical export-platform FDI that uses imported intermediate goods to assemble final goods in China, which are then exported to the global market. A striking feature of export-platform FDI in China is that FOEs mainly undertake processing trade rather than ordinary trade (Yang and Hayakawa, 2013). Although export information spillovers through the demonstration effect and worker movement mechanisms remain available for processing-trade FDI, technology spillovers are considered to be limited as production activities related to processing trade are generally low-skilled and labor intensive, while core technologies are often embedded in imported components or parts. Furthermore, the competitive advantage of MNEs engaging in processing trade may generate a strong negative competition effect among

domestic firms in international markets. Research has argued that the strength of spillovers from export-platform FDI or processing-trade FDI is likely to be lower than from ordinary FDI; some research has supported this perspective (Ruane and Sutherland, 2005; Fu, 2011).

In the context of developing countries, after a period of steady economic growth, export-led economies, such as China, almost inevitably face challenges of structural transformation in their export sectors. Actually, purely pursing growth in trade volume cannot guarantee future export competitiveness. Therefore, currently, the focus should shift toward the improvement of export goods' quality as a mechanism to enhance their value-added, and thus raise exporting firms' profits. Without such quality improvement, senior emerging economies will face severe competition from junior emerging economies, with production cost advantages shifting to the latter. Previous research, for example, Hausmann *et al.* (2007) and Krishna and Maloney (2011), have highlighted the contribution of export quality, measured by the unit value of exports, to economic growth. Moreover, a country-level study by Harding and Javorcik (2012) suggests that attracting FDI offers potential for raising export quality in developing countries. Therefore, if the export spillover effect does exist, then a crucial issue arises: Does the presence of foreign firms influence local counterparts to broaden product lines and enhance product quality in international markets?

This study examines the effect of export spillovers from FDI by extending the scope of exports and increasing export prices (unit value of exports) in the Chinese electronics industry. As China is a globally recognized manufacturing base for electronic products, it becomes the primary focus of study. This study contributes to the existing literature by providing the following distinct features of empirical evidence. First, unlike most previous studies on the basis of more aggregated data from China, this study utilizes a detailed firm-transaction level dataset to investigate the effects of export spillovers from FDI.

Second, differentiating from earlier studies that primarily focus on the propensity to export and/or export intensity among domestic firms, we extend our analyses on the variety and unit value of exports—two measures of extensive and intensive margins of exports widely discussed in recent trade literature. Third, we separate exports into processing trade and ordinary trade to explore possible differences in the export spillover effect between them. Previous studies have paid less attention to a possible heterogeneous effect on types of trade.

Using a comprehensive firm-transaction level dataset linking Chinese firm surveys with Customs data, our results revealed no significant relationship between the presence of foreign firms and the variety of commodities exported by domestic firms. Moreover, export spillovers from FDI are strongly and negatively related to the unit value of local firms' exports, and this relationship is particularly relevant to processing trade as opposed to ordinary trade. We also find that FDI's export spillover effects on export scope and price vary between private firms and state-owned enterprises (SOEs). Private firms benefit more from export spillovers compared to their state-owned counterparts in terms of export unit values, whereas FDI generates more export spillovers for SOEs in a variety of exports.

The remainder of the study is organized as follows. Section 2 summarizes the related literature. Section 3 describes the data and the empirical specifications. Section 4 analyzes the empirical results. Section 5 presents conclusions and policy implications.

## 2. Related Literature

Following the pioneering work in Aitken *et al.* (1997), one line of literature has examined whether the presence of foreign firms influences local firms' export decisions and/or export intensities. However, no consensus has been reached. Using data on Mexican manufacturing plants, Aitken *et al.* (1997) find that the likelihood of export of adomestic plant is positively correlated with the proximity to MNEs—a finding that supports the hypothesis that MNEs act as export catalysts. Similarly, Kokko *et al.* (2001) suggest that the entry of foreign firms in Uruguay after 1973 increased the export likelihood among domestic firms. Based on firm-level data from the United Kingdom, Greenaway *et al.* (2004) also confirm positive spillover effects from MNEs on domestic firms' decisions to export and their export propensity, by increasing competition.

Although previous studies have demonstrated strong positive export spillovers from FDI, a number of recent studies document contrasting evidence, suggesting either no impact or, in some cases, negative impact. For example, Barrios *et al*. (2003) provide little evidence of export spillovers from foreign firms to domestic firms in the Spanish manufacturing sector. In the case of export-platform FDI in Ireland, Ruane and Sutherland (2005) find that the export intensity of local enterprises is negatively associated with FOE export sales ratios, which contrast most previous empirical studies.

Extensive research has also considered that FDI heterogeneity as well as the extent of spillover effects may depend on both sender capacity (foreign firms) and absorptive capacity (domestic firms). By distinguishing between FDI-related horizontal and vertical spillovers in the United Kingdom, Kneller and Pisu (2007) find positive and significant horizontal spillovers on firms' decision to participate in export markets, but no effect on their export intensity, whereas there is evidence of positive backward externalities and negative forward export externalities. Anwar and Nguyen (2011) examine the case of Vietnam and find evidence suggesting that the presence of export-oriented foreign firms significantly increases the probability that domestic firms will start exporting as well as increase their export shares. Moreover, the effect is mainly attributed to FDI-related horizontal and forward linkages.

Franco and Sasidharan (2010) argue that different export spillover channels may have different impacts on firms' decisions to export and on export intensity in the Indian manufacturing sector. They find that R&D activities and skill intensity among MNEs positively and negatively influence domestic firms' export propensity and export intensity, respectively. Iwasaki *et al*. (2011) emphasize FDI heterogeneity and find that in Hungary, the extent of the information spillover significantly depends on firm-level characteristics of both MNEs and domestic firms. Similarly, Karpaty and Kneller (2011) use firm-level data from Sweden to determine that the presence of foreign MNEs has little effect on domestic firms' decisions to export, whereas it has a positive influence on export intensity, suggesting that export spillovers emerge from demonstration effects rather than congestion effects. Furthermore, export spillovers are shown to be strongest for the most productive foreign firms and the most R&D-intensive domestic firms.

In the context of China, previous studies use more aggregate data to investigate whether export spillovers emanating from FDI affect export propensity and reach a positive relation (e.g., Ma, 2006; Xu and Lu, 2009).

examines the relationship between MNE proximity and the formation of new trade connections by private Chinese firms. Results using city-level data show that growth in the presence of MNEs is positively associated with the creation of new trade relationships among local Chinese firms. Swenson and Chen (2013) further use city-level and product-level data to examine how the city–industry presence of MNEs influences the quality, frequency, and survival of new export transactions by private Chinese firms. Using data on new export transactions at the product level, they find that the proximity to own-industry MNEs is associated with more frequent, higher-valued, and longer-lasting new trade transactions. Mayneris and Poncet (2013) compile a balanced panel dataset of province–product–destination countries from 1997 to 2007 to examine the effect of proximity to MNEs on the creation of new export linkages. They find that foreign export spillovers in China are product–country specific, and are primarily limited to ordinary trade activities.

While several studies argue that China's high export sophistication can primarily be attributed to the high value-added parts and components imported by foreign firms that undertake processing trade (Gilboy, 2004; Branstetter and Lardy, 2006), Wang and Wei (2010) use city-level data to suggest that neither FDI nor processing trade play an important role in raising China's export sophistication—a contrasting position against most previous studies on China. By distinguishing among FDI sources, they find the presence of wholly foreign-owned firms from OECD countries positively influences the export sophistication of Chinese industries, whereas the presence of other types of foreign firms has no effect.

There are few studies in China that implement empirical estimations at the firm level. Sun (2009) uses firm-level data to explore the export spillovers from FDI in the cultural, educational, and sports manufacturing industries in China. Using a Heckman sample selection model, this study finds that FDI generates export spillovers in both export participation and export intensity decisions, while the magnitude of export spillovers depends on firms' geographical location and ownership structure. Using a larger dataset to revisit this issue, Sun (2010) reaffirms the existence of positive export spillovers, and, once again, finds a heterogeneous effect, wherein some firms receive positive impacts, while others receive negative impacts. Fu (2011) examines the impact of processing-trade FDI on export decisions and export performance of indigenous firms in technology-intensive industries. Fu (2011) finds a significant information spillover effect; however, the technology spillover effect is limited.

Reviewing the above literature, we find mixed results for China. Therefore, we extend the existing literature by using detailed firm–product level data to investigate export spillovers from FDI on domestic firms in terms of export variety and unit value. To the best of our knowledge, this is first paper to explore this topic by combining Chinese firm surveys and Customs data. We restrict our analysis to the Chinese electronics industry, as it plays a key role in manufacturing information and communication technology (ICT) goods in the global market with the specific feature of assembly export by multinational exporters. Specifically, we focus on two questions as follows. Do export spillovers from FDI exist and do their effects vary between ordinary trade and processing trade? Can the effects of export spillovers broaden export product lines and increase export prices of domestic firms? This study clarifies these important but less examined issues.

## 3. Data and Empirical Specification

### *3.1 Data and descriptive analysis*

To investigate whether domestic firms benefit from the export spillover by foreign exporters in the Chinese electronics industry, we construct firm–product panel data by linking two Chinese databases: Customs data and the Large and Medium-sized Enterprise (LMEs) Survey conducted by the National Bureau of Statistics (NBS) during 2004−2006.[3] The Customs data provide detailed information on the eight-digit Harmonized System (HS) product codes, product unit, quantity, unit value, total value, type of ownership, origin, destination, and type of trade. Particularly, information on types of ownership and trade enables us to separate firms into foreign and domestic, and to classify exports into ordinary and processing trade.[4] The NBS survey covers almost all LMEs with annual sales of over RMB 5 million.

[3] The Customs dataset covers 2001 to 2006. Since we have to use lagged three-year information of intermediate inputs when calculating Levinsohn and Petrin's (2003) Total factor productivity (TFP), we restrict our analysis to firm-level data over the 2004–2006 period.

[4] The data also refer to a third category, "Others," which contains other flows, such as aid, border trade, and consignment. As "Others" accounts for less than 1% of total trade value per year, we omit this type of trade in our analysis.

To highlight possible export spillovers under the circumstances of global production fragmentation, we focus on exporters in the electronics industry. In our data, this industry is coded with the two-digit code of 40, and is officially named as the "manufacturing of electronics and telecommunications equipment," which consists of nine three-digit sub-industries: telecommunications equipment (401), radar and peripheral equipment (402), broadcast and television equipment (403), electronic computer (404), electronic apparatus (405), electronics components (406), household audiovisual equipment (407), electronics and telecommunications equipment repair (408), and other electronics equipment (409). This study examines the effect of export spillovers from FDI on various export outcomes among domestic exporters instead of determining the propensity to export among all domestic firms. Therefore, the rule of matching uses exporting firms shown in the Customs dataset as the base. Because of the unavailability of unique firm identifiers in the two databases, we use the company name (in Chinese) to identify the same companies in both databases. The compiling process leads to an unbalanced panel data of 6,295 firms and 53,753 firm–product observations. Our dataset includes 3,396 domestic firms, comprising the primary sample employed to implement empirical estimations, while the remaining 2,899 MNEs are used to calculate indicators of export

spillovers from FDI.[5]

Before conducting the econometric analysis, some stylized facts regarding the dynamics of export performance for FOEs and domestic firms are shown in Table 1. In terms of average export volume, foreign exporters ship a significantly larger volume (approximately 4.5–5.7 times) than domestic exporters. The average export volume of foreign exporters has decreased gradually, while the corresponding figures for domestic exporters seem stable. In contrast with the decreasing trend of average export volumes,

[5] We classify the firms into three ownership types according to the widely adopted classifications (e.g., Jefferson *et al.*, 2000; Yang *et al.*, 2010): (1) SOEs (including state-owned and collectively-owned enterprises); (2) FOEs (including Hong Kong-owned, Macau-owned, Taiwan-owned, and other foreign-owned enterprises); (3) Private firms (including shareholding and private enterprises).

both the number of exporting products and the average unit value increased steadily for both foreign and domestic exporters during 2004–2006. As the product's unit value (unit price) is commonly used as a proxy for product quality, it is obvious that foreign exporters perform better than their domestic counterparts.

[Insert Table 1 approximately here]

Despite the predominant role of FOEs in exports from the Chinese electronics industry, the importance of domestic exporters gradually increased in terms of variety and unit value as opposed to volume. Do the export spillovers from FDI, if any, affect domestic firms' export variety and enhance their export quality in terms of unit value? This study analyzes this issue using detailed firm–product level data.

*3.2 Empirical specification*

To estimate how the presence of foreign exporters affects domestic firms' export performance, we follow Mayneris and Poncet (2013) and Swenson and Chen (2013) to link export outcomes of domestic exporters with other firm characteristics, as well as with

industrial/regional factors, particularly foreign export spillovers. The regressions are specified as follows:

$$EXPROD_{it} = \beta_0 + \beta_1 \ln SIZE_{it} + \beta_2 \ln KL_{it} + \beta_3 \ln WAGE_{it} + \beta_4 AGE_{it} + \beta_5 \ln TFP_{it} + \beta_5 SPILL_{it} + REG + IND + u_i + v_t + \varepsilon_{it} \quad (1)$$

$$\ln UV_{jit} = \beta_0 + \beta_1 \ln SIZE_{it} + \beta_2 \ln KL_{it} + \beta_3 \ln WAGE_{it} + \beta_4 AGE_{it} + \beta_5 \ln TFP_{it} + \beta_6 SPILL_{it} + \beta_7 OECD_{jt} + REG + \beta_j + v_t + \varepsilon_{it} \quad (2)$$

where subscripts *i*, *j*, and *t* denote firm, product, and time, respectively. In equation (1), the dependent variable $EXPROD_{it}$ represents export scope, measured as the varieties of HS8 products exported by firm *i* at time *t*.[6] In equation (2), we use the unit value of

[6] Another component of the extensive margin of exports is the number of exporting destinations. During the sample period, Hong Kong is the major export destination, accounting for more than 30% of value being exported by Chinese electronics firms. However, displaying the functions of transship and entrepot, Hong Kong is usually not the final destination for most of Chinese exports. This limitation prevents us to examine

product *j* exported by firm *i* at time *t* (in logarithm), and $lnUV_{jit}$, as the proxy for export quality, which is widely used in the literature (Bastos and Silva, 2010; Krishna and Maloney, 2011; Johnson, 2012; Manova and Zhang, 2012).

As for the explanatory variables, *SIZE* denotes firm size measured by number of employees. Large firms enjoy the advantage of economies of scale and have better financing ability to overcome the sunk costs related to exporting, thereby tending to have better performances on export outcomes (Bernard *et al*., 2007). *KL* and *WAGE* represent the capital–labor ratio and average wage, respectively. China's electronics industry has gradually transformed from being labor-intensive toward more capital-intensive, suggesting that the degree of capital intensity might matter to exporting behaviors. The average wage can be the proxy for the level of skill intensity at firms. Haltiwanger *et al.* (1999) highlight the critical role played by human capital investment undertaken by firms to improve productivity, suggesting that this variable might indirectly impact exporting behavior. *AGE* denotes a firm's age measured by current year excluding the founded year. Since there is no consensus about the relationship between firm age and export performance in the literature, we have no prior expectation on the sign of this variable.

Total factor productivity (*TFP*) is extensively used as one of the key predictors for export performance in firm heterogeneity-trade theories. For example, Melitz (2003), Yeaple (2005), and Melitz and Ottaviano (2008) emphasize that fixed and variable export costs generate a selection mechanism in export markets, facilitating only more-productive firms to overcome this sunk cost to serve foreign markets. To test the theoretical argument, we adopt the semi-parametric approach of Levinsohn and Petrin (2003) to calculate *TFP*. This methodology deals with the problems of endogeneity and selection bias that arise from the use of traditional residual measure of productivity.[7] Extensive research suggests that more productive firms tend to export higher volumes and more products, as well as the export spillover effect on destinations.

[7] The STATA code of TFP estimation is available in Petrin *et al*. (2004).

have higher export quality by taking advantage of their operation efficiency (Tsou *et al.*, 2008; Bastos and Silva, 2010). Thus, we expect the sign of *TFP* in equations (1) and (2) to be positive.

The key variable of particular interest, *SPILL*, represents export spillovers emanating from multinational exporters. The aforementioned literature suggests that the effect of export spillovers from FDI is probably region-specific (Swenson and Chen, 2013) or industry-specific (Koenig, 2009), and therefore we adopt two measures of export spillover from FDI. One is region-specific export spillover measured by the share of FOEs' exports to provincial total exports (*SPILL_Reg*). The other is industry-specific export spillover measured by the share of FOEs' exports to a three-digit industry's total exports (*SPILL_Ind*).

In equation (2), the additional variable OECD is a dummy variable that takes the value of one if the product was exported to OECD countries. Manova and Zhang (2012) summarize China's exports and find that firm–product export unit values are higher in export destinations with a larger market size, higher income, and longer geographic distance. Thus, we expect that the coefficient of this variable will be positive and significant. Moreover, *REG* and *IND* are sets of region and industry dummies used to control geographical and industrial differences in trade, respectively. The term $u_i$ in equation (1) represents the firm-specific unobserved heterogeneity that differs across firms, but is the same for a firm across time, whereas in equation (2), $\square_j$ denotes unobserved product-specific characteristics. Finally, $v_t$ captures the aggregate economic shocks common to all firms, and $\square_{it}$ is the white noise error term. Table 2 reports the detailed variable definitions and summary statistics.

[Insert Table 2 approximately here]

## 4. Empirical Results

### *4.1 Effect of export spillovers from FDI on export scope*

Table 3 presents the results on the relationship between export spillovers from FDI and the export variety of domestic firms. As the dependent variable is a non-negative integer, we obtain estimates using the panel negative binomial model. In columns (1)–(4), the export spillover indicator is measured at the geographic level (*SPILL_Reg*), whereas in columns (5)–(8), *SPILL_Ind* is measured at the three-digit industry level. We find robust results across specifications. Most firm-level characteristics have the expected signs and support previous theoretical predictions (Arkolakis and Muendler, 2010; Eckel and Neary, 2010) as well as the stylized facts for China (Manova and Zhang, 2012). First, we find that larger firms are more likely to export wider varieties of products as they exploit the advantages of economies of scope. As expected, capital intensity (*KL*) is positively associated with the extensive margin of export products.

[Insert Table 3 approximately here]

With respect to the other firm-level characteristics, the variety of exporting commodities increases with the wage per employee and firm age, reflecting the fact that firms with higher skill intensity or more experience are able to export more products and compete successfully in international markets. As Table 3 shows, most coefficients on ln*TFP* are positive and statistically significant, suggesting that more-productive firms can offer more varieties of products in international markets. This finding is in line with theoretical predictions in Bernard *et al*. (2007) and Arkolakis and Muendler (2010), highlighting the importance of technological heterogeneity of firms on export performance.

Turning to the key variable, export spillovers from FDI, we find that neither the coefficient of *SPILL_Reg* nor that of *SPILL_Ind* reaches a statistical significant level, suggesting that the presence of FDI does not influence local firms to export more product varieties. By using a more disaggregated firm–product level dataset, our results contrast with Swenson (2008) and Mayneris and Poncet (2013), where export spillovers from FDI were explored at more aggregated city–product or province–product levels. Contrary to the conventional belief, we find no evidence that FOEs contribute positive information spillovers on indigenous firms' export decisions. This implies that, despite that the presence of/proximity to foreign firms may exert a positive externality effect and lower the sunk cost for domestic firms to enter foreign markets; this facilitating effect is less relevant to the variety of exports in China's electronics industry.

As emphasized above, the extent of export spillovers may depend on local firms' absorptive capability and ownership structure. To test whether the spillover effect varies across firms, we include the interaction terms between the export spillovers variable and productivity (absorptive capability), as shown in columns (3) and (4). We find that the estimated coefficients on interactions are positive but insignificant, indicating inadequate evidence that more productive domestic firms can achieve greater information spillovers from FDI. In contrast, the coefficients on the interaction terms between export spillovers and the dummy for private firms are negative and significant at the 1% level, as displayed in columns (5) and (6). SOEs are more likely to export more varieties of products than their private counterparts in the circumstance of receiving the same export spillover from FDI. Given that firm scale is strongly associated with variety of exports and that SOEs in China are generally much larger (e.g., Huawei Technologies) than private firms, our finding to some extent supports Sun's (2009) perspective that the export spillover effect from FDI depends on firm ownership, after controlling for firm size.

*4.2 Effect of export spillovers from FDI on unit value of exports*

Turning to the export spillover effect from FDI on unit value exported by domestic exporters, we report the results of the fixed effect model in Table 4. Compared with the results on export scope presented in Table 3, most variables have a similar influence onunit value, while several important differences are worth emphasizing on and being the focus of further discussions.

[Insert Table 4 approximately here]

Firm characteristics, including firm size, capital intensity, and average wage not only have a significantly positive impact on export scope but also positively influence the unit value of exports. However, the estimated coefficient of firm age (*AGE*) is negative and significant at the 1% level in all specifications, suggesting that although younger firms tend to export fewer varieties of products, the unit value of their exports is higher than that of their older counterparts. Moreover, we find a stronger relationship between *TFP* and the unit value of exports, suggesting that firms with higher productivity tend to export higher quality products. This result is consistent with the evidence for Portugal (Bastos and Silva,
2010) and for the US (Johnson, 2012), and also lends a supportive view to the theoretical argument of Melitz (2003) that firm heterogeneity in terms of productivity influences export behavior. The incremental variable, OECD, is found to be significantly and positively associated with unit value in all specifications—consistent with the idea that exporters sell higher-quality goods to richer countries (Verhoogen, 2008; Álvarez and Fuentes, 2011; Manova and Zhang, 2012). Specifically, the unit value of products exported to OECD countries is 14%–15% higher than those exported to non-OECD countries.

The most striking finding is that, contrary to conventional belief, the estimated coefficients of both export spillover indicators (*SPILL_Reg* and *SPILL_Ind*) are negative and significant at the 1% statistical level (columns (1) and (2)). In other words, if indigenous exporters are located in a region (or operate in an industry) with more FOEs, then their unit value of exports is significantly lower than that of firms at greater distances from clustered FOEs (or firms operating in less-concentrated FOEs in the industry). This result contrasts Swenson and Chen's (2013) finding, which indicates that more frequent interaction with own-industry FOEs is associated with higher-valued trade transactions, where the unit of analysis is at the city–product level. Since our study focuses only on the electronics industry, and the measures of export spillovers from FDI are different from those used in Swenson and Chen (2013), one should be cautious in making direct comparisons of the empirical results.

Evidence shows that FDI generates a positive influence on promoting local firms' productivity in China (Hu and Jefferson, 2002; Wei and Liu, 2006), there are two possible interpretations for negative export spillovers from FDI. One explanation is that foreign firms are more productive and have superior technological advantages over indigenous firms in the Chinese electronics industry (Yang *et al*., 2010), and the presence of foreign firms may induce tough price competition not only in the domestic market but also in international markets. Therefore, indigenous exporters might target their markets with middle-quality products and price them lower. An alternative explanation is that tough competition may force domestic firms to adopt a low-price strategy to compete with foreign exporters in the global market, even though the quality of their products is similar. For example, in the mobile phone market, Chinese firms develop a few brands at cheaper prices, targeting domestic poorer sections of the population or low-income countries.

After adding the interaction terms between export spillovers and productivity, the results in columns (3) and (4) show little difference. In column (3), the coefficient of ln*TFP* remains significantly positive, while the interaction term (*SPILL_Reg**ln*TFP*) is negative and significant. These results suggest that, while technological heterogeneity generally plays a key role in improving export quality, more productive indigenous exporters seem to suffer stronger price competition pressure in regions with higher ratios of FOEs. When we adopt the export spillover indicator measured at the industry level, the coefficient of ln*TFP* in column (4) becomes insignificant, and that on the interaction term *SPILL_Ind**ln*TFP* is positive and marginally significant. In contrast with previous findings, this implies that within an industry with a higher ratio of FOEs, more productive indigenous exporters seem to benefit from the network effect and increase their export unit value.

Focusing on the interactions between export spillovers from FDI and firm ownership type, columns (5) and (6) show that both interaction terms are significantly positive, in contrast with the negative relationship shown on the variety of exports in Table 4. Compared with the SOEs, the export spillovers from FDI, measured at either the regional or the industrial level, are more beneficial to private firms in terms of raising export unit values. One potential explanation is that despite private firms being smaller than SOEs, private electronics firms are more productive than their SOE counterparts (Yang *et al*., 2010). This may be the reason why private firms can export their products at a higher price relative to SOEs despite experiencing the same level of export spillovers from FDI. This finding validates the argument that export spillovers from FDI not only depend on type of ownership but also on the measures of exports in which we are interested (Sun, 2009).

*4.3 Processing trade vs. ordinary trade*

As described earlier, export-platform FDI is a striking feature in the Chinese electronics industry. The processing trade undertaken by foreign electronics firms seems to generate limited export spillover in creating new export linkages or in raising China's export sophistication (Mayneris and Poncet, 2013; Xu and Lu, 2009; Wang and Wei, 2010). To address the possibility of heterogeneous effects, we repeat our estimations by types of trade and separate the regressions for ordinary trade and processing trade in Tables 5 and 6, respectively.

[Insert Tables 5 and 6 approximately here]

Comparing the results for ordinary trade and processing trade, several interesting findings emerge. First, the relationship between firm size and export unit value heads in the opposite direction for the two types of trade. The coefficient of ln*SIZE* remains significantly positive for processing trade, indicating that larger firms tend to have a higher unit value in processing trade. In contrast, the estimated coefficient of firm size is negative and marginally significant for ordinary trade in almost all specifications. Because these sample firms are LMEs, the result indicates that medium-sized firms tend to charge a higher price on products of ordinary trade than their larger counterparts.

Second, productivity continues to play an important role in improving export quality in terms of unit value for both ordinary trade and processing trade. Our empirical result echoes the theoretical literature linking the technological heterogeneity of firms to export behavior. It is also consistent with the findings of limited studies, such as Bastos and Silva (2010) and Johnson (2012). One policy implication is inspired from this finding; to achieve sustainable growth through an export-led strategy, the critical task for China is to upgrade its technological ladder. In addition to the productivity-enhancing effect brought about by FDI, China must implement a series of Science & Technology (S&T) policies to promote indigenous technological capability through various technological sources, such as in-house R&D and technology imports.[8]

Third, the negative effect of export spillover from FDI on the unit value of indigenous firms' exports only influences processing trade, not ordinary trade. This result is in line with the case of export-platform FDI in Sweden by Ruane and Sutherland (2005) and the evidence for China by Wang and Wei (2010). As Manova and Zhang (2012) indicate for the case of China, exporters selling higher-quality goods tend to import higher-quality inputs. This situation applies to the processing exports of electronics firms. On one hand, a vast majority of Chinese electronics industry MNEs undertake export-platform FDI, implying that their Chinese affiliates may import intermediate goods and key components from their parent firms. On the other hand, most local electronics firms exploit their

[8] Indeed, China's 11th Five-Year Program (2006–2010), initialized in 2006, extolled the aim of "scientific development" together with a determined emphasis on encouraging "an innovation-oriented nation"

advantage of cheap and qualified labor to serve as subcontractors for international companies, operating as original equipment manufacturers (OEM) and undertaking assembly exports. Therefore, competition pressure from the presence of FOEs is particularly severe for indigenous exporters, forcing them to charge lower prices in international markets or to target markets with low- or middle-quality products. As processing trade is mainly undertaken by export-platform FDI, there is presumably little interaction between domestic and foreign firms, which could be the main reason that negative export spillovers from FDI are being witnessed. Regarding ordinary trade, the negative export spillover effect from FDI is insignificant.

## 5. Concluding Remarks and Policy Implications

FDI inflows are widely known for providing beneficial effects to host economies. Potential channels include job creation, productivity promotion, and export increase. For an export-oriented growth economy, the issues of whether FDI facilitates more domestic firms to enter the international markets or whether it enhances their export performance are particularly important under the circumstances of global production fragmentation.

Using a comprehensive firm-product level dataset on the Chinese electronics industry, we extend the existing literature by examining the existence of export spillovers from FDI on both export variety and unit value. To consolidate our analyses, we use two measures of export spillovers from FDI constructed at regional and industrial levels. Our results show little evidence of export spillovers from FDI on the variety of exported products. The presence of FOEs leads to a negative impact on the unit value of products exported by indigenous firms, and this adverse effect is particularly relevant to the processing trade. This result may indicate that Chinese domestic firms are less likely to internalize benefits from a foreign presence when multinationals' activities are limited to the mere assembly of imported inputs. Furthermore, FOEs' superior competitive advantages may induce a strong negative competition effect on domestic exporters in the international markets,

forcing them to export their products at a lower unit value. These findings are consistent with the evidence for China reported by Xu and Fu (2009), Wang and Wei (2010), and Mayneris and Poncet (2013).

Export spillovers from FDI also have different influences depending on the type of firm ownership. We find that private firms achieve more information spillovers from FOEs in improving their export quality in terms of unit value, whereas SOEs tend to export a greater variety of products than their private counterparts under the same level of export spillovers from FDI. In addition, firms with higher productivity perform better in two aspects of export performance: exporting greater varieties of products and exporting higher-quality products in terms of unit value. This is consistent with the predictions of existing heterogeneous firm trade literature whereby more productive firms outperform less productive ones in various aspects.

Our analysis implies some important policy implications. Extensive studies have found that the presence of foreign exporters generally facilitates indigenous firms to export higher volumes; however, researchers have argued that exports' extensive margin is relatively more important than their intensive margin (Evenett and Venables, 2002; Hummels and Klenow, 2005). As the information spillovers from FOEs on expanding the variety of export products are limited, the development of new products relies heavily on local firms' efforts at their own innovative activities. A similar problem emerges in raising exports' unit values. With relatively low technological capability, Chinese electronics firms are mainly subcontractors in the global production chain, forcing them to offer middle-quality products rather than high-end ones. Moving up the technological ladder and developing own-brands are two critical ways for Chinese electronics firms to enhance their product quality, and thus to raise their exports' unit values.

References

Aitken, B., Hanson, G.H., Harrison, A.E., 1997. Spillovers, foreign investment, and export behavior. Journal of International Economics 43, 103-132.

Álvarez, R., Fuentes, J.R., 2011. Entry into export markets and product quality. The World Economy 34, 1237-1262.

Amiti, M., Freund, C. 2010. An anatomy of China's export growth. In Feenstra, R. and Wei, S.J., (eds), *China's Growing Role in World Trade*, University of Chicago Press. Anwar, S., Nguyen, L.P., 2011. Foreign direct investment and export spillovers: Evidence from Vietnam. International Business Review 20, 177-193.

Arkolakis, C., Muendler, M., 2010. The extensive margin of exporting goods: A firm-level analysis. NBER Working Paper Series, No. 16641.

Barrios, S., Gorg, H., Strobl, E., 2003. Explaining firms' export behaviour: R&D, spillovers and the destination market. Oxford Bulletin of Economics and Statistics 65, 475-496.

Bastos, P., Silva, J., 2010. The quality of a firm's exports: Where you export to matters. Journal of International Economics 82, 99-111.

Blomström, M., Kokko, A., 1998. Multinational corporations and spillovers. Journal of Economic Survey 12, 247-277.

Branstetter, L., Lardy, N. 2006. China's embrace of globalization. NBER Working Paper, No. 12373.

Eckel, C., Neary, J.P., 2010. Multi-product firms and flexible manufacturing in the global economy. Review of Economic Studies 77, 188-217.

Franco, C., Sasidharan, S., 2010. MNEs, technological efforts and channels of export spillover: An analysis of Indian manufacturing industries. Economic Systems 34, 270-288.

Fu, X., 2011. Processing trade, FDI and the exports of indigenous firms: Firm-level

evidence from technology-intensive industries in China. Oxford Bulletin of Economics & Statistics 73, 792-817.

Gilboy, G.J., 2004. The myth behind China's miracle. Foreign Affairs 83, 33-48.

Evenett, S.J., Venables, A., 2009. Export growth in developing countries: Market entry and bilateral trade flows, University of Nottingham working paper, mimeo.

Greenaway, D., Sousa, N., Wakelin, K., 2004. Do domestic firms learn to export from multinationals? European Journal of Political Economy 20, 1027-1043.

Hallak, J.C., 2006. Product quality and the direction of trade. Journal of International Economics 68, 238-265.

Haltiwanger, J.C., Lane, J.I., Splezer, J.R., 1999. Productivity differences across employers: The role of employer size, age, and human capital. American Economic Review 89, 94-98.

Harding, T., Javorcik, B.S. 2012. Foreign direct investment and export upgrading. Review of Economics and Statistics 94, 964-980.

Hausmann, R., Hwang, J., Rodrik, D., 2007. What you export matters. Journal of Economic Growth 12, 1-25.

Hu, A.G.Z., Jefferson, G.H., 2002. FDI impact and spillover: Evidence from China's electronic and textile industries. World Economy 25, 1063-1076.

Hummels, D., Klenow, P., 2005. The variety and quality of a nation's exports. American Economic Review 95, 704-723.

Iwasaki, I., Csizmadia, C., Illéssy, M., Makó, C., Szanyi, M., 2011. Foreign direct investment, information spillover, and export decision: Evidence from Hungarian firm-level data. Journal of World Investment & Trade 12, 487-516.

Jefferson, G., Rawski, T.G., Wang, L., Zheng, Y., 2000. Ownership, productivity change, and financial performance in Chinese industry. Journal of Comparative Economics 28, 786-813.

Johnson, R.C., 2012. Trade and prices with heterogeneous firms. Journal of International Economics 86, 43-56.

Karpaty, P., Kneller, R., 2011. Demonstration or congestion? Export spillovers in Sweden. Review of World Economics 147, 109-130.

Kneller, R., Pisu, M., 2007. Industrial linkages and export spillovers from FDI. World Economy 30, 105-134.

Koenig, P., 2009. Agglomeration and the export decisions of French firms. Journal of Urban Economics 66, 186-195.

Kokko, A., Zejan, M., Tansini, R., 2001. Trade regimes and spillover effects of FDI: Evidence from Uruguay. Review of World Economics 137, 124-149.

Krautheim, S., 2012. Gravity and information: Heterogeneous firms, exporter networks and the distance puzzle., Journal of International Economics 87, 27-35.

Krishna, P., Maloney, F.W., 2011. Export quality dynamics. Policy Research Working Paper Series 5701, The World Bank.

Levinsohn, J., Petrin, A., 2003. Estimating production functions using inputs to control for unobservables. Review of Economic Studies 70, 317-341.

Ma, A., 2006. Export spillovers to Chinese firms: Evidence from provincial data. Journal of Chinese Economic and Business Studies 4, 127-149.

Manova, K., Zhang, Z., 2012. Export prices across firms and destinations. Quarterly Journal of Economics 127, 379-463.

Mayneris, F., Poncet, S., 2013. Chinese firms' entry on export markets: The role of foreign export spillover. Policy Research Working Paper No. 6398, World Bank, Washington, DC.

Melitz, M., 2003. The impact of trade on intra-industry reallocation and aggregate industry productivity. Econometrica 71, 1695-1725.

Melitz, M., Ottaviano, G.I.P., 2008. Market size, trade, and productivity. Review of

Economic Studies 75, 295-316.

Petrin, A., Poi, B.P., Levinsohn, J., 2004. Production function estimation in Stata using inputs to control for unobservable. The Stata Journal 4, 113-123.

Ruane, F., Sutherland, J., 2005. Foreign direct investment and export spillovers: How do export platforms fare?. IIIS Discussion Paper 58.

Rauch, J.E., Watson, J. 2003. Starting small in an unfamiliar environment. International Journal of Industrial Organization 21, 1021-1042.

Sun, H., 2001. Foreign direct investment and regional export performance in China. Journal of Regional Science 41, 317-336.

Sun, S., 2009. How does FDI affect domestic firms' exports? Industrial evidence. World Economy 32, 1203-1222.

Sun, S., 2010. Heterogeneity of FDI export spillovers and its policy implications: The experience of China., Asian Economic Journal 24, 289-303.

Swenson, D., 2008. Multinationals and the creation of Chinese trade linkages. Canadian Journal of Economics 41, 596-618.

Swenson, D., Chen, H., 2013. Multinational exposure and the quality of new Chinese exports. Oxford Bulletin of Economics and Statistics, forthcoming.

Tsou, M.W., Liu, J.T., Hammitt, J.K., Wang, K.H., 2008. Exporting and productivity growth: Evidence from the Taiwan electronic plants. Scottish Journal of Political Economy 55, 190-208.

Verhoogen, E., 2008. Trade, quality upgrading and wage inequality in the Mexican manufacturing sector. Quarterly Journal of Economics 123, 489-530.

Wang, Z., Wei, S.J., 2010. What accounts for the rising sophistication of China's exports? In Freenstra, R., Wei, S.J., (eds.). *China's Growing Role in World Trade*, University of Chicago Press.

Wei, Y., Liu, X., 2006. Productivity spillovers from R&D, exports and FDI in China's

manufacturing sector. Journal of International Business Studies 37, 544-557.

Wooster, R.B., Diebel, D.S., 2010. Productivity spillovers from foreign direct investment in developing countries: A meta-regression analysis. Review of Development Economics 14, 640-655.

Xu, B., Lu, J., 2009. Foreign direct investment, processing trade, and the sophistication of China's exports. China Economic Review 20, 425-439.

Yang, C.H., Lin, C.H., Ma, D., 2010. R&D, human capital investment and productivity: Firm-level evidence from China's electronics industry. China & World Economy 18, 72- 89.

Yang, C.H., Hayakawa, K., 2013. Localization and overseas R&D activity: The case of Taiwanese multinational enterprises in China. Bangkok Research Center Working Paper.

Yeaple, S.R., 2005. A simple model of firm heterogeneity, international trade, and wages. Journal of International Economics 65, 1-20.

Zhang, K., Song, S., 2000. Promoting exports: The role of inward FDI in China. China Economic Review 11, 385-396.

Table 1 Dynamics of Export Performance for Foreign and Domestic Exporters

| | All exporters | Foreign exporters | Domestic exporters |
|---|---|---|---|
| | Average export volume (RMB million) | | |
| 2004 | 323 | 376 | 66 |
| 2005 | 293 | 351 | 78 |
| 2006 | 256 | 302 | 66 |
| | Number of products | | |
| 2004 | 2.91 | 3.02 | 2.02 |
| 2005 | 3.05 | 3.27 | 2.23 |
| 2006 | 3.40 | 3.60 | 2.37 |
| | Average unit value (RMB thousand) | | |
| 2004 | 52.87 | 56.98 | 39.02 |
| 2005 | 60.21 | 63.51 | 42.20 |
| 2006 | 61.74 | 64.95 | 47.13 |

Table 2: Variable Definitions and Summary Statistics

| Variable | Definition | Mean (S.D.) |
|---|---|---|
| EXPROD | Number of exporting products | 2.785 (3.495) |
| lnUV SIZE | Logarithm of unit value of exports (RMB thousand) Total | 2.453 (2.040) |
| KL | employment | 580.36 (1545.8) |
| WAGE | Capital-labor ratio (RMB thousand/employee) Average | 106.675 (352.198) |
| AGE | wage (RMB thousand) | 19.653 (17.092) |
| lnTFP | Age of firms | 7.820 (5.014) |
| SPILL_Reg | Levinsohn-Petrin productivity (in logarithm) | 1.236 (1.263) |
| SPILL_Ind | The share of FOEs exports to provincial total exports | 0.563 (0.225) |
| Private | The share of FOEs exports to 3-digit industry's total exports | 0.621 (0.197) |
| | 1 for private firms, 0 for SOEs | 0.267 (0.442) |

Table 3 Export Spillovers from FDI on variety of exports – Panel Negative Binomial Model

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Constant | 2.577*** | 2.672*** | 2.715*** | 2.764*** | 2.907*** | -2.920*** |
| | (0.899) | (0.969) | (0.963) | (0.935) | (1.087) | (1.012) |
| lnSIZE | 0.271*** | 0.271*** | 0.271*** | 0.271*** | 0.263*** | 0.264*** |
| | (0.013) | (0.013) | (0.013) | (0.013) | (0.013) | (0.013) |
| lnKL | 0.069*** | 0.069*** | 0.069*** | 0.069*** | 0.065*** | 0.065*** |
| | (0.015) | (0.014) | (0.015) | (0.015) | (0.015) | ().015) |
| lnWAGE | 0.117*** | 0.117*** | 0.117*** | 0.118*** | 0.112*** | 0.113*** |
| | (0.031) | (0.030) | (0.031) | (0.031) | (0.030) | (0.030) |
| AGE | 0.011*** | 0.011*** | 0.011*** | 0.011*** | 0.012*** | 0.012*** |
| | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) |
| lnTFP | 0.088*** | 0.088*** | 0.013 | 0.023 | 0.012 | 0.027 |
| | (0.014) | (0.014) | (0.070) | (0.101) | (0.070) | (0.101) |
| SPILL_Reg | 0.008 | | -0.084 | | -0.030 | |
| | (0.117) | | (0.144) | | (0.114) | |
| SPILL_Ind | | -0.092 | | -0.204 | | -0.147 |
| | | (0.269) | | (0.318) | | (0.319) |
| SPILL_Reg *lnTFP | | | 0.085 | | 0.089 | 0.070 |
| | | | (0.076) | | (0.077) | (0.110) |
| SPILL_Ind*lnTFP | | | | 0.072 | | |
| | | | | (0.100) | | |
| SPILL_Reg*Private | | | | | -0.158*** | |
| | | | | | (0.046) | |
| SPILL-Ind*Private | | | | | | -0.153*** |
| | | | | | | (0.043) Yes |
| Industry dummy | Yes | Yes | Yes | Yes | Yes | Yes |
| Regional dummy | Yes | Yes | Yes | Yes | Yes | |
| Log-likelihood | -6408 | -6409 | -6408 | -6409 | -6402 | -6402 |
| Observations | 3,396 | 3,396 | 3,396 | 3,396 | 3,396 | 3,396 |

Note: Figures in parentheses are standard errors. *** p<0.01. Firm and year effects are controlled in all specifications.

Table 4 Export Spillovers from FDI on Unit Value of Exports – Fixed Effects Model

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| lnSIZE | 0.062*** | 0.063*** | 0.063*** | 0.064*** | 0.079*** | 0.078*** |
| | (0.007) | (0.007) | (0.007) | (0.007) | (0.007) | (0.007) |
| lnKL | 0.113*** | 0.114*** | 0.114*** | 0.114*** | 0.124*** | 0.124*** |
| | (0.008) | (0.008) | (0.008) | (0.008) | (0.008) | (0.008) |
| lnWAGE | 0.412*** | 0.404*** | 0.407*** | 0.406*** | 0.422*** | 0.421*** |
| | (0.017) | (0.017) | (0.017) | (0.017) | (0.017) | (0.017) |
| AGE | -0.023*** | -0.023*** | -0.023*** | -0.023*** | -0.024*** | -0.025*** |
| | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |
| lnTFP | 0.071*** | 0.068*** | 0.242*** | -0.040 | 0.264*** | -0.029 |
| | (0.008) | (0.008) | (0.051) | (0.056) | (0.051) | (0.058) |
| OECD | 0.139*** | 0.141*** | 0.141*** | 0.140*** | 0.151*** | 0.151*** |
| | (0.035) | (0.015) | (0.015) | (0.015) | (0.015) | (0.015) |
| SPILL_Reg | -0.148** | | 0.085 | | 0.010 | |
| | (0.077) | | (0.100) | | (0.100) | |
| SPILL_Ind | | -0.297*** | | -0.546*** | | -0.555*** |
| | | (0.095) | | (0.159) | | (0.159) |
| SPILL_Reg *lnTFP | | | -0.193*** | | -0.217*** | 0.107* |
| | | | (0.056) | | (0.056) | (0.060) |
| SPILL_Ind*lnTFP | | | | 0.119* | | |
| | | | | (0.061) | | |
| SPILL_Reg*Private | | | | | 0.367*** | |
| | | | | | (0.027) | |
| SPILL_Ind*Private | | | | | | 0.348*** |
| | | | | | | (0.025) |
| Regional dummy | Yes | Yes | Yes | Yes | Yes | Yes |
| R-square | 0.107 | 0.107 | 0.107 | 0.107 | 0.113 | 0.113 |
| Observations | 29,992 | 22,992 | 29,992 | 22,992 | 29,992 | 29,992 |

Note: Figures in parentheses are standard errors. * p<.1, ** p<0.05, *** p<0.01. Product and year effects are controlled in all specifications.

Table 5 Export Spillovers from FDI on Unit Value of Exports – Processing Trade

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| lnSIZE | 0.105*** | 0.108*** | 0.107*** | 0.108*** | 0.109*** | 0.109*** |
| | (0.008) | (0.008) | (0.008) | (0.008) | (0.008) | (0.008) |
| lnKL | 0.089*** | 0.092*** | 0.095*** | 0.092*** | 0.095*** | 0.093*** |
| | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) |
| lnWAGE | 0.435*** | 0.423*** | 0.428*** | 0.425*** | 0.432*** | 0.428*** |
| | (0.021) | (0.022) | (0.021) | (0.022) | (0.022) | (0.022) |
| AGE | -0.032*** | -0.033*** | -0.032*** | -0.034*** | -0.032*** | -0.034*** |
| | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |
| lnTFP | 0.052*** | 0.055*** | 0.643*** | -0.102 | 0.647*** | -0.102 |
| | (0.009) | (0.009) | (0.088) | (0.104) | (0.088) | (0.104) |
| OECD | 0.124*** | 0.118*** | 0.122*** | 0.119*** | 0.123*** | 0.120*** |
| | (0.018) | (0.018) | (0.018) | (0.018) | (0.018) | (0.018) |
| SPILL_Reg | -1.556*** | | -0.426 | | -0.406 | |
| | (0.241) | | (0.294) | | (0.294) | |
| SPILL_Ind | | -1.301*** | | -1.593*** | | -1.584*** |
| | | (0.170) | | (0.253) | | (0.253) |
| SPILL_Reg *lnTFP | | | -0.647*** | | -0.650*** | 0.170 |
| | | | (0.096) | | (0.096) | (0.112) |
| SPILL_Ind*lnTFP | | | | 0.171 | | |
| | | | | (0.112) | | |
| SPILL_Reg*Private | | | | | 0.117** | |
| | | | | | (0.057) | |
| SPILL_Ind*Private | | | | | | 0.171* |
| | | | | | | (0.112) |
| Regional dummy | Yes | Yes | Yes | Yes | Yes | Yes |
| R-square | 0.158 | 0.159 | 0.161 | 0.159 | 0.161 | 0.159 |
| Observations | 17,984 | 17,984 | 17,984 | 17,984 | 17,984 | 17,984 |

Note: Figures in parentheses are standard errors. * p<.1, ** p<0.05, *** p<0.01. Product and year effects are controlled in all specifications.

Table 6 Export Spillovers from FDI on Unit Value of Exports – Ordinary Trade

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| lnSIZE | -0.020* | -0.020* | -0.022* | -0.020* | -0.014 | -0.013 |
| | (0.012) | (0.012) | (0.012) | (0.012) | (0.012) | (0.012) |
| lnKL | 0.183*** | 0.183*** | 0.183*** | 0.183*** | 0.194*** | 0.194*** |
| | (0.015) | (0.015) | (0.015) | (0.015) | (0.015) | (0.015) |
| lnWAGE | 0.280*** | 0.282*** | 0.279*** | 0.279*** | 0.308*** | 0.313*** |
| | (0.030) | (0.030) | (0.030) | (0.030) | (0.030) | (0.030) |
| AGE | -0.007*** | -0.007*** | -0.007*** | -0.007*** | -0.009*** | -0.010*** |
| | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) |
| lnTFP | 0.125*** | 0.125*** | -0.014 | 0.190*** | 0.007 | 0.183** |
| | (0.013) | (0.013) | (0.065) | (0.071) | (0.065) | (0.071) |
| OECD | 0.201*** | 0.201*** | 0.200*** | 0.201*** | 0.203*** | 0.205*** |
| | (0.025) | (0.025) | (0.025) | (0.025) | (0.025) | (0.025) |
| SPILL_Reg | 0.073 | | -0.102 | | -0.181 | |
| | (0.087) | | (0.118) | | (0.118) | |
| SPILL_Ind | | -0.076 | | 0.087 | | -0.021 |
| | | (0.121) | | (0.212) | | (0.211) |
| SPILL_Reg*lnTFP | | | 0.158** | | 0.135* | -0.064 |
| | | | (0.072) | | (0.072) | (0.078) |
| SPILL_Ind*lnTFP | | | | -0.073 | | |
| | | | | (0.078) | | |
| SPILL_Reg*Private | | | | | 0.227*** | |
| | | | | | (0.038) | |
| SPILL_Ind*Provate | | | | | | 0.245*** |
| | | | | | | (0.036) |
| Regional dummy | Yes | Yes | Yes | Yes | Yes | Yes |
| R-square | 0.076 | 0.076 | 0.076 | 0.076 | 0.079 | 0.080 |
| Observations | 12,008 | 12,008 | 12,008 | 12,008 | 12,008 | 12,008 |

Note: Figures in parentheses are standard errors. * p<.1, ** p<0.05, *** p<0.01. Product and year effects are controlled in all specifications.