

The Effects of Free Trade Agreements on SMEs' Direct and Indirect Exports¹

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I. Introduction

A free trade agreement (FTA) is a treaty between two or more countries that aims to facilitate trade among the member countries by lowering tariff/non-tariff barriers. FTAs have increased dramatically for the last three decades. The cumulative number of FTAs in force is 336 in 2020, up by more than 1,000% since 1990.² During the same period, the world trade volume became five times higher, and FTAs played an important role in this large trade creation (see Baier and Bergstrand 2007, Magee 2008, Hayakawa and Kimura 2016, Johnson and Noguera 2017, etc.). This article takes one step further to explore which one between small/medium-sized enterprises (SMEs) and large-sized enterprises (LEs) contributed more to the trade creation of FTAs at the industry level.

It is theoretically ambiguous whether trade liberalization policies such as FTAs work in favor of SMEs. On the one hand, according to Melitz (2003), LEs with high productivity are more

likely to experience expansion of production and exports and increase in profits due to trade liberalization, whereas SMEs with relatively low productivity might have smaller sales and profits due to increased competitions from foreign suppliers. On the other hand, if the FTA has the additional effects of lowering the fixed cost of exports by mitigating the non-tariff barriers, this may have a more favorable effect on the expansion of exports by SMEs because the fixed cost for exports is usually more binding to SMEs than LEs. Given the theoretical ambiguity, an empirical approach is needed to examine the export effects of FTA policy for SMEs.

Although there exist a number of studies that empirically analyze the general trade impact of FTAs, just a few studies have explored the trade effects of FTAs by firm size. Hayakawa (2015) analyzes how the FTA utilization and export effects vary depending on the firm size, based on a corporate survey of Japanese affiliates in the ASEAN, India, and Oceania regions. The study finds that larger firms show

¹ This is a summary article based on the third chapter of Koo *et al.* (2019)

² <http://rtais.wto.org/UI/PublicMaintainRTAHome.aspx> (accessed on Jan. 19, 2021).

higher FTA utilization rates and larger exports to FTA partner countries. Park (2016) studies the impact of FTAs on the exports of Korean SMEs during the period 2005-2012 using SMEs' trade data at the product level (6-digit HS code). He finds that the FTA policies have promoted the exports of SMEs significantly and the rise in exports has been mainly driven by the increase in extensive margin (the number of exporting SMEs) rather than that in intensive margin (average exports per one SME).

This study empirically explores how Korea's FTA policies have affected direct exports of SMEs and LEs from 2005 to 2017 using trade data at the product level (6-digit HS code), and how the effects are different depending on industries.³ Moreover, we estimate the indirect export effects of FTA, which means the impact of direct export effects of FTAs on domestic input supplies through industrial input-output linkages. Given that the share of SMEs for indirect exports is, in general, larger than that for direct exports, the indirect exports would be a main channel through which FTAs can benefit the SMEs considerably.⁴ The indirect export effects of FTA, however, have not been studied in the literature mainly due to the data limitation.

To sum up, the main contributions of this study are twofold. First, we estimate differential export effects of FTAs by firm size and industries. Second, we further estimate indirect export effects of FTAs, thus suggesting a useful way to more thoroughly understand the channels through which FTAs might affect SMEs' behaviors.

³ Korea has been one of the most active countries in implementing FTA policies for the last two decades. During the period 2004-2017, Korea entered into 15 FTAs with over 50 countries, whose total GDP accounted for more than 70% of the World GDP. (Cho *et al.* 2019)

II. Econometric Model and Data

1) Direct export effect

To estimate differential FTA export effects between small/medium enterprises (SMEs) and large enterprises (LEs), we mainly use the following econometric model, which is basically a one-to-many country version of the gravity model at the product level.

$$\ln(EX_{pisc}) = \beta_1 FTA_{ct} + \beta_2 (FTA_{ct} \times Large_s) + \gamma_i (\ln(GDP_{ct}) \times Indus_i) + \alpha_{psc} + \alpha_{pst} + \epsilon_{pisc} \quad (1)$$

EX_{pisc} is product p 's exports of Korean firm i with size s to country c at year t , where $s \in \{\text{small and medium, large}\}$, and the unit of product p is the 6-digit HS code. FTA_{ct} is equal to one if an FTA is effective between Korea and country c at year t , or zero otherwise. $Large_s$ is equal to one if firm i is categorized into a large-sized enterprise (LE), or zero if firm i is categorized into a small and medium-sized enterprise (SME). The term $(\ln(GDP_{ct}) \times Indus_i)$ controls the effects of GDP for partner country c by industry i at year t , where $Indus_i$ indicates an industry dummy. The variables, α_{psc} and α_{pst} , control product-(firm)size-country-specific and product-(firm)size-year-specific fixed effects, respectively, which turns out to play an important role in alleviating endogeneity problems when estimating the coefficients for FTA dummies based on the gravity model (Baier and Bergstrand 2007). Lastly, ϵ_{pisc} means residuals.

⁴ In Korea, according to Koo *et al.* (2019), SMEs account for more than 70% of the total indirect exports, while accounting for 20% of the total direct exports.

Based on the OLS estimates, the direct export-creation effects of FTAs for SMEs and LEs are calculated as follows:

Direct export effects of FTA for SMEs: $e^{\widehat{\beta}_1} - 1$

Direct export effects of FTA for LEs: $e^{\widehat{\beta}_1 + \widehat{\beta}_2} - 1$

We further estimate heterogeneous direct export effects of FTAs by industry as well as firm size. The econometric model is as follows:

$$\ln(EX_{pisc}) = \beta_{1i}(FTA_{ct} \times Indus_i) + \beta_{2i}(FTA_{ct} \times Large_s \times Indus_i) + \gamma_i(\ln(GDP_{ct}) \times Indus_i) + \alpha_{psc} + \alpha_{pst} + \epsilon_{pisc} \quad (2)$$

The industrial direct export effects of FTA for SMEs and LEs are calculated as follows:

Direct export effects of FTA for SMEs in industry i :

$$e^{\widehat{\beta}_{1i}} - 1$$

Direct export effects of FTA for LEs SMEs in

$$\text{industry } i: e^{\widehat{\beta}_{1i} + \widehat{\beta}_{2i}} - 1$$

2) Indirect export effect

The change in direct exports due to FTAs can also affect domestic input sales through domestic input-output industrial linkages. Specifically, domestic input supply in an industry can be raised up because of a rise in direct exports of other domestic industries due to the FTA. This type of exports is defined as indirect exports created by FTAs.

Based on the estimates from (2) above, indirect export effects of FTAs for SMEs in industry i are calculated as follows:

$$\begin{aligned} & \frac{IEX_{L,SME}^{FTA} - IEX_{L,SME}^{NoFTA}}{IEX_{L,SME}^{FTA}} \\ &= \frac{S_{SME}^i (\sum_j EX_j^{FTA} (1 - e^{-\widehat{\beta}_{1j}}) a_{ij})}{S_{SME}^i (\sum_j EX_j^{FTA} e^{-\widehat{\beta}_{1j}} a_{ij})} \\ &= \frac{\sum_j EX_j^{FTA} a_{ij}}{\sum_j EX_j^{FTA} e^{-\widehat{\beta}_{1j}} a_{ij}} - 1 \end{aligned}$$

S_{SME}^i means the share of SMEs out of the whole sales for industry i , whereas EX_j^{FTA} indicates the total exports for industry j since the FTAs came into effect. The input coefficient, a_{ij} means the amount of input from industry i for producing one unit of output for industry j .

3) Data

The data of trade values at the product level (6-digit HS code) by firm size from 2005 through 2017 is provided by the Korea Trade Statistics Promotion Institute. There exist four versions of HS codes during the period 2005-2017. As the 2002 version is the base HS code of our study, other versions of HS codes are converted to the 2002 version by using the concordance tables from World Integrated Trade Solution (WITS).

We also categorize the 6-digit HS codes into 37 manufacturing industries based on the concordance table provided by the Bank of Korea. Furthermore, we include in the sample only the partner countries whose GDP information are available for every year during the period 2005-2017. As a result, 4,595 6-unit HS code products that are exported from Korea to 189 countries were used for regression analysis.

In addition, the input-output table of Bank of Korea for 2015 is used to calculate the input coefficients (a_{ij}) for each industry.

III. Results

The estimation results based on equation (1) show that the Korean FTA policies increased the direct exports of SMEs and LEs by 9.9% and 18.5%, respectively, on average. The FTAs had positive effects on SMEs' direct exports, although the magnitude of the effects was about a half of those for LEs in Korea.

We find heterogeneous direct export effects of FTAs by industry as well as firm size. Table 1 presents 21 industries, either of whose SMEs or LEs show statistically significant increase in exports due to FTAs. The industries positioned higher show relatively high direct export effects of FTAs for SMEs so as to have lower LE premium for FTA export effects, while the industries placed lower are vice versa.

Table 1. Industrial Direct Export Effect of FTAs and Large Enterprise Premium

Industry (Selected) ²⁾		A. SMEs' Direct Export Effect of FTA (%)	B. LEs' Direct Export Effect of FTA (%)	LEs' Premium for Direct Export Effect of FTA (B-A, %p)
1	Beverages	51.9***	-5.3	-57.2
2	Precision machinery	15.6***	5.6	-10.0
3	Special purpose machinery	8.7***	1.1	-7.6
4	Ships	38.7*	31.3	-7.4
5	Textile and Clothing	5.8***	0.4	-5.4
6	Plastic products	27.5***	28.2***	0.7
7	Medicaments	24.0***	27.2***	3.2
8	Electrical equipment	14.5***	19.8***	5.3
9	Fabricated steel products	13.1**	22.2***	9.1
10	Computer and peripheral equipment	13.2*	25.1*	11.9
11	Basic chemicals	12.2***	24.9***	12.7
12	General purpose machinery	6.4**	20.6***	14.2
13	Other manufacturing	3.3	17.8**	14.5
14	Rubber products	20.2***	35.0***	14.8
15	Non-ferrous metal and metal products	12.5***	32.9***	20.4
16	Basic iron and steel	19.7***	41.4***	21.7
17	Coke and petroleum products	20.4**	49.2***	28.8
18	Synthetic fiber	11.2	41.8***	30.6
19	Other chemical products	14.9***	46.1***	31.2
20	Domestic electrical appliances	-10.8**	32.6***	43.4
21	Synthetic resin and rubber	20.6***	72.0***	51.4
Avg. for All Industries ³⁾		9.9***	18.5***	8.6

Note: 1) Robust standard errors are calculated by the delta method (*** p<0.01, ** p<0.05, * p<0.1).

2) The results for industries with no statistically significant direct export effects of FTAs for either SMEs or LEs are not presented. Thus, only the results for 21 industries out of 37 are displayed in Table 1.

3) Average export effects of FTAs for all industries presented in the last row are the results estimated across the whole 37 industries.

As seen in Table 1, for most industries, LEs show higher direct export effects than SMEs. Specifically, relatively large LEs' premiums are found in industries such as synthetic resin and rubber (51.4 %p), domestic electrical appliances (43.3 %p), other chemical products (31.2 %p), synthetic fiber (30.6 %p), coke and petroleum products (28.8 %p), basic iron and steel (21.7 %p), etc. On the contrary, negative or relatively small LEs' premiums are found in a number of industries such as beverages (-57.2 %p), precision machinery (-10.0 %p), special purpose machinery, ships (-7.4 %p), textile and clothing (-5.4 %p), plastic products (0.7 %p), and so on.

The difference in the LEs' premiums of FTA direct export effects across industries seems to be related to the difference in firm size distribution by industry. Specifically, the greater the polarization of the distribution of firm size within an industry is, the greater FTA direct export effects for LEs than SMEs tend to appear. Figure 1 (or Figure 2) depicts such relationships in a simple way: at the industry level, the mean-to-median ratio of the number of employees (or annual sales) per firm is positively correlated with the LEs' premiums for direct export effects of FTAs.

As in Melitz (2003), if firm size is considered as a proxy variable for firm productivity, an industry with a severe polarization in the firm-size distribution can be regarded as an industry within which a relatively large gap in productivity exists between firms. In other words, Figure 1 and 2 imply that the size of productivity gap between firms within an industry can be an important factor to explain the average difference in the direct export effects of FTAs between SMEs and LEs in that industry.

Figure 1. Correlation between Mean-to-median Ratio for Firm Size (# of Employees) and LEs' Premium for Directs Export Effects of FTAs

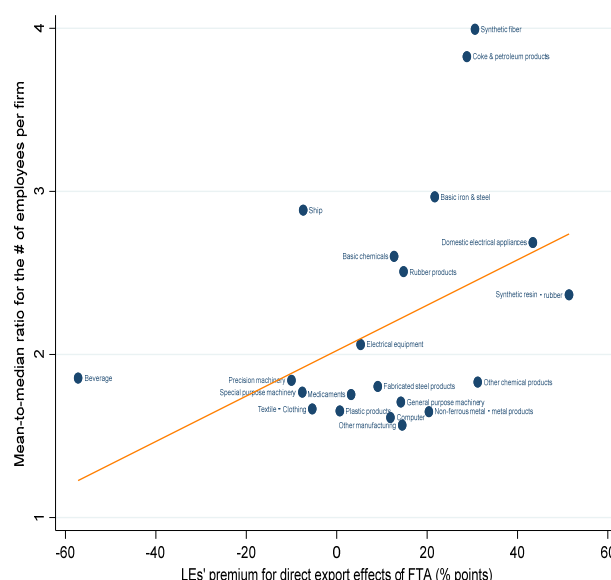


Figure 2. Correlation between Mean-to-median Ratio for Firm Size (Sales) and LEs' Premium for Directs Export Effects of FTAs

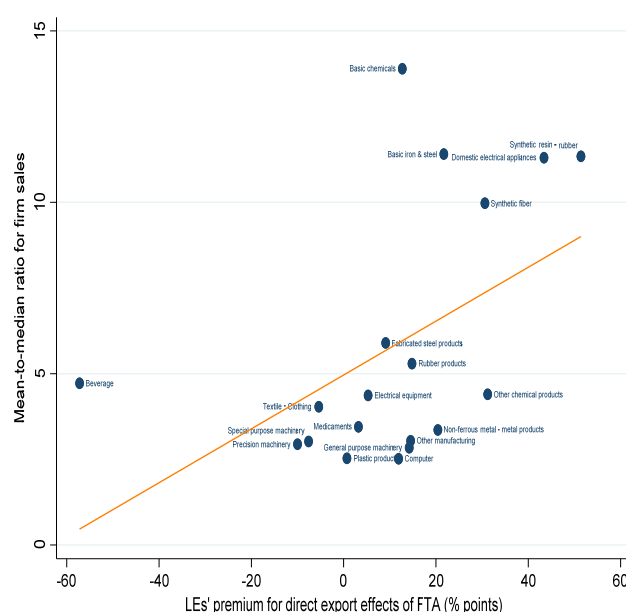


Table 2, in turn, shows how the FTA policies have affected industrial indirect exports for both SMEs and LEs in Korea. As discussed earlier, the indirect export effects of FTAs for an industry refer to how the domestic input supplies of the industry change due to the increased direct exports of other industries attributable to FTAs through domestic input-output industrial linkages. Given that SMEs, in general, are more engaged in indirect exports than direct exports,⁵ it is important to explore both the direct and indirect effects of FTAs to more thoroughly understand how FTA policies work for SMEs' export behaviors.

In Table 2, significant positive effects of FTAs on SMEs' indirect exports can be found in a wider range of industries, compared to the industries with positive direct exports effects of FTAs seen in Table 1. In particular, relatively high indirect export effects are found in the industries such as coal, crude petroleum, and natural gas (26.9%), basic chemicals (24.8%), medicaments (23.6%), coke and petroleum products (20.8%), and basic iron and steel (21.6%). Other industries also show significant positive indirect export effects of FTAs between 5 and 20%. It is also notable that FTA policies have increased indirect exports even for the industries that show no statistically significant direct export effect of FTAs, such as coal, crude petroleum, natural gas, metal ores and non-metallic minerals, food, leather, wood products, etc.

Therefore, only considering direct export effects of FTAs would underestimate the total FTA effects for SMEs. If indirect export effects of

FTAs are taken into account together with the direct effects, then the LEs premium in the export effect of FTAs becomes considerably smaller.

Table 2. Industrial Indirect Export Effect of FTAs

Order	Industry	Indirect Export Effect of FTA(%)
1	Ships	36.0**
2	Coal, crude petroleum, and natural gas	26.9***
3	Basic chemicals	24.8***
4	Medicament	23.6***
5	Basic iron and steel	21.6***
6	Coke and petroleum products	20.8***
7	General purpose machinery	19.6***
8	Synthetic resin and rubber	17.7***
9	Other non-metallic mineral products	15.9***
10	Precision	15.6***
11	Non-ferrous metal and metal products	15.4***
12	Printing and reproduction of recorded media	15.2***
13	Fabricated steel products	14.4***
14	Beverages	13.9***
15	Rubber products	13.6***
16	Other chemical products	12.0***
17	Computer and peripheral equipment	11.2***
18	Electrical equipment	10.8***
19	Pulp and paper products	10.8***
20	Domestic electrical appliances	10.7**
21	Leather products	10.5***
22	Metal ores and non-metallic minerals	10.1***
23	Other manufacturing	10.1***
24	Wood products	10.0***
25	Textile and Clothing	9.3***
26	Plastic products	8.9***
27	Food products	8.2***
28	Motor vehicles	7.5**
29	Fertilizers and pesticides	7.5*
30	Special purpose machinery	7.0***
31	Synthetic fiber	6.3***
32	Visual, sounding and communication equipment	4.6*

Note: 1) Robust standard errors are calculated by the delta method (***) $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).

2) The results for industries with no statistically significant indirect export effects of FTAs are not presented. As a result, only the results for 32 industries out of 37 are displayed in Table 2.

⁵ Refer to Footnote 4.

IV. Conclusion

FTAs have been known to have large positive effects on trade creation between member countries. However, it is relatively unexplored how much SMEs accounted for in the trade creation due to FTAs compared to LEs. We find that Korean FTA policies have significantly increased SMEs' direct exports to FTA partner countries between 2005 and 2017, although the effects were as much as a half of those for LEs, which indicates a LEs' premium in the direct export effects of FTAs. We further find that the FTAs also significantly increased the indirect exports of Korean firms, i.e., the domestic input supplies through industrial input-output linkage, and that SMEs have benefited more from the indirect export effects of FTAs than LEs. Considering the direct and indirect export effects together, the LEs' premium in the total export effects of FTA is found to become smaller.

Although FTAs have shown considerable positive effects on the exports of SMEs, and even more positive effects when considering indirect exports as well as direct ones, there still exists a significant gap between SMEs and LEs in the export effects of FTAs. This finding points at a need for continuous implementing of proper governmental policies to share the benefits of free trade more evenly between SMEs and LEs. On the one hand, for example, the government should provide SMEs with effective ways for easier utilization of FTAs by reducing administration costs. On the other hand, it should also figure out how to minimize the relative loss for SMEs that have not enjoyed enough benefits

from FTAs. As this study finds, differential export effects of FTAs for SMEs and LEs vary across industries, indicating that more sophisticated investigations on FTA utilization status by firm size and industry should follow to produce better policy outcomes. [KIEP](#)

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