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South Korea's Trade Intensity With ASEAN Countries and Its Changes Over Time*

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This paper analyzes how Korea's trade intensity with the major five ASEAN countries (i.e., Indonesia, Malaysia, Philippines, Singapore, and Thailand) changed from 2003 to 2008. For this purpose, trade intensity index, trade complementarity index, and special country bias index between Korea and these five major ASEAN countries were measured by a trade intensity index model developed by Yamazawa (1970). The OECD trade matrix was used as data. Korea's trade intensity with Indonesia was found to decrease from 6.99 in 2003 to 6.74 in 2008 due to the decrease in Korea's special country bias with Indonesia from 6.64 in 2003 to 6.06 in 2008, even if Korea's trade complementarity with Indonesia increased from 1.05 in 2003 to 1.11 in 2008. Therefore Korea's special country bias with Indonesia should be enhanced by increasing capital movements and reducing discriminatory tariffs and other import restrictions between Korea and Indonesia. It was also found that trade intensity between Korea and other four major ASEAN countries (i.e., Malaysia, Philippines, Singapore, and Thailand) showed an exactly opposite pattern of the above trade intensity between Korea and Indonesia. Here again, Korea's special country bias with these four ASEAN countries should be enhanced further by increasing capital movements and reducing discriminatory tariffs and other import restrictions between Korea and these four ASEAN countries.

JEL Codes: F11, F13 and F14

1. Introduction

The Korean economy has experienced dramatic changes during the last four decades. From a typical, underdeveloped agrarian economy, Korea emerged on the world stage as one of the front runners among the NIEs (newly industrializing economies). This outstanding economic achievement is truly remarkable considering the poor endowment of natural resources and the small domestic market. For this reason, the economic development strategy of Korea has been frequently referred to as a suitable model for other countries on the road to development.

In 2010 Korean exports to Indonesia rose to US$ 8.90 billion (i.e., 1.9% of Korea's total exports) and Korean imports from Indonesia reached US$ 13.99 billion (i.e., 3.3% of Korea's total imports). Consequently, Korea suffered from US$ 5.09 billion trade deficit with Indonesia. Likewise, Korean exports to Malaysia in 2010 rose to US$ 6.11 billion (i.e., 1.3% of Korea's total exports) and Korean imports from Malaysia reached US$ 9.53 billion (i.e., 2.2% of Korea's total imports). Accordingly, Korea suffered from US$ 3.42 billion trade deficit with Malaysia.

On the other hand, Korean exports to Philippines in 2010 rose to US$ 5.84 billion (i.e., 1.3% of Korea's total exports) and Korean imports from Philippines reached US$ 3.49 billion (i.e., 0.8% of Korea's total imports). Consequently, Korea enjoyed

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US$ 2.35 billion trade surplus with Philippines, which accounted for 5.7% of Korean trade surplus with the whole world. Likewise, Korean exports to Singapore in 2010 rose to US$ 15.24 billion (i.e., 3.3% of Korea's total exports) and Korean imports from Singapore reached US$ 7.85 billion (i.e., 1.8% of Korea's total imports). Accordingly, Korea enjoyed US$ 7.39 billion trade surplus with Singapore, which accounted for 17.9 % of Korean trade surplus with the whole world.

In 2010 Korean exports to Thailand rose to US$ 6.46 billion (i.e., 1.4% of Korea's total exports) and Korean imports from Thailand reached US$ 4.17 billion (i.e., 1.0% of Korea's total imports). Consequently, Korea enjoyed US$ 2.29 billion trade surplus with Thailand, which accounted for 5.6% of Korean trade surplus with the whole world.

This paper analyzes how Korea's trade intensity with the five major ASEAN countries (i.e., Indonesia, Malaysia, Philippines, Singapore, and Thailand) changed over time for the last five years (i.e., from 2003 to 2008). For this purpose, Section 2 will briefly survey a trade intensity index model developed by Yamazawa (1970) and Kim (2004) and methodology and research design of this paper will be suggested in Section 3.

Section 4 will measure a trade intensity index, a trade complementarity index, and a special country bias index between Korea and the five major ASEAN countries for the last five years by using the OECD trade matrix (2011). On top of this, this paper will also analyze the determinants of Korea's trade complementarity with the major ASEAN countries over the periods at both sectoral and aggregate levels (the analysis on the determinants of trade complementarity at a sectoral level was never attempted in the previous papers and accordingly this paper is the first attempt which tries to analyze the determinants of trade complementarity at both sectoral and aggregate levels so far). Furthermore, Korea's promising and potential exportable products to the five major ASEAN countries will be identified, which is also the first attempt of this paper.

Section 5 will summarize major empirical results and conclude the paper with a few remarks.

2. Literature Review

2.1 Trade Intensity, Trade Complementarity, and Special Country Bias[i]

According to the Heckscher-Ohlin type of two-country-two-product-two-factor model, trade patterns between countries will be determined by the comparative advantage structures between the two countries, determined by factor intensities of two products and factor endowment ratios of two countries. In the multi-country model, however, various other factors are found to play important roles in determining trade patterns among those countries, as will be elaborated below.

Two alternative models have been developed for analyzing the world trade flows. One is a gravity model[ii] and the other is a trade intensity index model. The trade intensity index model (Yamazawa, 1970; Kim, 2004 and 2007) concentrates on the structure of departures of actual trade flows from trade flows estimated in gravity

model. The index of intensity of country i's export trade with country j (in short, trade intensity index) is defined by

$$I_{ij} = \frac{X_{ij}}{X_{i.}} \Big/ \frac{X_{.j}}{X_{..}} \quad \text{---------- (1)}$$

where X_{ij} is country i's export to country j, and $X_{i.}$($\equiv \sum_j X_{ij}$), $X_{.j}$($\equiv \sum_i X_{ij}$), and $X_{..}$($\equiv \sum_i \sum_j X_{ij}$) represent the total export of country i, total import of country j, and the total volume of world trade respectively.[iii]

This trade intensity index can be decomposed into trade complementarity index (C_{ij}) and special country bias index (B_{ij}). The country i's trade complementarity to country j (C_{ij}) is obtained by replacing the expected value of trade ($\bar{X}_{ij}$) for the actual one (X_{ij}) in the equation (1).

$$C_{ij} = \frac{\bar{X}_{ij}}{X_{i.}} \Big/ \frac{X_{.j}}{X_{..}} \quad \text{---------- (2)}$$

The divergence between the expected value of trade and the actual value defines the degree of special country bias as follows.

$$B_{ij} \equiv \frac{X_{ij}}{\bar{X}_{ij}} = \frac{X_{ij}}{\sum_h \bar{X}^h_{ij}} = 1 \Big/ \sum_h \left(\frac{X^h_{ij}}{X_{ij}}\right) \frac{1}{B^h_{ij}} \quad \text{---------- (3)}$$

where B_{ij}^h is the degree of special country bias in the trade of commodity h ($B_{ij}^h = X_{ij}^h / \bar{X}_{ij}^h$) and B_{ij} turns out to be a weighted harmonic mean of B_{ij}^h.

The first line of equation (3) gives a decomposition of trade intensity into two components (i.e., $I_{ij} = C_{ij} \cdot B_{ij}$) which is the basic formula for our analysis.

2.2 Determinants of Trade Complementarity[iv]

To find the determinants of trade complementarity (C_{ij}), it can be decomposed as follows:

$$C_{ij} = \sum_h \left(\frac{X^h_{..}}{X_{..}}\right) S_i^h \cdot R_j^h \quad \text{---------- (4)}$$

where $S_i^h = \frac{X^h_{i.}}{X_{i.}} \Big/ \frac{X^h_{..}}{X_{..}}$, $R_j^h = \frac{X^h_{.j}}{X_{.j}} \Big/ \frac{X^h_{..}}{X_{..}}$

S_i^h and R_j^h are the shares of commodity h in country i's total exports and country j's total imports respectively both divided by commodity h's share in world total trade, which measure the degrees of country i's export specialization and country j's import specialization in commodity h respectively. It should be noted that S_i^h and R_j^h also

measure country i's revealed comparative advantage (Balassa, 1965) and country j's revealed comparative disadvantage in commodity h respectively.

The degree of concentration or diversification of country i's export specialization and country j's import specialization is affected by such important aspects of comparative advantage as the size of a country, skewed resource endowments, etc.. They can be measured in terms of standard deviations of specialization indexes from their mean (i.e., unity), which are square roots of the variances defined as follows.

$$\sigma^2 (S_i) = \sum_h \left(\frac{X_{i.}^h}{X_{..}}\right) (S_i^h - 1)^2$$

$$\sigma^2 (R_j) = \sum_h \left(\frac{X_{.j}^h}{X_{..}}\right) (R_j^h - 1)^2 \text{ ---------- (5)}$$

Covariance of the indices of country i's export specialization and those of country j's import specialization is defined as follows.

$$COV (S_i, R_j) = \sum_h \left(\frac{X_{i.}^h}{X_{..}}\right) (S_i^h - 1)(R_j^h - 1)$$

$$= \sum_h \left(\frac{X_{i.}^h}{X_{..}}\right) S_i^h R_j^h - 1$$

$$= C_{ij} - 1$$

$$or \quad C_{ij} = COV (S_i, R_j) + 1 \text{ ---------- (6)}$$

The correlation coefficient between the specialization structure of exports and imports, which is a measure of the degree of match of the two patterns neutral from the degree of concentration or diversification, can be obtained as follows.

$$r_{ij} = \frac{COV(S_i, R_j)}{\sigma(S_i) \times \sigma(R_j)} \text{ ---------- (7)}$$

Since Korea's promising and potential exportable products to the five major ASEAN countries were not identified in the past studies, we will firstly attempt to find them in this paper.

3. Methodology and Model

To calculate a trade intensity index, a trade complementarity index, and a special country bias index between Korea and the five major ASEAN countries for the last five years by adopting a trade intensity index model developed by Yamazawa (1970) and Kim (2007), the OECD (2011) trade matrix is used. As shown in Table 1, our basic sample of industries for the manufacturing sector consists of 35 industries at a SITC 2-digit level, which is an optimal sample size for our research. The classification of manufactured products by factor intensity and end uses is also listed in Table 2.

On top of this, this paper will also analyze the determinants of Korea's trade complementarity with the major ASEAN countries over the periods at both sectoral and aggregate levels (the analysis on the determinants of trade complementarity at a sectoral level was never attempted in the previous papers and accordingly this paper is the first attempt which tries to analyze the determinants of trade complementarity at both sectoral and aggregate levels so far). Furthermore, Korea's promising and potential exportable products to the five major ASEAN countries will be identified, which is also the first attempt of this paper.

Table 1: List of 35 Industries in Manufacturing Sector

SITC Code	Name of Industry	SITC Code	Name of Industry
51	Organic Chemicals	71	Power Generating Machinery And Equipment
52	Inorganic Chemicals	72	Specialized Machinery
53	Dyeing, Tanning And Coloring Materials	73	Metal Working Machinery
54	Medicinal and Pharmaceutical Pro ducts	74	Other Industrial Machinery and Parts
55	Essential Oils and Perfume Materials	75	Office Machines And ADP Equipment
56	Fertilizers	76	Telecommunications And Sound Recording Apparatus
57	Plastics in Primary Forms	77	Electrical Machinery, Apparatus And Appliances, n.e.s.
58	Plastics in Non-primary Forms	78	Road Vehicles
59	Chemical Materials and Products, n.e.s.	79	Other Transport Equipments
61	Leather, Leather Manufactures And Dressed Furskins	81	Prefabricated Buildings, Sanitary, Heating and Lighting Fixtures, n.e.s.
62	Rubber Manufactures, n.e.s.	82	Furniture and Parts Thereof
63	Cork and Wood Manufactures (excluding Furniture)	83	Travel Goods, Handbags, etc.
64	Paper and Paper Manufactures	84	Articles of Apparel And Clothing Accessories
65	Textile Yarn, Fabrics and Related Products	85	Footwear
66	Non-metallic Mineral Manufactures, n.e.s.	87	Professional and Scientific Instruments, n.e.s.
67	Iron and Steel	88	Photo Apparatus, Optical Goods, Watches and Clocks
68	Non-ferrous Metals	89	Miscellaneous Manufactured Articles, n.e.s.
69	Manufactures of Metal, n.e.s.		

Table 2: Classification of Manufactured Products by Factor Intensity and End Uses

	SITC 2 digit Code
1) Labor-Intensive Products	61 63 65 66 69 76 81 82 83 84 85 89
2) Capital/Technology-Intensive Products	51 52 53 54 55 56 57 58 59 62 64 66 67 68 71 72 73 74 75 76 77 78 79 86 87 88 89
3) Nondurable Consumer Products	55 57 65 83 84 85 86 88 89
4) Durable Consumer Products	66 69 76 77 78 81 82 88 89
5) Capital Goods	69 71 72 73 74 75 77 78 79 87 88
6) Labor-Intensive Intermediate Products	61 63 65 66 69
7) Capital-Intensive Intermediate Products	51 52 53 54 55 56 58 59 62 64 66 67 68 88

Source: Ministry of International Trade and Industry, Government of Japan, White Paper on International Trade (1986: 405-406).

4. Findings

4.1 Korea's Trade Intensity, Trade Complementarity and Special Country Bias with the Five Major ASEAN Countries

Korea's trade intensity, trade complementarity, and special country bias with the major ASEAN countries in the manufacturing sector for the period of 2003-2008 are displayed in Table 3. The results show that Korea's trade intensity with Indonesia decreased from 6.99 in 2003 to 6.74 in 2008, which advocates that Indonesia became *less important* as Korea's major trading partner over the last five years. This is totally due to the following two facts. One is that Korea's trade complementarity with Indonesia increased from 1.05 in 2003 to 1.11 in 2008, which means that Korea's export structure and an Indonesian import structure became *more complementary* with each other for the period of 2003-2008. The other is that Korea's special country bias with Indonesia decreased from 6.64 in 2003 to 6.06 in 2008 despite of the increase in Korea's foreign direct investment (FDI in short hereafter) to Indonesia from US$ 134.1 million in 2003 to US$ 541.3 million in 2008.

Table 3: Korea's Trade Intensity, Trade Complementarity, and Special Country Bias With Indonesia, Malaysia, Philippines, Singapore, Thailand in the Manufacturing Sector: 2003, 2008

	Year	Indonesia	Malaysia	Philippines	Singapore	Thailand
Trade Intensity	2003	6.99	3.85	4.32	2.94	2.78
	2008	6.74	4.11	5.99	4.79	3.61
Trade Complementarity	2003	1.05	1.51	1.59	1.33	1.12
	2008	1.11	1.38	1.35	1.22	1.06
Special Country Bias	2003	6.64	2.56	2.72	2.20	2.49
	2008	6.06	2.97	4.43	3.94	3.39

Table 3 also tells us that Korea's trade intensity with Malaysia increased from 3.85 in 2003 to 4.11 in 2008, which proves that Malaysia also became *more important* as Korea's major trading partner over the last five years. This is totally due to the

following two facts. One is that Korea's trade complementarity with Malaysia decreased from 1.51 in 2003 to 1.38 in 2008, which means that Korea's export structure and a Malaysian import structure became *less complementary* with each other for the last five years. The other is that Korea's special country bias with Malaysia increased from 2.56 in 2003 to 2.97 in 2008, which might be partly due to the increase in Korea's FDI to Malaysia from US$ 43.7 million in 2003 to US$ 327.0 million in 2008.

Korea's trade intensity with Philippines also increased from 4.32 in 2003 to 5.99 in 2008, which proves that Philippines also became *more important* as Korea's major trading partner over the last five years. This is totally due to the fact that Korea's trade complementarity with Philippines decreased from 1.59 in 2003 to 1.35 in 2008, which means that Korea's export structure and Philippines' import structure became *less complementary* with each other for the last five years, even if Korea's special country bias with Philippines increased from 2.72 in 2003 to 4.43 in 2008 due to the increase in Korea's FDI to Philippines from US$ 16.7 million in 2003 to US$ 198.3 million in 2008.

Table 3 also tells us that Korea's trade intensity with Singapore was found to have increased from 2.94 in 2003 to 4.79 in 2008 due to (a) the decrease in Korea's trade complementarity with Singapore from 1.33 in 2003 to 1.22 in 2008 , which means that Korea's export structure and a Singaporean import structure became *less complementary* with each other for the last five years and (b) the increase in Korea's special country bias with Singapore from 2.20 in 2003 to 3.94 in 2008, which might result from the increase in Korea's FDI to Singapore from US$ 235.4 million in 2003 to US$ 550.6 million in 2008 .

Korea's trade intensity with Thailand also increased from 2.78 in 2003 to 3.61 in 2008 due to the increase in Korea's special country bias with Thailand from 2.49 in 2003 to 3.39 in 2008, which might be partly due to the increase in Korea's FDI to Thailand from US$ 32.2 million in 2003 to US$ 91.3 million in 2008. Korea's trade complementarity with Thailand, however, decreased from 1.12 in 2003 to 1.06 in 2008, which means that Korea's export structure and a Thai import structure became *less complementary* with each other for the last five years.

Korea's trade intensity with Indonesia in 2008 is the highest among her trade intensity with the five major ASEAN countries. This is totally due to the fact that Korea's special country bias with Indonesia is the highest among her equivalent value with the five major ASEAN countries, even if Korea's trade complementarity with Indonesia is the second lowest next to her trade intensity with Thailand. This means that discriminatory tariffs and other import restrictions, lower capital movements and economic cooperation which are prevalent in the economic relations between Korea and other four ASEAN countries (i.e., Malaysia, Thailand, Singapore, and Philippines) do reduce Korea's special country bias with these four countries and accordingly lessen her trade intensity with these four ASEAN countries, even if Korea's trade complementarity indices with Malaysia, Philippines, and Singapore are higher than her equivalent value with Indonesia.

Korea's trade intensity with Philippines in 2008 is the second highest next to her trade intensity with Indonesia. This is totally due to the fact that Korea's special

country bias with Philippines is again the second highest next to her equivalent value with Indonesia, along with the fact that Korea's trade complementarity with Philippines is the second highest in the order of its value among her equivalent values with these five ASEAN countries as shown in Table 3. This means that discriminatory tariffs and other import restrictions, lower capital movements and economic cooperation which are prevalent in the economic relations between Korea and other three ASEAN countries (i.e., Malaysia, Thailand, and Singapore) do reduce Korea's special country bias with these three countries and accordingly lessen her trade intensity with these three ASEAN countries.

Korea's trade intensity with Singapore in 2008 is the third highest next to her trade intensity with Indonesia and Philippines. This is totally due to the fact that Korea's special country bias with Singapore is the third highest next to her equivalent value with Indonesia and Philippines along with the fact that Korea's trade complementarity with Singapore is the third highest among her equivalent value with these five ASEAN countries listed in Table 3. This means that discriminatory tariffs and other import restrictions, lower capital movements and economic cooperation which are prevalent in the economic relations between Korea and Malaysia (Thailand) do reduce Korea's special country bias with Malaysia (Thailand) and accordingly lessen her trade intensity with Thailand (Malaysia).

4.2 Determinants of Korea’s Trade Complementarity with Major ASEAN Countries

4.2.1 Determinants of Korea’s Trade Complementarity with Indonesia

As shown in Table 4, Korea in both 2003 and 2008 has comparative advantage in the production of (a) labor-intensive product, such as *textile yarn, fabrics and related products (SITC 65)* and (b) capital/technology-intensive products, such as *telecommunications and sound recording apparatus (SITC 76), office machines and ADP equipment (SITC 75), electrical machinery, apparatus and appliances, n.e.s. (SITC 77), rubber manufactures, n.e.s.(SITC 62),* and *other transport equipments (SITC 79)* (refer to Table 2 for the classification of manufactured products by factor intensity and end uses. Also notice that in order to save the space of this paper only SITC code will be listed from now on. Please look at Table 1 for the name of each SITC code listed).

On top of these products, Korea in 2003 used to have comparative advantage in the production of labor-intensive product, such as *SITC 84*. In 2008 Korea additionally gains comparative advantage in the production of capital/technology-intensive products, such as *SITC 67, SITC 73,* and *SITC 87*.

On the other hand, Indonesia has comparative disadvantage in the production of (a) labor-intensive products, such as *SITC 61, SITC 65,* and *SITC 69* and (b) capital/technology-intensive products, such as *SITC 73, SITC 56, SITC 72, SITC 53, SITC 67, SITC 59, SITC 57, SITC 68, SITC 74, SITC 71, SITC 76, SITC 77, SITC 52, SITC 51,* and *SITC 79* in 2003.
In 2008, Indonesia continues to have comparative disadvantage in the production of (a) labor-intensive products, such as *SITC 61* and (b) capital/technology-intensive products, such as *SITC 56, SITC 72, SITC 73, SITC 79, SITC 67, SITC 53, SITC 59,*

SITC 74, SITC 68, SITC 71, SITC 77, SITC 62, SITC 57, SITC 51, SITC 52, and *SITC 76*.

Consequently, Korea's promising and potential exportable products to Indonesia (i.e., the products which have a high value of $S_K^h \cdot R_I^h$ in Table 4) in 2003 turn out to be (a) labor-intensive product, such as *SITC 65* and (b) capital/technology-intensive products, such as *SITC 76, SITC 77, SITC 67, SITC 73, SITC 75, SITC 79, SITC 72, SITC 57,* and *SITC 62.*

In 2008, Korea's promising and potential exportable products to Indonesia change to capital/technology-intensive products, such as *SITC 76, SITC 79, SITC 72, SITC 67, SITC 73, SITC 77, SITC 62,* and *SITC 56.*

The standard deviation of S_K^hincreases from 0.81 in 2003 to 0.90 in 2008, which means that Korea's export specialization becomes *more concentrated* over the period. The standard deviation of R_I^h also increases from 0.81 in 2003 to 0.95 in 2008, which means that Indonesia's import specialization becomes *more concentrated* over the period.

Since Korea's pattern of export specialization and Indonesia's pattern of import specialization were positively correlated in 2003 (i.e., *COV* (S_K , R_I) = 0.05), C_{KI}(i.e., Korea's trade complementarity with Indonesia) reached 1.05, which means that Korea's export structure and Indonesia's import structure were *complementary* with each other in 2003. As this positive covariance between Korea's pattern of export specialization and Indonesia's pattern of import specialization increased to 0.11 in 2008 (i.e., *COV* (S_K , R_I) = 0.11), C_{KI} reached 1.11, which means that Korea's export structure and Indonesia's import structure became *more complementary* with each other in 2008.

Table 4: Analysis of Korea's Trade Complementarity With Indonesia in Manufacturing Sector: 2003, 2008

	2003					2008				
SITC	S_K^h	R_I^h	$S_K^h \cdot R_I^h$	$\frac{X_{..}^h}{X_{..}}$	$\left(\frac{X_{..}^h}{X_{..}}\right) S_K^h \cdot R_I^h$	S_K^h	R_I^h	$S_K^h \cdot R_I^h$	$\frac{X_{..}^h}{X_{..}}$	$\left(\frac{X_{..}^h}{X_{..}}\right) S_K^h \cdot R_I^h$
51	0.29	***1.21***	0.35	0.04	0.01	0.50	***1.05***	0.53	0.04	0.02
52	0.30	***1.33***	0.39	0.01	0.00	0.43	***1.01***	0.44	0.01	0.00
53	0.31	***2.03***	0.63	0.01	0.00	0.31	***1.65***	0.51	0.01	0.00
54	0.03	0.28	0.01	0.06	0.00	0.04	0.19	0.01	0.07	0.00
55	0.10	0.82	0.08	0.01	0.00	0.11	0.88	0.09	0.01	0.00
56	0.09	***2.41***	0.21	0.00	0.00	0.27	***4.65***	***1.26***	0.00	0.01
57	0.65	***1.77***	***1.15***	0.02	0.02	0.79	***1.11***	0.88	0.02	0.02
58	0.73	0.65	0.48	0.01	0.01	0.78	0.51	0.40	0.01	0.00
59	0.29	***1.84***	0.53	0.02	0.01	0.25	***1.55***	0.39	0.02	0.01
61	0.14	***2.96***	0.41	0.00	0.00	0.28	***2.84***	0.78	0.00	0.00
62	***1.34***	0.76	***1.03***	0.01	0.01	***1.41***	***1.14***	***1.60***	0.01	0.02
63	0.04	0.27	0.01	0.01	0.00	0.03	0.26	0.01	0.01	0.00
64	0.34	0.63	0.21	0.03	0.01	0.27	0.59	0.16	0.02	0.00
65	***1.53***	***2.30***	***3.52***	0.02	0.07	***1.15***	0.82	0.95	0.01	0.01
66	0.33	0.60	0.20	0.02	0.00	0.33	0.48	0.16	0.02	0.00
67	0.88	***1.96***	***1.73***	0.03	0.05	***1.37***	***1.82***	***2.49***	0.05	0.12
68	0.26	***1.58***	0.40	0.02	0.01	0.38	***1.43***	0.55	0.03	0.02
69	0.73	***1.08***	0.79	0.03	0.02	0.79	0.92	0.73	0.03	0.02
71	0.29	***1.45***	0.42	0.04	0.02	0.41	***1.42***	0.58	0.05	0.03
72	0.54	***2.28***	***1.24***	0.03	0.04	0.93	***2.74***	***2.54***	0.04	0.10
73	0.52	***2.70***	***1.40***	0.01	0.01	***1.19***	***2.05***	***2.45***	0.01	0.02
74	0.62	***1.47***	0.91	0.05	0.05	0.66	***1.43***	0.94	0.06	0.06
75	***2.59***	0.51	***1.32***	0.05	0.06	***1.34***	0.45	0.61	0.03	0.02
76	***3.95***	***1.42***	***5.62***	0.04	0.25	***5.07***	***1.00***	***5.08***	0.05	0.24
77	***2.08***	***1.34***	***2.79***	0.08	0.23	***1.90***	***1.15***	***2.18***	0.07	0.16
78	0.97	0.49	0.47	0.18	0.09	0.87	0.64	0.56	0.16	0.09
79	***1.27***	***1.02***	***1.30***	0.03	0.04	***1.92***	***2.02***	***3.89***	0.03	0.11
81	0.25	0.22	0.05	0.00	0.00	0.14	0.17	0.02	0.01	0.00
82	0.14	0.17	0.02	0.01	0.00	0.14	0.17	0.02	0.01	0.00
83	0.65	0.06	0.04	0.00	0.00	0.18	0.13	0.02	0.00	0.00
84	***1.62***	0.11	0.18	0.02	0.00	0.51	0.07	0.04	0.02	0.00
85	0.51	0.35	0.18	0.01	0.00	0.16	0.23	0.04	0.00	0.00
87	0.24	0.57	0.13	0.03	0.00	***1.02***	0.74	0.76	0.03	0.02
88	0.39	0.58	0.23	0.01	0.00	0.54	0.45	0.24	0.01	0.00
89	0.59	0.45	0.26	0.05	0.01	0.45	0.30	0.13	0.05	0.01
Standard Deviation	0.81	0.81		∑=1	∑=1.05	0.90	0.95		∑=1	∑=1.11
Covariance & Correlation Coefficient			$COV(S_K, R_I)$	r_{KI}				$COV(S_K, R_I)$	r_{KI}	
			0.05	0.09				0.11	0.16	

Accordingly, the correlation coefficient between Korea's export specialization structure and Indonesia's import specialization structure (i.e., r_{KI}), which is the measure of the degree of match of the two patterns neutral from the degree of concentration or diversification, increased from 0.09 in 2003 to 0.16 in 2008. This implies that Korea's export structure and Indonesia's import structure became *more complementary* with each other for the period of 2003-2008, if the degree of concentration or diversification was deleted from Korea's pattern of export specialization and Indonesia's pattern of import specialization.

4.2.2 Determinants of Korea's Trade Complementarity with Malaysia, Philippines, Singapore, and Thailand

Due to space limitation of this paper, the analyses on (a) comparative disadvantage structure of other 4 major Southeast Asian countries (i.e., Malaysia, Philippines, Singapore, and Thailand), (b) Korea's promising and potential exportable products to those countries, (c) standard deviation of import specialization of those countries, and (d) covariance of Korea's export specialization and import specialization of those countries will be skipped here. They, however, will be self-explanatory from Tables 5 to 8.

Table 5: Analysis of Korea's Trade Complementarity With Malaysia in Manufacturing Sector: 2003, 2008

	2003					2008				
SITC	S_K^h	R_M^h	$S_K^h \cdot R_M^h$	$\frac{X_{..}^h}{X_{..}}$	$\left(\frac{X_{..}^h}{X_{..}}\right) S_K^h \cdot R_M^h$	S_K^h	R_M^h	$S_K^h \cdot R_M^h$	$\frac{X_{..}^h}{X_{..}}$	$\left(\frac{X_{..}^h}{X_{..}}\right) S_K^h \cdot R_M^h$
51	0.29	0.38	0.11	0.04	0.00	0.50	0.25	0.13	0.04	0.01
52	0.30	***1.17***	0.34	0.01	0.00	0.43	0.88	0.38	0.01	0.00
53	0.31	0.86	0.27	0.01	0.00	0.31	0.82	0.25	0.01	0.00
54	0.03	0.19	0.01	0.06	0.00	0.04	0.24	0.01	0.07	0.00
55	0.10	0.44	0.04	0.01	0.00	0.11	0.44	0.05	0.01	0.00
56	0.09	***1.84***	0.16	0.00	0.00	0.27	***2.07***	0.56	0.00	0.00
57	0.65	0.76	0.49	0.02	0.01	0.79	0.68	0.54	0.02	0.01
58	0.73	0.63	0.46	0.01	0.01	0.78	0.63	0.49	0.01	0.01
59	0.29	0.71	0.20	0.02	0.00	0.25	0.84	0.21	0.02	0.00
61	0.14	0.29	0.04	0.00	0.00	0.28	0.51	0.14	0.00	0.00
62	***1.34***	0.28	0.37	0.01	0.00	***1.41***	0.28	0.39	0.01	0.00
63	0.04	0.14	0.01	0.01	0.00	0.03	0.17	0.01	0.01	0.00
64	0.34	0.53	0.18	0.03	0.00	0.27	0.58	0.16	0.02	0.00
65	***1.53***	0.32	0.49	0.02	0.01	***1.15***	0.33	0.38	0.01	0.01
66	0.33	0.44	0.15	0.02	0.00	0.33	0.64	0.21	0.02	0.00
67	0.88	***1.42***	***1.25***	0.03	0.04	***1.37***	***1.18***	***1.61***	0.05	0.07
68	0.26	***1.25***	0.32	0.02	0.01	0.38	***1.49***	0.57	0.03	0.02
69	0.73	0.48	0.35	0.03	0.01	0.79	0.48	0.38	0.03	0.01
71	0.29	0.58	0.17	0.04	0.01	0.41	0.72	0.29	0.05	0.01
72	0.54	***1.11***	0.60	0.03	0.02	0.93	***1.43***	***1.33***	0.04	0.05
73	0.52	***1.37***	0.71	0.01	0.01	***1.19***	***1.10***	***1.31***	0.01	0.01
74	0.62	0.81	0.50	0.05	0.03	0.66	0.85	0.55	0.06	0.03
75	***2.59***	***1.35***	***3.50***	0.05	0.17	***1.34***	***1.13***	***1.52***	0.03	0.05
76	***3.95***	0.85	***3.37***	0.04	0.15	***5.07***	0.72	***3.64***	0.05	0.17
77	***2.08***	***5.25***	***10.91***	0.08	0.91	***1.90***	***5.16***	***9.81***	0.07	0.71
78	0.97	0.34	0.33	0.18	0.06	0.87	0.34	0.30	0.16	0.05
79	***1.27***	0.77	0.98	0.03	0.03	***1.92***	***1.60***	***3.07***	0.03	0.08
81	0.25	0.15	0.04	0.00	0.00	0.14	0.23	0.03	0.01	0.00
82	0.14	0.20	0.03	0.01	0.00	0.14	0.17	0.02	0.01	0.00
83	0.65	0.11	0.07	0.00	0.00	0.18	0.26	0.05	0.00	0.00
84	***1.62***	0.05	0.08	0.02	0.00	0.51	0.06	0.03	0.02	0.00
85	0.51	0.03	0.01	0.01	0.00	0.16	0.05	0.01	0.00	0.00
87	0.24	***1.04***	0.25	0.03	0.01	***1.02***	***1.26***	***1.29***	0.03	0.04
88	0.39	0.62	0.24	0.01	0.00	0.54	0.74	0.40	0.01	0.00
89	0.59	0.36	0.21	0.05	0.01	0.45	0.34	0.15	0.05	0.01
Standard Deviation	0.81	0.90		∑=1	∑=1.51	0.90	0.89		∑=1	∑=1.38
Covariance & Correlation Coefficient			$COV(S_K, R_M)$	r_{KM}				$COV(S_K, R_M)$	r_{KM}	
			0.51	0.41				0.38	0.30	

Table 6: Analysis of Korea's Trade Complementarity With Philippines in Manufacturing Sector: 2003, 2008

	2003					2008				
SITC	S_K^h	R_P^h	$S_K^h \cdot R_P^h$	$\frac{X_{..}^h}{X_{..}}$	$\left(\frac{X_{..}^h}{X_{..}}\right) S_K^h \cdot R_P^h$	S_K^h	R_P^h	$S_K^h \cdot R_P^h$	$\frac{X_{..}^h}{X_{..}}$	$\left(\frac{X_{..}^h}{X_{..}}\right) S_K^h \cdot R_P^h$
51	0.29	0.35	0.10	0.04	0.00	0.50	0.35	0.18	0.04	0.01
52	0.30	0.48	0.14	0.01	0.00	0.43	0.91	0.39	0.01	0.00
53	0.31	0.71	0.22	0.01	0.00	0.31	***1.11***	0.34	0.01	0.00
54	0.03	0.31	0.01	0.06	0.00	0.04	0.42	0.02	0.07	0.00
55	0.10	0.54	0.05	0.01	0.00	0.11	0.67	0.07	0.01	0.00
56	0.09	***1.10***	0.10	0.00	0.00	0.27	***1.22***	0.33	0.00	0.00
57	0.65	0.62	0.40	0.02	0.01	0.79	0.58	0.46	0.02	0.01
58	0.73	0.71	0.52	0.01	0.01	0.78	***1.00***	0.78	0.01	0.01
59	0.29	0.70	0.20	0.02	0.00	0.25	***1.11***	0.28	0.02	0.01
61	0.14	0.70	0.10	0.00	0.00	0.28	0.74	0.20	0.00	0.00
62	***1.34***	0.37	0.50	0.01	0.01	***1.41***	0.44	0.62	0.01	0.01
63	0.04	0.25	0.01	0.01	0.00	0.03	0.29	0.01	0.01	0.00
64	0.34	0.48	0.16	0.03	0.00	0.27	0.81	0.22	0.02	0.00
65	***1.53***	0.89	***1.36***	0.02	0.03	***1.15***	0.53	0.62	0.01	0.01
66	0.33	0.53	0.18	0.02	0.00	0.33	0.73	0.24	0.02	0.00
67	0.88	0.74	0.65	0.03	0.02	***1.37***	0.88	***1.20***	0.05	0.06
68	0.26	0.64	0.16	0.02	0.00	0.38	0.70	0.27	0.03	0.01
69	0.73	0.64	0.47	0.03	0.01	0.79	0.60	0.47	0.03	0.02
71	0.29	0.58	0.17	0.04	0.01	0.41	0.49	0.20	0.05	0.01
72	0.54	0.84	0.46	0.03	0.02	0.93	***1.32***	***1.23***	0.04	0.05
73	0.52	0.96	0.50	0.01	0.00	***1.19***	0.99	***1.19***	0.01	0.01
74	0.62	0.60	0.37	0.05	0.02	0.66	0.78	0.51	0.06	0.03
75	***2.59***	***1.55***	***4.01***	0.05	0.19	***1.34***	***1.17***	***1.58***	0.03	0.05
76	***3.95***	0.88	***3.47***	0.04	0.15	***5.07***	0.60	***3.06***	0.05	0.15
77	***2.08***	***5.77***	***12.01***	0.08	1.00	***1.90***	***5.29***	***10.07***	0.07	0.73
78	0.97	0.22	0.21	0.18	0.04	0.87	0.28	0.24	0.16	0.04
79	***1.27***	0.55	0.70	0.03	0.02	***1.92***	***1.56***	***3.00***	0.03	0.08
81	0.25	0.13	0.03	0.00	0.00	0.14	0.19	0.03	0.01	0.00
82	0.14	0.17	0.02	0.01	0.00	0.14	0.20	0.03	0.01	0.00
83	0.65	0.15	0.10	0.00	0.00	0.18	0.13	0.02	0.00	0.00
84	***1.62***	0.06	0.09	0.02	0.00	0.51	0.05	0.03	0.02	0.00
85	0.51	0.08	0.04	0.01	0.00	0.16	0.10	0.02	0.00	0.00
87	0.24	***1.13***	0.27	0.03	0.01	***1.02***	***1.32***	***1.35***	0.03	0.04
88	0.39	***1.02***	0.39	0.01	0.00	0.54	***1.35***	0.72	0.01	0.01
89	0.59	0.47	0.27	0.05	0.01	0.45	0.62	0.28	0.05	0.01
Standard Deviation	0.81	0.94		∑=1	∑=1.59	0.90	0.87		∑=1	∑=1.35
Covariance & Correlation Coefficient			$COV(S_K, R_P)$	r_{KP}				$COV(S_K, R_P)$	r_{KP}	
			0.59	0.43				0.35	0.27	

Table 7: Analysis of Korea's Trade Complementarity With Singapore in Manufacturing Sector: 2003, 2008

	2003					2008				
SITC	S_K^h	R_S^h	$S_K^h \cdot R_S^h$	$\frac{X_{..}^h}{X_{..}}$	$\left(\frac{X_{..}^h}{X_{..}}\right) S_K^h \cdot R_S^h$	S_K^h	R_S^h	$S_K^h \cdot R_S^h$	$\frac{X_{..}^h}{X_{..}}$	$\left(\frac{X_{..}^h}{X_{..}}\right) S_K^h \cdot R_S^h$
51	0.29	0.66	0.19	0.04	0.01	0.50	0.56	0.28	0.04	0.01
52	0.30	0.71	0.21	0.01	0.00	0.43	0.51	0.22	0.01	0.00
53	0.31	***1.14***	0.35	0.01	0.00	0.31	***1.14***	0.35	0.01	0.00
54	0.03	0.24	0.01	0.06	0.00	0.04	0.27	0.01	0.07	0.00
55	0.10	0.77	0.08	0.01	0.00	0.11	***1.05***	0.11	0.01	0.00
56	0.09	0.06	0.01	0.00	0.00	0.27	0.03	0.01	0.00	0.00
57	0.65	0.82	0.53	0.02	0.01	0.79	0.79	0.62	0.02	0.02
58	0.73	0.73	0.54	0.01	0.01	0.78	0.58	0.46	0.01	0.01
59	0.29	***1.22***	0.35	0.02	0.01	0.25	***1.35***	0.34	0.02	0.01
61	0.14	0.16	0.02	0.00	0.00	0.28	0.25	0.07	0.00	0.00
62	***1.34***	0.54	0.72	0.01	0.01	***1.41***	0.43	0.61	0.01	0.01
63	0.04	0.06	0.00	0.01	0.00	0.03	0.06	0.00	0.01	0.00
64	0.34	0.31	0.10	0.03	0.00	0.27	0.27	0.07	0.02	0.00
65	***1.53***	0.29	0.44	0.02	0.01	***1.15***	0.27	0.31	0.01	0.00
66	0.33	0.55	0.19	0.02	0.00	0.33	0.53	0.18	0.02	0.00
67	0.88	0.78	0.68	0.03	0.02	***1.37***	0.75	***1.02***	0.05	0.05
68	0.26	0.62	0.16	0.02	0.00	0.38	0.56	0.22	0.03	0.01
69	0.73	0.76	0.55	0.03	0.02	0.79	0.84	0.67	0.03	0.02
71	0.29	***1.14***	0.33	0.04	0.01	0.41	***1.84***	0.75	0.05	0.03
72	0.54	***1.26***	0.69	0.03	0.02	0.93	***1.99***	***1.85***	0.04	0.07
73	0.52	***1.13***	0.59	0.01	0.00	***1.19***	0.87	***1.04***	0.01	0.01
74	0.62	***1.12***	0.69	0.05	0.04	0.66	***1.40***	0.92	0.06	0.06
75	***2.59***	***1.73***	***4.49***	0.05	0.21	***1.34***	***1.45***	***1.95***	0.03	0.07
76	***3.95***	***1.02***	***4.04***	0.04	0.18	***5.07***	0.69	***3.52***	0.05	0.17
77	***2.08***	***3.08***	***6.41***	0.08	0.54	***1.90***	***2.93***	***5.58***	0.07	0.40
78	0.97	0.21	0.20	0.18	0.04	0.87	0.22	0.19	0.16	0.03
79	***1.27***	***3.85***	***4.90***	0.03	0.15	***1.92***	***3.26***	***6.27***	0.03	0.17
81	0.25	0.30	0.07	0.00	0.00	0.14	0.36	0.05	0.01	0.00
82	0.14	0.19	0.03	0.01	0.00	0.14	0.19	0.03	0.01	0.00
83	0.65	0.42	0.28	0.00	0.00	0.18	***1.76***	0.32	0.00	0.00
84	***1.62***	0.13	0.21	0.02	0.00	0.51	0.18	0.09	0.02	0.00
85	0.51	0.11	0.05	0.01	0.00	0.16	0.16	0.02	0.00	0.00
87	0.24	***1.54***	0.36	0.03	0.01	***1.02***	***1.46***	***1.49***	0.03	0.05
88	0.39	***1.82***	0.70	0.01	0.01	0.54	***2.43***	***1.30***	0.01	0.01
89	0.59	0.62	0.36	0.05	0.02	0.45	0.67	0.30	0.05	0.01
Standard Deviation	0.81	0.81		∑=1	∑=1.33	0.90	0.81		∑=1	∑=1.22
Covariance & Correlation Coefficient			$COV(S_K, R_S)$	r_{KS}				$COV(S_K, R_S)$	r_{KS}	
			0.33	0.38				0.22	0.24	

Table 8: Analysis of Korea's Trade Complementarity With Thailand in Manufacturing Sector: 2003, 2008

	2003					2008				
SITC	S_K^h	R_T^h	$S_K^h \cdot R_T^h$	$\frac{X_{..}^h}{X_{..}}$	$\left(\frac{X_{..}^h}{X_{..}}\right) S_K^h \cdot R_T^h$	S_K^h	R_T^h	$S_K^h \cdot R_T^h$	$\frac{X_{..}^h}{X_{..}}$	$\left(\frac{X_{..}^h}{X_{..}}\right) S_K^h \cdot R_T^h$
51	0.29	0.76	0.22	0.04	0.01	0.50	0.62	0.31	0.04	0.01
52	0.30	***1.02***	0.30	0.01	0.00	0.43	***1.45***	0.63	0.01	0.01
53	0.31	***1.52***	0.47	0.01	0.00	0.31	***1.41***	0.44	0.01	0.00
54	0.03	0.29	0.01	0.06	0.00	0.04	0.33	0.01	0.07	0.00
55	0.10	0.69	0.07	0.01	0.00	0.11	0.67	0.07	0.01	0.00
56	0.09	***2.86***	0.25	0.00	0.00	0.27	***1.06***	0.29	0.00	0.00
57	0.65	***1.14***	0.74	0.02	0.02	0.79	***1.06***	0.84	0.02	0.02
58	0.73	0.97	0.71	0.01	0.01	0.78	0.86	0.67	0.01	0.01
59	0.29	***1.16***	0.33	0.02	0.01	0.25	***1.68***	0.42	0.02	0.01
61	0.14	***1.85***	0.26	0.00	0.00	0.28	***1.61***	0.44	0.00	0.00
62	***1.34***	0.46	0.62	0.01	0.01	***1.41***	0.51	0.72	0.01	0.01
63	0.04	0.08	0.00	0.01	0.00	0.03	0.09	0.00	0.01	0.00
64	0.34	0.40	0.14	0.03	0.00	0.27	0.54	0.14	0.02	0.00
65	***1.53***	0.94	***1.43***	0.02	0.03	***1.15***	0.91	***1.05***	0.01	0.02
66	0.33	***1.40***	0.47	0.02	0.01	0.33	***1.33***	0.44	0.02	0.01
67	0.88	***2.58***	***2.27***	0.03	0.07	***1.37***	***2.53***	***3.45***	0.05	0.16
68	0.26	***1.59***	0.41	0.02	0.01	0.38	***1.60***	0.61	0.03	0.02
69	0.73	0.76	0.55	0.03	0.02	0.79	0.83	0.66	0.03	0.02
71	0.29	***1.00***	0.29	0.04	0.01	0.41	***1.27***	0.52	0.05	0.02
72	0.54	***1.95***	***1.06***	0.03	0.04	0.93	***1.63***	***1.52***	0.04	0.06
73	0.52	***3.44***	***1.78***	0.01	0.01	***1.19***	***2.95***	***3.52***	0.01	0.03
74	0.62	***1.53***	0.95	0.05	0.05	0.66	***1.34***	0.88	0.06	0.05
75	***2.59***	0.91	***2.35***	0.05	0.11	***1.34***	0.95	***1.27***	0.03	0.04
76	***3.95***	0.99	***3.90***	0.04	0.17	***5.07***	0.52	***2.66***	0.05	0.13
77	***2.08***	***2.23***	***4.64***	0.08	0.39	***1.90***	***2.06***	***3.91***	0.07	0.28
78	0.97	0.41	0.40	0.18	0.07	0.87	0.44	0.38	0.16	0.06
79	***1.27***	***1.11***	***1.41***	0.03	0.04	***1.92***	0.73	***1.40***	0.03	0.04
81	0.25	0.12	0.03	0.00	0.00	0.14	0.17	0.02	0.01	0.00
82	0.14	0.18	0.02	0.01	0.00	0.14	0.24	0.03	0.01	0.00
83	0.65	0.15	0.10	0.00	0.00	0.18	0.28	0.05	0.00	0.00
84	***1.62***	0.05	0.09	0.02	0.00	0.51	0.08	0.04	0.02	0.00
85	0.51	0.10	0.05	0.01	0.00	0.16	0.07	0.01	0.00	0.00
87	0.24	***1.05***	0.25	0.03	0.01	***1.02***	***1.02***	***1.04***	0.03	0.03
88	0.39	***1.11***	0.43	0.01	0.01	0.54	***1.63***	0.87	0.01	0.01
89	0.59	0.52	0.31	0.05	0.01	0.45	0.55	0.25	0.05	0.01
Standard Deviation	0.81	0.82		∑=1	∑=1.12	0.90	0.69		∑=1	∑=1.06
Covariance & Correlation Coefficient			$COV(S_K, R_T)$ 0.12	r_{KT} 0.18				$COV(S_K, R_T)$ 0.06	r_{KT} 0.09	

5. Summary and Conclusions

From the above analysis on Korea's trade intensity with major ASEAN countries, the following policy recommendation can be suggested.

(1) It was found that Korea's trade intensity with Indonesia decreased from 6.99 in 2003 to 6.74 in 2008 due to (a) the decrease in Korea's special country bias with Indonesia from 6.64 in 2003 to 6.06 in 2008 and (b) the increase in Korea's trade complementarity with Indonesia from 1.05 in 2003 to 1.11 in 2008. Therefore Korea's special country bias with Indonesia should be enhanced by increasing capital movements and reducing discriminatory tariffs and other import restrictions between Korea and Indonesia. The FTA between two countries might help to increase capital movements and reduce tariffs and import restrictions.

(2) It was also found that Korea's trade intensity with Malaysia increased from 3.85 in 2003 to 4.11 in 2008 due to increase in Korea's special country bias with Malaysia from 2.56 in 2003 to 2.97 in 2008 even if Korea's trade complementarity with Malaysia decreased from 1.51 in 2003 to 1.38 in 2008. Therefore Korea's special country bias with Malaysia should be enhanced further by increasing capital movements and reducing discriminatory tariffs and other import restrictions between Korea and Malaysia.

(3) It was found that Korea's trade intensity with Philippines increased from 4.32 in 2003 to 5.99 in 2008 due to the increase in Korea's special country bias with Philippines from 2.72 in 2003 to 4.43 in 2008 even if Korea's trade complementarity with Philippines decreased from 1.59 in 2003 to 1.35 in 2008. Therefore Korea's special country bias with Philippines should be enhanced further by increasing capital movements and reducing discriminatory tariffs and other import restrictions between Korea and Philippines.

(4) It was also found that Korea's trade intensity with Singapore increased from 2.94 in 2003 to 4.79 in 2008 due to the increase in Korea's special country bias with Singapore from 2.20 in 2003 to 3.94 in 2008 even if Korea's trade complementarity with Singapore decreased from 1.33 in 2003 to 1.22 in 2008. Therefore Korea's special country bias with Singapore should be enhanced further by increasing capital movements and reducing discriminatory tariffs and other import restrictions between Korea and Singapore.

(5) It was found that Korea's trade intensity with Thailand increased from 2.78 in 2003 to 3.61 in 2008 due to the increase in Korea's special country bias with Thailand from 2.49 in 2003 to 3.39 in 2008 even if Korea's trade complementarity with Thailand decreased from 1.12 in 2003 to 1.06 in 2008. Therefore Korea's special country bias with Thailand should be enhanced further by increasing capital movements and reducing discriminatory tariffs and other import restrictions between Korea and Thailand.

(6) Korea's trade intensity with Indonesia in 2008 is the highest among her trade intensity with the five major ASEAN countries due to the fact that Korea's special country bias with Indonesia is the highest among her equivalent value with the five ASEAN countries, even if Korea's trade complementarity with Indonesia is the second lowest next to her equivalent value with Thailand. This means that discriminatory tariffs and other import restrictions, lower capital movements and economic cooperation which are prevalent in the economic relations between Korea and the other four ASEAN countries (i.e., Malaysia, Thailand, Singapore, and Philippines) do reduce Korea's special country bias with these four ASEAN countries and accordingly lessen her trade intensity with these four ASEAN countries, even if Korea's trade complementarity indices with Malaysia, Philippines, and Singapore are higher than her equivalent value with Indonesia. Therefore Korea's special country bias with these four countries should be enhanced further by increasing capital movements and reducing discriminatory tariffs and other import restrictions between Korea and these four ASEAN countries.

(7) Korea's trade intensity with Philippines in 2008 is the second highest next to her trade intensity with Indonesia. This is totally due to the fact that Korea's special

country bias with Philippines is again the second highest next to her equivalent value with Indonesia, along with the fact that Korea's trade complementarity with Philippines is the second highest in the order of its value among her equivalent values with these five ASEAN countries. This means that discriminatory tariffs and other import restrictions, lower capital movements and economic cooperation which are prevalent in the economic relations between Korea and other three ASEAN countries (i.e., Malaysia, Thailand, and Singapore) do reduce Korea's special country bias with these three countries and accordingly lessen her trade intensity with these three ASEAN countries. Therefore Korea's special country bias with these three countries should be enhanced further by increasing capital movements and reducing discriminatory tariffs and other import restrictions between Korea and these three ASEAN countries.

(8) Korea's trade intensity with Singapore in 2008 is the third highest next to her trade intensity with Indonesia and Philippines. This is totally due to the fact that Korea's special country bias with Singapore is the third highest next to her equivalent value with Indonesia and Philippines along with the fact that Korea's trade complementarity with Singapore is the third highest among her equivalent value with these five ASEAN countries. This means that discriminatory tariffs and other import restrictions, lower capital movements and economic cooperation which are prevalent in the economic relations between Korea and Malaysia (Thailand) do reduce Korea's special country bias with Malaysia (Thailand) and accordingly lessen her trade intensity with Thailand (Malaysia). Therefore Korea's special country bias with these two countries (i.e., Malaysia and Thailand) should be enhanced further by increasing capital movements and reducing discriminatory tariffs and other import restrictions between Korea and these two ASEAN countries.

(9) Rapid wage hikes from the late 1980s in Korea forced her to lose international competitiveness in the export of labor intensive manufactured products and start to have comparative advantage in the production of manufactured commodities which are relatively capital/technology intensive such as *SITC 76*, *SITC 79*, *SITC 77, SITC 62, SITC 67, SITC 75, SITC 73,* and *SITC 87*. In order to transform Korea's export patterns more capital/technology intensive in the near future, the accumulation of physical/human capital through appropriate incentive schemes should be pursued in Korea along with the increases in R&D expenditures.

(10) Korea's promising and potential exportable products to Indonesia in the manufacturing sector in 2008 are found to be capital/technology-intensive products, such as *SITC 76, SITC 79, SITC 72, SITC 67, SITC 73, SITC 77, SITC 62,* and *SITC 56.* Therefore Korea should try to export more of these products to Indonesia from now on, which is an original and timely policy suggestion of this paper.

(11) The Korean export products in the manufacturing sector became more concentrated during the period of 2003-2008. Since this kind of high concentration of Korean export products are not desirable for avoiding any potential economic loss associated with unfavorable trade-environmental changes against these export products, it should be relieved gradually in the near future.

(12) In 2008, Korea's promising and potential exportable products to Malaysia change to capital/technology-intensive products, such as *SITC 77, SITC 76, SITC 79,*

SITC 67, SITC 75, SITC 72, SITC 73, and *SITC 87.* Therefore Korea should try to export more of these products to Malaysia from now on, which is an original and timely policy suggestion of this paper.

(13) Korea's promising and potential exportable products to Philippines in 2008 are found to be capital/technology-intensive products, such as *SITC 77, SITC 76, SITC 79, SITC 75, SITC 87, SITC 72, SITC 67,* and *SITC 73.* Therefore Korea should try to export more of these products to Philippines from now on, which is an original and timely policy suggestion of this paper.

(14) In 2008, Korea's promising and potential exportable products to Singapore change to capital/technology-intensive products, such as *SITC 79, SITC 77, SITC 76, SITC 75, SITC 72, SITC 87, SITC 88, SITC 73,* and *SITC 67.* Therefore Korea should try to export more of these products to Singapore from now on, which is an original and timely policy suggestion of this paper.

(15) Korea's promising and potential exportable products to Thailand in 2008 are found to be (a) labor-intensive product, such as SITC 65 and (b) capital/technology-intensive products, such as *SITC 77, SITC 73, SITC 67, SITC 76, SITC 72, SITC 79, SITC 75,* and *SITC 87.* Therefore Korea should try to export more of these products to Thailand from now on, which is an original and timely policy suggestion of this paper.

Endnotes

[i] More detailed survey on the trade intensity model could be seen in pp. 125-131 in Kim (2004).
[ii] Refer to footnote 8 in p. 125 in Kim (2004).
[iii] The data for X.. is supposed to use the total trade volume of the world. In order to secure consistency of data set, we have to use total OECD trade volume which is smaller than total world trade volume. This might cause some bias to calculate the indices. Furthermore, we cannot utilize the trade data of China who is not an OECD country but is one of the biggest countries in the trade volume. This also could cause a bias of the indexes. These biases that cannot be corrected until when the world trade volume is available might be one of the flaws of our research.
[iv] More detailed explanation about the determinants of trade complementarity could be seen in pp. 125-131 in Kim (2004).

References

Balassa, B. 1965, 'Trade liberalization and revealed comparative advantages', *The Manchester School of Economic and Social Studies,* vol. 33, no. 2, Manchester, England.

Kim, SJ 2004, *Pure Trade Theory,* Yulgok Books Co., Seoul, Korea.

Kim, SJ 2007, 'Korea's trade intensity with her major trading countries in the manufacturing sector: Its changes over the last decade', *International Area Review*, vol. 10, no. 1, pp. 151-174, Hankuk University Foreign Studies, Seoul, Korea.

Ministry of International Trade and Industry, Government of Japan 1986, *White Paper on International Trade*, Tokyo, Japan.

OECD 2011, *International Trade by Commodity Statistics,* vol. 5, Paris, France.

Yamazawa, I. 1970, 'Intensity analysis of world trade flow', *Hitotsubashi Journal of Economics,* vol. 10, pp. 61-90, Tokyo, Japan.