

Assessment of the Korean-Chinese Exports Competition in Sophisticated Markets*

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Abstract

Purpose - This paper empirically investigates the competition effect of exports between Korea and China in their common-export markets considering market sophistication. Modern market sophistication includes an importing country's aggregate demand for products of high quality, design, novelty, eco-friendliness, and even IPR protection. Using an empirical analysis to identify the demand for product quality across countries, this paper estimates the effects of market sophistication on the competition between Korean exports and Chinese products.

Design/Methodology - Our empirical model considers the relationship between an importing country's consumer sophistication and the export competition between Korea and China. This study employs the existing theoretical framework to identify the aggregate demand for product quality across countries. Using a quite direct measurement (the consumer sophistication index, our analysis investigates the differential effects of Korea's export market sophistication, particularly in markets where Korean exports are in competition with similar Chinese products.

Findings - Our main findings can be summarized as follows: the negative effects of the export competition between Korea and China on Korea's exports are stronger in third markets where consumers are less sophisticated while the effects are not as pronounced in markets where consumers are more sophisticated. This result, however, best applies to differentiated goods which significantly vary in product quality.

Originality/value - Existing studies focus on the supply side of production and make the assumption that the market preference for export quality is identical across countries. This paper attempts to evaluate the export competition between Korea and China from the demand-side perspective. This area of trade studies is underexplored both empirically and in theory, although the issue has long been important to Korean and world trade.

Keywords: Export Competition Between Korea and China, Export Similarity Index, Korea's Bilateral Exports, Market Sophistication

JEL Classifications: D12, F14, O53

1. Introduction

China is one of the most dynamic countries in regards to exports. The volume of China's exports has increased rapidly after its accession to the WTO. The rank of Chinese exports in the world market has jumped from 8th in 1998 to 2nd in 2008. By comparison, Korea's export volume ranked 12th during the same period, with an average market share of about 2.6% (2.17% excluding exports to China). Since then, it seems that the gap between the exports of Korea and China has widened. While Korean exports have slightly increased, Chinese exports have continued to grow exponentially- even following the 2008 global

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financial crisis (See Fig. 1 in Section 2).

A common concern of China's expanding exports was that they would likely undermine the exports of other countries. When studying this risk, mixed results are often seen because the precise effect of Chinese export expansion depends on whether a country's exports are complementary or in competition with Chinese products (Gereffi and Frederick, 2010; Jenkins, Peters and Moreira, 2008; Rodrik, 2006). Many studies discuss the beneficial effects of Chinese export growth on export competitors that form part of the same global value chains (Dean, Fung and Wang Zhi, 2011; Shin Won-Kyu and Ahn Duk-Geun, 2017; Xing Yuqing, 2014/2016). In this paper, we focus on the effects of direct competition with rising China's exports in the third-export markets.

Lall and Albaladejo (2004) argue that China's rapid growth in the world export market will strongly affect Asian countries with export baskets that are largely composed of low-skilled or low-technology intensive products. Shafaeddin (2004) finds that China's exports have less of a rivalry with those of newly industrializing economies (NIEs) than with those of South Asian countries, whose exports face severe competition in labor-intensive products. However, Ianchovichina and Walmsley (2005) predict that the NIEs will soon face a challenge in the global export markets due to China's competitive edge shifting to the production of high-end goods. Lall, Weiss and Hiroshi Oikawa (2005) support this prediction with empirical evidence. They argue that countries with a similar export structure to China are likely to lose exports in competing export markets. China's exported products look similar to and function as well as competing products but are more affordable. This imposes price pressure on existing products and forces them out of the markets. Eichengreen, Rhee Yeong-Seop and Tong Hui (2007), and Tong Hui (2007) also show that China drives out existing goods in the textile and shoe industries by flooding the markets with made-in-China products. Greenaway, Mahabir and Milner (2008) show that high-income Asian countries feel a heavy burden due to competition with China in the export of similar consumer products.

It is a great challenge for Korea to compete with China in third-export markets since the two countries produce and export similar products.¹ Many argue that a successful strategy for Korea could be to upgrade the quality of export products (Felipe et al., 2012; Xing, 2016). When presenting this strategy, the theoretical framework for calculating product quality and explaining the direction of bilateral trade flows is used to identify possibly adverse effects of China's exports on Korea's bilateral exports. According to the pioneering studies of Flam and Helpman (1987) and Schott (2004) on export quality, each country produces and exports differentiated-quality goods based on its level of productivity, income, and factor endowment.

Here, a simple policy suggestion for improving Korea's exports is to develop a more competitive edge in the production of high-quality export products, considering that the quality of China's exports largely lags behind (Jenkins et al., 2008; Rodrik, 2006).² But what characteristics of product quality are critical for upgrading export products? This policy suggestion and previous studies focus on the supply side of production and make the assumption that the market preference for export quality is identical across countries. Hallak (2006), Hallak and Schott (2011) and Weder (1996), however, suggest that each country has a different preference for its product demands. Weder (1996) specifically refers to this preference as the sophistication of import market demand. Although Korean

¹ In 2013, Korea had the 7th highest export similarities with China among 164 countries according to the Export Similarity Index calculated by the author with 3-digit export data of SITC revision 3, which will be introduced in section 2.

² Schott (2008) argue that it will take some time for China to catch up with other OECD countries in the quality of export products in the US market due to relative scarcity in skill and capital.

exports are generally more competitive in export quality than those of China, they may not fully take into account importers' specific quality preferences.

This paper attempts to evaluate the export competition between Korea and China from the demand-side perspective. This area of trade studies is underexplored both empirically and in theory, although the issue has long been important to Korean and world trade. Our empirical model considers the relationship between an importing country's consumer sophistication and the export competition between Korea and China. This study employs the empirical framework of Hallak (2006) to identify the aggregate demand for product quality across countries, weighted by per capita income. Using a quite direct measurement (the consumer sophistication index developed by the Institute for Industrial Policy and Studies in South Korea),³ our analysis investigates the differential effects of Korea's export market sophistication, particularly in markets where Korean exports are in direct competition with similar Chinese products.

The structure of this paper is as follows. The paper explains the empirical framework and hypothesis in Section 2, before introducing the methodology and data in Section 3. In Section 4, we provide empirical results. Section 5 concludes the paper with implications and policy suggestions.

2. Empirical Framework and Hypothesis

This paper largely builds upon two strands of literature. The first relates to empirical studies on the rapid growth of Chinese exports and its consequences, particularly on export competitors whose export portfolios look similar to those of China. The second is based on the theoretical arguments and empirical findings of Hallak (2006) and Hallak and Schott (2011) which found that rich countries tend to import relatively more from countries that produce high-quality goods.

First, the market diversion effect caused by the growth of China's exports takes place in third markets (Lall et al., 2005). When the final export goods of Korea and China look alike and compete in the third markets, Korean exports, including NIEs, face a decline or, at the least, stagnation (Greenaway et al., 2008, Ianchovichina and Walmsley, 2005). Fig. 1 provides sweeping evidence of the relationship between China's exports and the level of export similarity (i.e. measuring competition between Korea and China) at the level of consumer goods. While Chinese export market shares grow as the export similarity between Korea and China increases, overall exports of Korea become stagnant in the world market.

Second is the theoretical and empirical framework developed by Hallak (2006) and Hallak and Schott (2011). Their studies established theoretical framework for empirically testing the effect of product quality difference on trade flows and confirm that rich countries tend to import relatively more from countries that produce high-quality goods. The important assumption of this framework is that export quality and the intensity of preference for quality vary across countries. In Hallak's (2006) framework, for example, the GDP per capita level represents the overall intensity of demand for quality (i.e. market sophistication). However, instead of using GDP per capita, this paper employs the consumer sophistication index (CSI), enabling empirical measurements to explain overall market sophistication.

³ The Institute for Industrial Policy and Studies is a business research institute established in 1993 under the Ministry of Commerce, Industry & Energy of Republic of Korea.

Fig. 1. The World Export Market Share of Korea & China; and the Level of Similarity in their Export Baskets



Note: The third export markets indicate export destinations that include all countries except for two countries. The X axis is % of exports to the world while the Y axis is the ESI score measuring the export similarity (competition) between two countries.

Source: Authors' calculation using UN Comtrade data.

The concept of the consumer sophistication is not new. Sproles et al. (1978) conceptualize consumer sophistication as an individual's aggregated level of acquired knowledge, experience in purchasing products, and decision-making skills. Barnes and McTavish (1983) and Titus and Bradford (1996) develop further this concept to certain consumer characteristics such as awareness of ethical issues, life-style, health, and eco-friendliness.

Empirical studies supporting the concept and usefulness of the consumer sophistication are found in various literatures. Townsend (1991) argues the U.S are generally sensitive to design because consumers have a strong preference for product novelty. In addition, environmental awareness and eco-friendliness are important issues for modern consumer sophistication. Bjørner et al. (2004) found that Danish people are willing to pay a premium for eco-friendly products. Cherian and Jacob (2012) also argue that consumer attitudes now favor an eco-friendly lifestyle and, in response to this change, producers have tried to develop a competitive edge in the green market industry. More recently, the issues over Intellectual Property Rights (IPRs) relating to trade flows become significant in the current world trading system as the perception of IPRs level in importing countries affect the patterns of bilateral trade (Shin Won-Kyu, Lee Keun and Park Walter G., 2016).

Bearing in mind above theoretical discussion and empirical findings, our empirical analysis has the following three steps.

Firstly, the 'Export Similarity Index (ESI)' between Korea and China for a given sector are calculated to measure the degree of export competition between them to the third markets. The ESI is the index first used by Finger and Kreinin (1979) which measures the level of competition between country k and country c in country i , and is computed as below:

$$ESI(kc, i) = \{\sum Min[X_z(ki), X_z(ci)]\} \times 100 \quad (1)$$

where $X_z(ki)$ is the share of product z in the exports of country k to country i , and $X_z(ci)$ is the share of product z in the exports of country c to country i . According to Lall et al. (2005), we can expect the market diversion effect taking place in the third-export markets as China's exports replace the previously prevailing Korean products. This effect continues to accelerate when the export baskets of two countries become more alike. The higher the ESI score is, the more competition there is between the export baskets.

Secondly, this paper relates the concept of a consumer's sophistication in the analysis on the effects of an importer's demand for quality varying over the different export competition between Korea and China to the third markets. Again, in Hallak's (2006) framework, the GDP per capita level represents the overall intensity of demand for quality. Instead of using GDP per capita, this paper borrows the consumer sophistication index, enabling empirical measurements to explain overall market sophistication. Assuming that CSI has a positive relationship with the intensity of preference for quality, a consumer's demand for the quality is regarded as the sophistication of domestic demand (Hallak, 2006; Hallak and Schott, 2011; Weder, 1996).

Thirdly, to identify the effects of the consumer sophistication in this empirical setup, this paper utilizes an interaction term (the level of market sophistication in the third markets: CSI_i with respect to a variable measuring the export competition between Korea and China: ESI^{kc}). This interaction term is used to identify the variations in the level of competition between Korea and China in the common export markets of the two countries, considering each market's sophistication level. This paper uses panel data of 61 common export markets for Korea and China (markets which both countries are exporting to) during the period of 2003 to 2010. To explain bilateral trade flows between Korea and its trading partner countries considering trade barriers, cultural differences, and transaction costs, our empirical specification⁴ is defined as:

$$\ln EX_{it}^k = \alpha + \beta_1 \ln ESI_{it}^{kc} + \beta_2 \ln ESI_{it}^{kc} * \ln CSI_{it} + \beta_3 \ln Dist_i^k + \beta_4 Com_lang_i^k + \psi_i + \zeta_t + \varepsilon_{it}^k \quad (2)$$

where EX_{it}^k is country k 's (i.e. Korea's) exports to country i at time t ; ESI_{it}^{kc} is the export similarity index between country k and country c (i.e. China) in importer i ; CSI_{it} is country i 's consumer sophistication index (CSI); $Dist_i^k$ is the bilateral distance between country k and i ; $Com_lang_i^k$ is a dummy variable which indicates whether country k and country i share a common language, ψ_i is importer fixed effects; ζ_t is time fixed effects; and ε_{it}^k is an error term.⁵

Following the studies of Flam and Helpman (1987), Hallak (2006), and Schott (2004), which investigate the relationship between export quality and income, the country with the higher income exports higher quality products. We may therefore assume that overall Korea's exports are of higher quality than those of China (Rodrik, 2006; Xu, 2007). Hallak (2006) and Hallak and Schott (2011) demonstrate that a country with a high preference for export quality imports more from higher-income countries rather than from lower-income countries. Therefore, we should expect countries with a strong preference for export quality

⁴ This empirical specification is similar to gravity model since Hallak's (2006) framework also benchmarks the gravity model to estimate bilateral trade flows considering level consumer sophistication as one of factors of trade costs.

⁵ Considering Korea is exporting country k , the dummy variables regarding a common border and a colonial relationship are practically not applicable to the specification.

to prefer Korean exports over those of China. On the other hand, countries with a preference for cheap prices over product quality would be expected to favor Chinese exports. We can conclude that the competition between Korean and Chinese exports in third markets is affected by the importing country's preference for export quality.

Therefore, we hypothesize that the adverse effects of China's export expansion are likely to be less pronounced in importing countries that have a strong preference for export quality. The interaction term (β_2) in Equation (2) represents that the effects of export competition can vary across countries according to market sophistication ($\ln CSI_{it}$). Then, the coefficient of $\ln ESI_{it}^{kc}$ is expected to be negative while that of the interaction term between the $\ln ESI_{it}^{kc}$ and $\ln CSI_{it}$ is likely to be positive. To put this differently, the negative effect of the export competition between Korea and China ($\ln ESI_{it}^{kc}$) decreases when the level of consumer sophistication ($\ln CSI_{it}$) goes higher.

However, this prediction is likely to hold true only for product groups where the difference in quality between Korean and Chinese products is observable. If the product groups are homogeneous and cannot be easily separated in terms of quality by consumers, this argument is likely to be inaccurate. Regarding distinctions in the quality of export products, Rauch (1999) classified export goods into three categories such as homogeneous, referenced, and differentiated goods according to their price-setting mechanism.⁶ Hallak (2006) and Hallak and Schott (2011) show that homogeneous goods are insensitive to the demand for quality and sophistication.

3. Empirical Method and Data

This paper adopts various econometric methods such as the OLS, fixed effects, random effects, and the Hausman-Taylor model for Equation (2). First, we must note that OLS analysis may be biased due to unobserved individual factors. Fixed and random effects models, however, are known to effectively control these country-specific factors in regards to bilateral trade flows. In this case, however, the fixed effects model is more appropriate for Equation (2), if the null hypothesis of the Hausman test is rejected. This means that any unobserved individual factors must be correlated with other explanatory variables.

Fixed effects analysis, however, would be unable to offer estimations for time-invariant variables. In this case, the Hausman-Taylor model can serve as a good alternative. This method can provide the coefficients of time-invariant variables. Furthermore, the model addresses endogeneity problem between explanatory variables and error terms by using instrument variables. In our paper, $\ln ESI$ and the interaction term between $\ln ESI$ and $\ln CSI$ are treated as time-varying endogenous variables in the Hausman-Taylor estimation model. To ensure validity of the instruments we use the Hausman test of over-identification. The null hypothesis of the Hausman test regarding the differences between the fixed effect and Hausman-Taylor estimators should not be rejected.

We use export data from the United Nations Commodity Trade Statistics Database (UN Comtrade). To consider the characteristics of exported products, this paper divides all commodities into differentiated, reference-priced, and homogeneous goods. This classi-

⁶ Differentiated products do not have well-defined product standards and are not traded on specialized exchanges. Differentiated products carry the largest potential for quality variation. Reference-priced products are goods that have referable standards for corresponding prices that are available in specialized publications; however, they are not traded on organized exchanges. Quality variation is possible but to a lesser degree than for differentiated goods. Homogenous products are goods that have clearly defined standards and/or are internationally traded on organized exchanges. Hence, they have well-defined prices and the smallest potential variation in quality (Rauch, 1999).

fication of commodities follows the reasoning of Hallak (2006) and Rauch (1999). The differentiated, reference-priced, homogeneous goods include 111, 48, 36 codes respectively from the 3-digit SITC (Standard International Trade Classification) Revision 3 data; and the ESI is also calculated using the 3-digit codes of SITC accordingly.⁷

The Institute for Industrial Policy and Studies uses a unique measure for consumer sophistication in its annual ‘National Competitiveness Report’. The Institute for Industrial Policy and Studies publishes the report annually. The report is a Korean version of ‘Global Competitiveness Report’ of the World Economic Forum. The index is a survey result conducted by its partner institution, the Korea Trade-Investment Promotion Agency (KOTRA), which runs more than 100 offices abroad. It has several components as shown in Table 1(a). Each component is ranged from 0 to 100 on the basis of the survey. Subsequently, the CSI is derived from an average of each component.

Table 1. Components for Consumer Sophistication Index

(a) Breakdown of Consumer Sophistication Index

Components	Survey Questions
Information	How much does consumer know about product?
Quality	How much is consumer sensitive to product’s quality?
Brand	How much is consumer sensitive to company’s brand?
Design	How much is consumer sensitive to product’s design?
New product	How strong is consumer’s preference for new product?
Health & Environmental Issue	How sensitive is consumer to health & environmental issues?
Intellectual Property Right	How much is consumer reluctant to accept illegally copied products?

(b) Descriptive Statistics of the Index (2003~2010)

No. of country	Mean	Std. Dev.	Min	Max
61	52.390	15.824	19.954 (Kenya)	84.772 (Denmark)

Source: Authors’ calculation based on the ‘National Competitiveness Report’ published by the Institute for Industrial Policy and Studies.

The CSI is available for 61 countries during the analysis period of 2003 to 2010.⁸ Table

⁷ Several codes are excluded for an adjustment to the product classification of Korea’s exports— SITC codes of 628, 736, and 847 for the differentiated goods; 14, 233, and 341 for the reference-priced goods; 423 and 424 for homogeneous goods. Further disaggregation approach may help to reduce possible aggregation bias for ESI. For example, calculating ESI based on the HS (Harmonized Commodity Description and Coding System) 6-digit codes may be more favorable to control for the bias. However, this paper follows the broad classification of commodities using empirical frameworks of Hallak (2006) and Rauch (1999) that introduces for the quality variation of exports, the 3-digit codes of SITC is the most disaggregated available.

⁸ Due to the consistency of data construction, our analysis covers 2003 to 2010. The components of CSI index are reformed recently after year 2010; it has provided consistent data only by 2010. 61 countries are major export destinations for Korea and make up 86% of Korea’s total exports (excluding exports to China) in 2008; the same countries made up 91% of China’s total exports (excluding exports to

1(b) shows the statistics for consumer sophistication index averages from 2003 to 2010. Kenya has the lowest index value while Denmark has the highest.

Bilateral trade data such as bilateral distance and common language is drawn from the gravity dataset of CEPII (Centre d'Etudes Prospectives et d'Informations Internationales-Institute for Research on the International Economy). Distance is calculated by finding the distance between each country's most populous cities. Additionally, the common language dummy variable indicates whether at least 9% of both countries' populations speak the same language.

Table 2 presents summary statistics for the data used in the estimation.

Table 2. Descriptive Statistics on Variables

Product Classification	Variable	Obs.	Mean	S.D.	Min	Max
Differentiated goods	$\ln EX_{it}^k$	488	20.840	1.396	16.959	24.449
	$\ln ESI_{it}^{kc}$	488	3.610	0.367	1.864	4.314
	$\ln ESI_{it}^{kc} * \ln CSI_{it}$	488	14.091	2.097	0	18.442
	$\ln Dist_i^k$	61	8.961	0.524	7.053	9.875
Reference-priced goods	$\ln EX_{it}^k$	488	19.050	1.703	15.012	23.133
	$\ln ESI_{it}^{kc}$	488	2.882	1.493	0.115	4.275
	$\ln ESI_{it}^{kc} * \ln CSI_{it}$	488	11.378	6.100	0	18.459
	$\ln Dist_i^k$	488	8.961	0.524	7.053	9.875
Homogeneous goods	$\ln EX_{it}^k$	488	17.423	2.452	7.879	22.478
	$\ln ESI_{it}^{kc}$	488	2.525	1.445	0.011	4.598
	$\ln ESI_{it}^{kc} * \ln CSI_{it}$	488	9.928	5.788	0	19.130
	$\ln Dist_i^k$	488	8.961	0.524	7.053	9.875

Note: When the value of the consumer sophistication index is zero (e.g. Libya), this index is treated by taking the form as such $\ln(CSI+1)$.

4. Empirical Results

Tables 3-5 show regression results of different product groups based on Equation (2). For differentiated and reference-priced goods, the coefficient of the $\ln ESI$ is negatively significant at the 1-10% level for all econometric models while that of the interaction term between the $\ln ESI$ and $\ln CSI$ is positively significant at the same level. More specifically, we interpret the results of the interaction term using estimated coefficients of the Hausman-Taylor models in Table 3-4.

For the explanation of these variables for differentiated goods, the negative impacts of the $\ln ESI$ with a slope of -0.242 become -0.242, -0.112, -0.104, -0.095, and -0.082 at the

Korea) in 2008. The list of countries is as follows: Argentina, Australia, Austria, Bangladesh, Belgium, Brazil, Cambodia, Canada, Chile, Colombia, Croatia, Czech Rep., Denmark, Dominican Rep., Egypt, Finland, France, Germany, Greece, Guatemala, Hong Kong, Hungary, India, Indonesia, Iran, Israel, Italy, Japan, Jordan, Kenya, Kuwait, Malaysia, Mexico, Morocco, Netherlands, New Zealand, Nigeria, Oman, Pakistan, Panama, Peru, Philippines, Poland, Romania, Russian Federation, Saudi Arabia, Singapore, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Thailand, Turkey, United Arab Emirates, Ukraine, United Kingdom, USA, Venezuela, Viet Nam, and Libya.

minimum (0), 1st quartile (3.71), 2nd quartile (3.95), 3rd quartile (4.20), and 4th quartile (4.57) of the $\ln CSI$, respectively. This suggests that exports of Korea experienced about 3 times lower damages ($-0.242 \rightarrow -0.082$: 24% of negative effects due to export competition from Chinese products falls to 8%) in the third export markets competing with China at the 4th quartile. In the sample, countries with those types of CSI scores represent developed countries. For instance, Denmark, Japan, Israel, Sweden, Switzerland, Austria, Finland, and Netherland, Italy, Canada, and the United States. Notably, many European and Nordic countries highly appreciate various aspects of product quality such as eco-friendliness, novelty, and design. Therefore, this result lends support for our hypothesis and the overall validity of our theoretical prediction.

Table 3. Regression Results for Differentiated Goods

DV: $\ln EX_{it}^k$	OLS	FE	RE	HT
$\ln ESI_{it}^{kc}$	-0.585*** (-2.90)	-0.242** (-2.16)	-0.249** (-2.20)	-0.242** (-2.15)
$\ln ESI_{it}^{kc} * \ln CSI_{it}$	0.363*** (10.42)	0.035** (2.05)	0.045*** (2.65)	0.035** (2.05)
$\ln Dist_i^k$	-0.446*** (-3.95)	–	-0.829*** (-3.11)	-0.843*** (-2.73)
$Com_lang_i^k$	0.198* (1.68)	–	0.286 (0.93)	0.289 (0.81)
No. of Observation	488	488	488	488
R-square	0.328	0.429	0.428	–
$\chi^2(11)$	–	–	–	320.86***
Hausman Test: $\chi^2(9)$	–	–	18.44**	–
Hausman Over-identification Test: $\chi^2(9)$	–	–	–	0.00

Note: * significance at 10% level, ** significance at 5% level, and *** significance at 1% level. () is t-value or z-value. Coefficient estimates for year fixed effects and constant are not reported in the tables although they are included in the analysis.

Analogously, with regard to the explanation for reference-priced goods, the slope of the $\ln ESI$ curve is -0.408, -0.293, -0.286, -0.278, and -0.266 at the minimum (0), 1st quartile (3.71), 2nd quartile (3.95), 3rd quartile (4.20), and 4th quartile (4.57) of the $\ln CSI$, respectively. These results imply that the negative effects of $\ln ESI$ are dampened when consumption in the export destinations becomes sophisticated. Reference-priced goods also have quality variation but less so than differentiated goods. These estimation results confirm that the positive effects of market sophistication can be applied to products with smaller variance in quality, although the effects are less pronounced.

However, the regression result for homogeneous goods turns out to be statistically insignificant while the results for the OLS models are significant. As discussed in Section 2, this result is in line with Hallak (2006) and Hallak and Schott (2011). In other words, this finding implies that, among the three categories, homogeneous goods cannot be applied within the theoretical framework of this study.

Table 4. Regression Results for Reference-priced Goods

DV: $\ln EX_{it}^k$	OLS	FE	RE	HT
$\ln ESI_{it}^{kc}$	-0.530* (-1.65)	-0.408*** (-3.96)	-0.409*** (-3.98)	-0.408*** (-3.95)
$\ln ESI_{it}^{kc} * \ln CSI_{it}$	0.168*** (3.35)	0.031* (1.84)	0.033** (1.97)	0.031* (1.84)
$\ln Dist_i^k$	-1.327*** (-10.35)	–	-1.405*** (-4.00)	-1.407*** (-4.03)
$Com_lang_i^k$	0.734*** (5.02)	–	0.767* (1.87)	0.767* (1.88)
No. of Observation	488	488	488	488
R-square	0.304	0.586	0.586	–
χ^2 (11)	–	–	–	610.68***
Hausman Test: χ^2 (9)	–	–	3.65	–
Hausman Over-identification Test: χ^2 (9)	–	–	–	0.00

Note: * significance at 10% level, ** significance at 5% level, and *** significance at 1% level. () is t-value or z-value. Coefficient estimates for year fixed effects and constant are not reported in the tables although they are included in the analysis.

Table 5. Regression Results for Homogeneous Goods

DV: $\ln EX_{it}^k$	OLS	FE	RE	HT
$\ln ESI_{it}^{kc}$	-0.570* (-1.75)	-0.336* (-1.76)	-0.341* (-1.79)	-0.336* (-1.75)
$\ln ESI_{it}^{kc} * \ln CSI_{it}$	0.285*** (3.67)	0.030 (0.68)	0.041 (0.94)	0.030 (0.68)
$\ln Dist_i^k$	-1.533*** (-8.24)	–	-1.721*** (-3.65)	-1.731*** (-3.52)
$Com_lang_i^k$	1.148*** (5.32)	–	1.327** (2.41)	1.336** (2.33)
No. of Observation	488	488	488	488
R-square	0.284	0.296	0.296	–
χ^2 (11)	–	–	–	194.06***
Hausman Test: χ^2 (9)	–	–	33.56***	–
Hausman Over-identification Test: χ^2 (9)	–	–	–	0.00

Note: * significance at 10% level, ** significance at 5% level, and *** significance at 1% level. () is t-value or z-value. Coefficient estimates for year fixed effects and constant are not reported in the tables although they are included in the analysis.

The coefficient of the distance variable is negatively significant, as expected, at the 1% level for all the classifications. In regards to the common language variable, its coefficient

is almost insignificant for differentiated goods but positively significant at the 1-10% level for reference-priced and homogeneous goods. It is noted that the estimated results of these two variables display some interesting features. The values of their coefficients increase as product groups become more similar in quality. For example, the coefficient values of the distance variable increase from the range of 0.446~0.843, for differentiated goods, to the range of 1.327~1.407, for reference-priced goods, and to that of 1.533~1.731 for homogeneous goods. The results indicate that the variables influencing trade costs (i.e. distance and common language) become prevailing factors for the direction of trade when products are similar in quality. In other words, the results support the direction of trade patterns as emphasized in the inter-trade Heckscher-Ohlin framework, addressing the traditional aspects of trade costs besides product quality. Again, our paper attempts to account for aspects of product quality that affect global patterns of bilateral trade.

Since the null hypothesis for the Hausman test is rejected at the 1-5% level for differentiated and homogeneous goods, the fixed effects model is more appropriate for estimating Equation (2) than the random effect method. In addition, the null hypothesis for the over-identification test of the Hausman-Taylor analysis is not rejected for all sectors. Thus, the instrument variables for the Hausman-Taylor estimations are valid.

5. Conclusion

There is much empirical evidence for the rise of Chinese exports and their market expansion effect by price competitiveness stemming from abundant labor. Panel data consisting of 61 common markets for Korea and China during the period of 2003 to 2010 captures the negative effects of the export competition with China on Korea's exports to the third-export markets. The empirical results show that China's exports do negatively affect Korean exports overall. However, this study provides a different angle, showing that the negative effects diminish when a third market possesses a high demand for quality, novelty, design, brand, eco-friendliness, and anti-privacy—the aspects of modern market sophistication.

Our main findings can be summarized as follows: the negative effects of the export competition between Korea and China on Korea's exports are stronger in third markets where consumers are less sophisticated while the effects are not as pronounced in markets where consumers are more sophisticated. This result, however, applies to differentiated and reference-priced goods which vary in product quality. For homogenous goods, the effects of market sophistication are diminished.

We may draw some policy implications from our study of trade competition between Korea and China, especially considering consumer demand for quality sophistication. As the technological level of exports from China continues to rise, the gap in overall quality between the two countries' exports is likely to decrease (Felipe et al., 2012). Unless Korea produces and exports substantially different product portfolios from China, it is almost inevitable that the country will face steep price competition or even quality competition.

Generally, Korean firms are advised to seek a complementary strategy to Chinese trade since a struggle for price-competitiveness would be a losing battle in the end. For instance, direct investment of Korea in China is a typical case for setting up GVCs (Global Value Chains) to favor Korean firms (Xing Yuqing, 2014). However, this type of approach only avails Korean firms that are capable enough of investing or expanding their production network in China. These firms probably are larger, more innovative and productive in the first place. For small-medium sized firms that lack technological skills and the capital for R&D, competition from China is a considerable challenge (Shin Won-Kyu and Ahn Duk-Geun, 2017; Shin Won-Kyu et al., 2016).

Our findings emphasize that, when exporting the same portfolios as China, it is important for Korea to export differentiated products. There are some ways for exported products to be differentiated. Conventional aspects of product quality are subject to technical capabilities in production that can relatively easier to upgrade through investment in R&D, technical innovations, and capacity building (Morrison, Pietrobelli, and Rabellotti, 2008). However, quality is perhaps more shaped by the institutional and socio-cultural conditions of the economy, which concern novelty, health, eco-friendliness, and public perception of IPRs. An appreciation for these aspects is not developed overnight and take time for a country to build. Therefore, a simple implication is that Korea's exporting firms need to consider the demands for product sophistication strategically and strive to deliver the more implicit aspects of quality in their export goods in order to appeal to higher sophisticated markets (Messerlin and Shin Won-Kyu, 2017; Xing Yuqing, 2014).

As long as China's market expansion is a result of fair and free trade promoting resource reallocation, export competition between Korea and China should be promoted for the benefit of the world economy as a whole (Deardorff, 2008; Shin Won-Kyu and Ahn Duk-Geun, 2019). Throughout the paper, we highlight quality dimensions and the strategic gains from the interactive effect of competition and market sophistication, using the exports of Korea as an applicable example. We hope to develop an analytical framework to better evaluate the role of market sophistication and provide empirical evidence to identify its effects on Korea's export flows with trading competitors and partners.

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