First Draft

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**Changes in Korea’s Trade Intensity With Her Major Trading Countries in the Manufacturing Sector for the Period of 2003-2008**

**Seung Jin KIM**

**Professor of Economics**

**Hankuk Univ. of Foreign Studies**

**Seoul, Korea**

**H/P: +82-10-6206-9585**

**E-mail: seungjinkim@hotmail.com**

Changes in Korea’s Trade Intensity With Her Major Trading Countries in the Manufacturing Sector for the Period of 2003-2008\*

**Seung Jin Kim\*\***

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.

Ever since a sudden collapse of Lehman Brothers in September 2008 the USA has been suffering from a so-called global economic crisis by recording -3.5% and 3.0% GDP growth rate in 2009 and 2010 respectively. Japan has also been suffering from a global economic crisis by making -6.3% and 3.9% GDP growth rate in 2009 and 2010 respectively. China, however, has made an economic miracle by achieving 10.4% GDP growth rate on average for the last decade and is now the second biggest country next to the USA in terms of a size of GDP.

In 2010 Korean exports to the USA amounted to US$ 49.82 billion (i.e., 10.7% of Korea’s total exports) and Korean imports from the USA reached US$ 40.40 billion (i.e., 9.5% of Korea’s total imports). Accordingly, Korea enjoyed US$ 9.42 billion trade surplus with the USA. On the other hand, Korean exports to Japan in 2010 amounted to US$ 28.18 billion (i.e., 6.0% of Korea’s total exports) and Korean imports from Japan reached US$ 64.30 billion (i.e., 15.1% of Korea’s total imports). Consequently, Korea suffered from US$ 36.12 billion trade deficit with Japan.

**\*** This work was supported by Hankuk University of Foreign Studies Research Fund of 2011.

\*\* Professor, Department of International Economics and Law, College of Business and Economics, Hankuk University of Foreign Studies, Seoul, Korea: E-mail: [seungjinkim@hotmail.com](mailto:seungjinkim@hotmail.com), Tel: 82-10-6206-9585.

To our surprise, Korean exports to China in 2010 amounted to US$ 116.84 billion (i.e., 25.1% of Korea’s total exports) and Korean imports from China reached US$ 71.57

billion (i.e., 16.8% of Korea’s total imports). Accordingly, Korea enjoyed US$ 45.27

billion trade surplus with China.

This paper aims to analyze how Korea’s trade intensity with her major trading countries (i.e., the USA, Japan, and Korea) changed over time for the last five years (i.e., from 2003 to 2008).[[1]](#footnote-1) For this purpose, Section 2 will survey a trade intensity index model which was developed by Yamazawa (1970). Section 3 will measure a trade intensity index, a trade complementarity index, and a special country bias index between Korea and her major trading countries for the last five years by using the OECD trade matrix and analyze how Korea’s trade intensity with her major trading countries changed over time. Section 4 will summarize major empirical results and conclude the paper with a few remarks.

**2. Survey on Trade Intensity Index Model**

2.1 Trade Intensity, Trade Complementarity and Special Country Bias

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 (Balassa, 1965; Caves and Poter, 1975; Helpman and Krugman, 1985). 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(Hufbauer, 1970; Kierzkowski, 1984; Krugman, 1979).

Two alternative models have been developed for analyzing the world trade flows. One is a *gravity* model[[2]](#footnote-2) and the other is a *trade intensity* *index* model. The trade intensity index model (Yamazawa, 1970) 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

*Iij =  /  --------------------------------------------------------------* (1)

where *Xi*.( ≡ ), *X.j*( ≡ ), and *X..*( ≡ ) represent the total export of country i, total import of country j, and the total volume of world trade respectively.[[3]](#footnote-3) It is easily proved that, in a simplified gravity model where bilateral trade is solely determined by the GNP's of countries i and j, *Iij* is always equal to unity[[4]](#footnote-4). In other words, *Iij*equals unity if the value of trade is proportional to the GNP's of the two countries; exceeds unity if the trade becomes more intensive between the countries, and falls short of unity if trade becomes less intensive between the countries i and j. High trade intensity reflects such various factors as the strong complementarity in comparative advantage structures, smaller geographical and psychic distances, and mutually favorable trade agreements between the two countries.

This trade intensity index can be decomposed into trade complementarity index (*Cij*) and special country bias index (*Bij*) as follows.

Country i's patterns of exports to and imports from the world are principally determined by its structure of comparative advantage and disadvantage vis-a-vis the world. Assuming a homogeneous commodity is traded in a world where both transport costs and artificial barriers to trade are negligible, the country i's export of commodity h to country j () is expected to be the product of 「*country j's total import of the h-th commodity (X.jh)*」 multiplied by「*the share of country i in the world trade (i.e., export) of commodity h (Xi.h / X..h)*」 as follows.

*= X.jh () --------------------------------------------------------*  (2)

In other words, the exporting country i's expected market share in the importing country j's market in the trade of the h-th commodity (/*X.jh*) is supposed to be determined by the exporting country i's market share in the world market in the trade of the same commodity *(Xi.h / X..h)* assuming that there are no trade barriers and no transportation costs.

This expected value of country i's export of commodity h to country j () can be rewritten as follows.

* =  -----------------------------------------------------------* (3)

The expected value of total exports from country i to country j is defined as the sum of expected values of all commodities.

*≡  ------------------------------------------------------------* (4)

The country i's expected intensity of trade to country j (*Cij*) or the country i's trade complementarity to country j (*Cij*) is obtained by replacing the expected value of trade (**) for the actual one (*Xij*) in the equation (1).

*Cij = / ------------------------------------------------------------* (5)

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

*Bij*≡**= ** = *1* / * ----------------------------------* (6)

where *Bijh* is the degree of special country bias in the trade of commodity h (*Bijh = Xijh /* ) and *Bij* turns out to be a weighted harmonic mean of *Bijh.*

The first line of equation (6) gives a decomposition of trade intensity into two components as follows.

*Iij = Cij* ⋅ *Bij  ----------------------------------------------------------------* (7)

which is the basic formula for our analysis.

2.2 Determinants of Trade Complementarity

To find the determinants of trade complementarity (*Cij*), it can be decomposed as follows:

*Cij* =  / 

= 

= 

=  *Sih· Rjh ----------------------------------------* (8)

where *Sih* =  / , *Rjh*=  /

*Sih* and *Rjh* 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.[[5]](#footnote-5) They measure the degrees of country i's export specialization and country j's import specialization in commodity h respectively. Since their weighted average over all commodities always takes a constant value of unity,

 *Sih* =  *Rjh*= *1 ---------------------------------------* (9)

each of them takes value around unity. *Sih*of over (under) unity implies that country i exports commodity h more (less) intensively than the world average, and the higher (lower) the value of *Sih* the stronger (weaker) is country i's export specialization in commodity h. Similarly, the higher (lower) the value of *Rjh,* the stronger (weaker) is country j's import specialization in commodity h.

The vector of *Sih* over all commodities, (*Si1, Si2,..., Sin*), shows the structure of export specialization of country i, which reflects country i's structure of comparative advantage. Higher (lower) value of *Sih* indicates that country i has strong (weak) comparative advantage in the production of commodity h. The exactly same thing also applies to the vector of indices of import specialization. The structure of import specialization, however, is affected not only by the structure of comparative disadvantage but also by protective commercial policies much more than that of export specialization.

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.

σ2 (*Si*) =  (*Sih*- 1)2

σ2 (*Rj*) =  (*Rjh* - 1)2 *--------------------------------------------* (10)

It can be easily demonstrated that the lower the standard deviation of export (import) specialization index of a certain country, the more diversified the export (import) specialization pattern of the country[[6]](#footnote-6).

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

COV (*Si , Rj*)= ** (*Sih - 1*)(*Rjh - 1*)

*= * ( *Sih Rjh - Sih - Rjh + 1*)

*=  Sih Rjh - Sih - Rjh +*

*=  Sih Rjh - 1 - 1 + 1[[7]](#footnote-7)*

*=  Sih Rjh - 1*

*= Cij - 1[[8]](#footnote-8)*

*or Cij = COV* (*Si , Rj*) *+ 1 ---------------------------------------------* (11)

Therefore, if country i's pattern of export specialization matches country j's pattern of import specialization closely, that is, if the indices of country i's export specialization and country j's import specialization are positively correlated (i.e., *COV* (*Si , Rj*)＞0), *Cij* will take a value greater than unity. On the contrary, if they match poorly, that is, if they are negatively correlated (i.e., *COV* (*Si , Rj*)＜0), *Cij* will take a value less than unity. If they are independent (*COV* (*Si , Rj*)＝0), *Cij* will be equal to unity. Consequently, *Cij* measures the degree of complementarity in the specialization structures of two trading countries.

The degree of complementarity, however, is not only influenced by the match of the specialization patterns of exports and imports, but also by their concentration or diversification. A country with highly concentrated pattern of export specialization tends to have higher complementarity in her export activities than the country with a similar but more diversified pattern of export specialization[[9]](#footnote-9). Therefore, if the correlation coefficient between the specialization structure of exports and imports is calculated, the measure of the degree of match of the two patterns neutral from the degree of concentration or diversification can be obtained as follows.

*rij*=  ----------------------------------------------------- (12)

**3. Korea's Trade Intensity With Her Major Trading Countries in the**

**Manufacturing Sector for the Period of 2003-2008**

3.1 Thirty Five Industries in the Manufacturing Sector

To calculate Korea’s trade intensity with her major trading countries for the last five years, the OECD trade matrix is used. As shown in Table 1, our basic sample of industries for the manufacturing sector consists of 35 industries. The classification of manufactured products by factor intensity and end uses is also listed in Table 2.

[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 Products | 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*, pp. 405-406.

3.2 Korea’s Trade Intensity, Trade Complementarity and Special Country Bias With Her Major Trading Countries

Korea's trade intensity, trade complementarity, and special country bias with her major trading countries in the manufacturing sector for the period of 2003-2008 are displayed in Table 3.[[10]](#footnote-10) The results show that Korea's trade intensity with the USA decreased from 1.74 in 2003 to 1.70 in 2008, which advocates that the USA 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 the USA increased from 1.08 in 2003 to 1.10 in 2008, which means that Korea's export structure and the US import structure became **more complementary** for the last five years. The other is that Korea's special country bias with the USA decreased from 1.60 in 2003 to 1.55 in 2008, despite of the increase in Korea’s foreign direct investment (FDI in short hereafter) to the USA from US$ 1.07 billion in 2003 to US$ 5.13 billion in 2008.[[11]](#footnote-11)

[Table 3] Korea’s Trade Intensity, Trade Complementarity, and Special Country Bias

with USA, Japan, China in Manufacturing Sector : 2003, 2008

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Year** | **U.S.A.** | **Japan** | **China** |
| **Trade**  **Intensity** | 2003 | 1.74 | 4.66 | 7.32 |
| 2008 | 1.70 | 6.51 | 9.64 |
| **Trade**  **Complementarity** | 2003 | 1.08 | 0.99 | 1.21 |
| 2008 | 1.10 | 0.87 | 1.17 |
| **Special Country**  **Bias** | 2003 | 1.60 | 4.72 | 6.06 |
| 2008 | 1.55 | 7.47 | 8.24 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Year** | **UK** | **France** | **Germany** |
| **Trade**  **Intensity** | 2003 | 0.56 | 0.23 | 0.49 |
| 2008 | 0.54 | 0.28 | 0.54 |
| **Trade**  **Complementarity** | 2003 | 1.06 | 0.97 | 1.01 |
| 2008 | 0.99 | 0.94 | 0.95 |
| **Special Country**  **Bias** | 2003 | 0.53 | 0.24 | 0.49 |
| 2008 | 0.54 | 0.30 | 0.57 |

Table 3 also tells us that Korea's trade intensity with Japan increased from 4.66 in 2003 to 6.51 in 2008, which proves that Japan 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 Japan decreased from 0.99 in 2003 to 0.87 in 2008, which means that Korea's export structure and Japan’s import structure became **more competitive** over the last five years. The other is that Korea's special country bias with Japan increased from 4.72 in 2003 to 7.47 in 2008, partly due to the increase in Korea’s FDI to Japan from US$ 0.05 billion in 2003 to US$ 0.43 billion in 2008.

On the other hand, China emerged as **Korea’s major trading partner** as shown in the fact that Korea's trade intensity with China drastically increased from 7.32 in 2003 to 9.64 in 2008. This is totally due to the following two facts. One is that Korea's trade complementarity with China decreased from 1.21 in 2003 to 1.17 in 2008, which means that Korea's export structure and China’s import structure became **less complementary** over the last five years. The other is that Korea's special country bias with China also increased from 6.06 in 2003 to 8.24 in 2008, partly due to the drastic increase in Korea’s FDI to China from US$ 1.78 billion in 2003 to US$ 3.75 billion in 2008.

Korea's trade intensity with the USA in 2008 is lower than her trade intensity with Japan. This is totally due to the fact that Korea's special country bias with the USA is much lower than her equivalent value with Japan, even if Korea's trade complementarity with the USA is higher than her equivalent value with Japan. This means that higher transport cost, discriminatory tariffs and other import restrictions, lower capital movements and economic cooperation which are prevalent in the economic relations between Korea and the USA do reduce Korea's special country bias with the USA and accordingly lessen her trade intensity with the USA, even if Korea's trade complementarity with the USA is higher than her equivalent value with Japan.

Korea's trade intensity with China in 2008 is higher than her trade intensity with the USA. This is totally due to the fact that Korea's special country bias with China is much higher than her equivalent value with the USA, along with the fact that Korea's trade complementarity with China is higher than her equivalent value with the USA. This means that lower transport cost, discriminatory tariffs and other import restrictions, higher capital movements and economic cooperation which are prevalent in the economic relations between Korea and China do increase Korea's special country bias with China and accordingly raise her trade intensity with China, which is also reinforced by the fact that Korea's trade complementarity with China is higher than her equivalent value with the USA.

Korea's trade intensity with Japan in 2008 is lower than her trade intensity with China. This is totally due to the fact that Korea's special country bias with Japan is lower than her equivalent value with China, along with the fact that Korea's trade complementarity with Japan is lower than her equivalent value with China. This means that higher discriminatory tariffs and other import restrictions, lower capital movements and economic cooperation which are prevalent in the economic relations between Korea and Japan do reduce Korea's special country bias with Japan and accordingly lessen her trade intensity with Japan, which is also strengthened by the fact that Korea's trade complementarity with Japan is lower than her equivalent value with China.

3.3 Determinants of Korea’s Trade Complementarity with the USA

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).[[12]](#footnote-12)

[Table 4] Analysis of Korea's Trade Complementarity with the U.S.A. in Manufacturing Sector: 2003, 2008

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 2003 | | | | | 2008 | | | | |
| ***SITC*** | *SKh* | *RUh* | *SKh· RUh* |  |  | *SKh* | *RUh* | *SKh· RUh* |  |  |
| 51  52  53  54  55  56  57  58  59  61  62  63  64  65  66  67  68  69  71  72  73  74  75  76  77  78  79  81  82  83  84  85  87  88  89 | 0.29  0.30  0.31  0.03  0.10  0.09  0.65  0.73  0.29  0.14  ***1.34***  0.04  0.34  ***1.53***  0.33  0.88  0.26  0.73  0.29  0.54  0.52  0.62  ***2.59***  ***3.95***  ***2.08***  0.97  ***1.27***  0.25  0.14  0.65  ***1.62***  0.51  0.24  0.39  0.59 | 0.98  0.79  0.41  0.75  0.55  0.96  0.48  0.56  0.60  0.49  0.80  ***1.40***  0.80  0.63  0.93  0.50  0.90  0.79  ***1.18***  0.90  0.97  0.84  ***1.02***  ***1.34***  ***1.01***  ***1.41***  ***1.17***  0.82  ***1.23***  0.67  0.99  0.65  ***1.01***  ***1.03***  0.90 | 0.28  0.23  0.13  0.02  0.05  0.08  0.31  0.41  0.17  0.07  ***1.08***  0.06  0.27  0.97  0.31  0.44  0.23  0.58  0.34  0.49  0.50  0.52  ***2.64***  ***5.31***  ***2.11***  ***1.36***  ***1.49***  0.20  0.17  0.43  ***1.61***  0.33  0.24  0.40  0.53 | 0.04  0.01  0.01  0.06  0.01  0.00  0.02  0.01  0.02  0.00  0.01  0.01  0.03  0.02  0.02  0.03  0.02  0.03  0.04  0.03  0.01  0.05  0.05  0.04  0.08  0.18  0.03  0.00  0.01  0.00  0.02  0.01  0.03  0.01  0.05 | 0.01  0.00  0.00  0.00  0.00  0.00  0.01  0.00  0.00  0.00  0.01  0.00  0.01  0.02  0.01  0.01  0.00  0.02  0.01  0.02  0.00  0.03  0.13  0.24  0.18  0.25  0.04  0.00  0.00  0.00  0.04  0.00  0.01  0.00  0.03 | 0.50  0.43  0.31  0.04  0.11  0.27  0.79  0.78  0.25  0.28  ***1.41***  0.03  0.27  ***1.15***  0.33  ***1.37***  0.38  0.79  0.41  0.93  ***1.19***  0.66  ***1.34***  ***5.07***  ***1.90***  0.87  ***1.92***  0.14  0.14  0.18  0.51  0.16  ***1.02***  0.54  0.45 | 0.97  0.93  0.44  0.89  0.69  ***1.35***  0.50  0.55  0.62  0.79  0.74  0.93  0.77  0.61  0.86  0.61  ***1.10***  0.74  ***1.26***  ***1.00***  ***1.05***  0.94  0.93  ***1.41***  ***1.12***  ***1.30***  ***1.08***  0.77  ***1.06***  0.74  0.69  0.53  ***1.24***  ***1.11***  0.90 | 0.49  0.40  0.14  0.04  0.07  0.37  0.39  0.43  0.16  0.22  ***1.04***  0.03  0.21  0.70  0.29  0.83  0.42  0.59  0.52  0.93  ***1.25***  0.62  ***1.25***  ***7.16***  ***2.13***  ***1.13***  ***2.07***  0.11  0.15  0.13  0.35  0.08  ***1.27***  0.59  0.40 | 0.04  0.01  0.01  0.07  0.01  0.00  0.02  0.01  0.02  0.00  0.01  0.01  0.02  0.01  0.02  0.05  0.03  0.03  0.05  0.04  0.01  0.06  0.03  0.05  0.07  0.16  0.03  0.01  0.01  0.00  0.02  0.00  0.03  0.01  0.05 | 0.02  0.00  0.00  0.00  0.00  0.00  0.01  0.00  0.00  0.00  0.01  0.00  0.00  0.01  0.01  0.04  0.01  0.02  0.02  0.03  0.01  0.04  0.04  0.34  0.15  0.18  0.06  0.00  0.00  0.00  0.01  0.00  0.04  0.01  0.02 |
| Standard  Deviation | 0.81 | 0.87 |  | ∑=1 | ∑=1.08 | 0.90 | 0.89 |  | ∑=1 | ∑=1.10 |
| Covar. &  Corr.  Coeff. | *COV* (*SK , RU*)  *rKU*  0.08 0.33 | | | | | *COV* (*SK , RU*) *rKU*  0.10 0.39 | | | | |

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, the USA has comparative disadvantage in the production of (a) labor-intensive products, such as *SITC 63,* and *SITC 82* and (b) capital/technology-intensive products, such as *SITC 78, SITC 76, SITC 71, SITC 79, SITC 88, SITC 75, SITC 77,* and *SITC 87* in 2003.

In 2008, the USA continues to have comparative disadvantage in the production of (a) labor-intensive product, such as *SITC 82* and (b) capital/technology-intensive products, such as *SITC 76, SITC 56, SITC 78, SITC 71, SITC 87, SITC 77, SITC 88, SITC 68,* *SITC* *79, SITC 73,* and *SITC 72*.

Consequently, Korea's promising and potential exportable products to the USA (i.e., the products which have a high value of *SKh · RUh*in Table 4) in 2003 turn out to be (a) labor-intensive product, such as *SITC 84* and (b) capital/technology-intensive products, such as *SITC 76*, *SITC 75,* *SITC 77,* *SITC 79,* *SITC 78*, and *SITC 62*.

In 2008, Korea's promising and potential exportable products to the USA changes to capital/technology-intensive products, such as *SITC 76, SITC 77, SITC 79, SITC 87, SITC 73, SITC 75, SITC 78,* and *SITC 62*.

The standard deviation of *SKh* increases from 0.81 in 2003 to 0.90 in 2008, which means that Korea's export specialization becomes **more concentrated** over time for the last five years. The standard deviation of *RUh* also increases from 0.87 in 2003 to 0.89 in 2008, which means that the US import specialization becomes **more concentrated** over time for the last five years.

Since Korea's pattern of export specialization and the US pattern of import specialization were positively correlated in 2003 (i.e., COV (*SK , RU*) = 0.08), *CKU* (i.e., Korea’s trade complementarity with the USA) reached 1.08, which means that Korea's export structure and the US import structure were complementary with each other in 2003. As this positive correlation coefficient between Korea's pattern of export specialization and the US pattern of import specialization increased in 2008 (i.e., COV (*SK , RU*) = 0.10), *CKU* reached 1.10, which means that Korea's export structure and the US import structure became **more complementary** with each other in 2008.

Accordingly, the correlation coefficient between Korea's export specialization structure and the US import specialization structure (i.e., *rKU*), which is the measure of the degree of match of the two patterns neutral from the degree of concentration or diversification increased from 0.33 in 2003 to 0.39 in 2008, which implied that Korea's export structure and the US import structure became **more complementary** with each other for the period of 2003-2008.

3.4 Determinants of Korea’s Trade Complementarity with Japan

As shown in Tables 4 and 5, Korea in both 2003 and 2008 has comparative advantage in the production of (a) labor-intensive product, such as *SITC 65* and (b) capital/technology-intensive products, such as *SITC 76, SITC 75, SITC 77,* *SITC 62,* and *SITC 79.*

[Table 5] Analysis of Korea's Trade Complementarity with Japan in Manufacturing Sector: 2003, 2008

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 2003 | | | | | 2008 | | | | |
| ***SITC*** | *SKh* | *RJh* | *SKh· RJh* |  |  | *SKh* | *RJh* | *SKh· RJh* |  |  |
| 51  52  53  54  55  56  57  58  59  61  62  63  64  65  66  67  68  69  71  72  73  74  75  76  77  78  79  81  82  83  84  85  87  88  89 | 0.29  0.30  0.31  0.03  0.10  0.09  0.65  0.73  0.29  0.14  ***1.34***  0.04  0.34  ***1.53***  0.33  0.88  0.26  0.73  0.29  0.54  0.52  0.62  ***2.59***  ***3.95***  ***2.08***  0.97  ***1.27***  0.25  0.14  0.65  ***1.62***  0.51  0.24  0.39  0.59 | ***1.48***  ***2.72***  0.71  0.93  ***1.14***  0.99  0.69  0.62  ***1.53***  0.67  0.44  ***1.00***  0.55  0.65  0.92  0.47  ***1.62***  0.67  0.75  0.99  ***1.03***  0.76  ***1.14***  0.85  ***1.38***  0.50  ***1.95***  0.83  0.73  ***7.37***  ***1.14***  0.99  ***2.22***  ***2.20***  ***1.23*** | 0.42  0.80  0.22  0.03  0.11  0.09  0.45  0.45  0.44  0.09  0.60  0.04  0.19  0.99  0.31  0.42  0.42  0.49  0.22  0.54  0.53  0.47  ***2.94***  ***3.36***  ***2.86***  0.49  ***2.48***  0.20  0.10  ***4.79***  ***1.84***  0.51  0.52  0.85  0.72 | 0.04  0.01  0.01  0.06  0.01  0.00  0.02  0.01  0.02  0.00  0.01  0.01  0.03  0.02  0.02  0.03  0.02  0.03  0.04  0.03  0.01  0.05  0.05  0.04  0.08  0.18  0.03  0.00  0.01  0.00  0.02  0.01  0.03  0.01  0.05 | 0.02  0.01  0.00  0.00  0.00  0.00  0.01  0.01  0.01  0.00  0.01  0.00  0.00  0.02  0.01  0.01  0.01  0.01  0.01  0.02  0.00  0.03  0.14  0.15  0.24  0.09  0.07  0.00  0.00  0.01  0.04  0.00  0.02  0.01  0.03 | 0.50  0.43  0.31  0.04  0.11  0.27  0.79  0.78  0.25  0.28  ***1.41***  0.03  0.27  ***1.15***  0.33  ***1.37***  0.38  0.79  0.41  0.93  ***1.19***  0.66  ***1.34***  ***5.07***  ***1.90***  0.87  ***1.92***  0.14  0.14  0.18  0.51  0.16  ***1.02***  0.54  0.45 | ***1.42***  ***2.99***  0.87  ***1.15***  ***1.14***  ***1.32***  0.88  0.43  ***1.76***  ***1.30***  0.35  0.87  0.42  0.64  0.79  0.12  ***2.31***  0.62  ***1.02***  ***1.21***  0.84  0.77  0.78  0.54  0.92  0.52  ***2.44***  0.37  0.46  ***6.54***  ***1.11***  ***1.03***  ***2.29***  ***2.97***  ***1.28*** | 0.72  ***1.30***  0.27  0.05  0.12  0.36  0.70  0.33  0.44  0.36  0.50  0.03  0.11  0.74  0.26  0.16  0.89  0.49  0.42  ***1.13***  ***1.01***  0.51  ***1.04***  ***2.75***  ***1.75***  0.45  ***4.70***  0.05  0.07  ***1.17***  0.57  0.16  ***2.34***  ***1.59***  0.58 | 0.04  0.01  0.01  0.07  0.01  0.00  0.02  0.01  0.02  0.00  0.01  0.01  0.02  0.01  0.02  0.05  0.03  0.03  0.05  0.04  0.01  0.06  0.03  0.05  0.07  0.16  0.03  0.01  0.01  0.00  0.02  0.00  0.03  0.01  0.05 | 0.03  0.01  0.00  0.00  0.00  0.00  0.02  0.00  0.01  0.00  0.01  0.00  0.00  0.01  0.00  0.01  0.03  0.02  0.02  0.04  0.01  0.03  0.03  0.13  0.13  0.07  0.13  0.00  0.00  0.00  0.01  0.00  0.07  0.01  0.03 |
| Standard  Deviation | 0.81 | 1.25 |  | ∑=1 | ∑=0.99 | 0.90 | 1.27 |  | ∑=1 | ∑=0.87 |
| Covar. &  Corr.  Coeff. | *COV* (*SK , RJ*)  *rKJ*  -0.01 -0.03 | | | | | *COV* (*SK , RJ*) *rKJ*  -0.13 -0.19 | | | | |

On top of these products, as mentioned in sub-section 3.3, Korea in 2003 used to have comparative advantage in the production of (a) 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, Japan has comparative disadvantage in the production of (a) labor-intensive products, such as *SITC 83, SITC 84,* and *SITC 63* and (b) capital/technology-intensive products, such as *SITC 52, SITC 87, SITC 88, SITC 79, SITC 68, SITC 59, SITC 51, SITC 77, SITC 89, SITC 75, SITC 55,* and *SITC 73* in 2003.

In 2008, Japan continues to have comparative disadvantage in the production of (a) labor-intensive products, such as *SITC 83, SITC 61, SITC 84,* and *SITC 85* and (b) capital/technology-intensive products, such as *SITC 52, SITC 88, SITC 79, SITC 68, SITC 87, SITC 59, SITC 51, SITC 56, SITC 89, SITC 72, SITC 54, SITC 55,* and *SITC 71.*

Consequently, Korea's promising and potential exportable products to Japan (i.e., the products which have a high value of *SKh · RJh*in Table 5) in 2003 turn out to be (a) labor-intensive products, such as *SITC 83* and *SITC 84,* and(b)capital/technology-intensive products, such as *SITC 76, SITC 75, SITC 77,* and *SITC 79*.

In 2008, Korea's promising and potential exportable products to Japan changes to (a) labor-intensive product, such as *SITC 83* (b)capital/technology-intensive products, such as *SITC 79, SITC 76, SITC 87, SITC 77, SITC 88, SITC 52, SITC 72, SITC 75,* and *SITC 73.*

As mentioned in sub-section 3.3, the standard deviation of *SKh* increases in the period of 2003-2008, which means that Korea's export specialization becomes more concentrated over time. The standard deviation of *RJh* also increases from 1.25 in 2003 to 1.27 in 2008, which means that Japan’s import specialization becomes **more concentrated** over time for the last five years.

Since Korea's pattern of export specialization and Japan’s pattern of import specialization were negatively correlated in 2003 (i.e., COV (*SK , RJ*) = -0.01), *CKJ* (i.e., Korea’s trade complementarity with Japan) reached 0.99, which means that Korea's export structure and Japan’s import structure were competing with each other in 2003. As this negative correlation coefficient between Korea's pattern of export specialization and Japan’s pattern of import specialization was strengthened in 2008 (i.e., COV (*SK , RJ*) = -0.13), *CKJ* reached 0.87, which means that Korea's export structure and Japan’s import structure became **more competitive** with each other in 2008.

Accordingly, the correlation coefficient between Korea's export specialization structure and Japan’s import specialization structure (i.e., *rKJ*), which is the measure of the degree of match of the two patterns neutral from the degree of concentration or diversification decreased from -0.03 in 2003 to -0.19 in 2008, which implied that Korea's export structure and Japan’s import structure became **more competitive** with each other for the period of 2003-2008.

3.5 Determinants of Korea’s Trade Complementarity with China

As shown in Tables 4 to 6, Korea in both 2003 and 2008 has comparative advantage in the production of (a) labor-intensive product, such as *SITC 65* and (b) capital/technology-intensive products, such as *SITC 76, SITC 75, SITC 77,* *SITC 62,* and *SITC 79.*

[Table 6] Analysis of Korea's Trade Complementarity with the China in Manufacturing Sector: 2003, 2008

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 2003 | | | | | 2008 | | | | |
| ***SITC*** | *SKh* | *RCh* | *SKh· RCh* |  |  | *SKh* | *RCh* | *SKh· RCh* |  |  |
| 51  52  53  54  55  56  57  58  59  61  62  63  64  65  66  67  68  69  71  72  73  74  75  76  77  78  79  81  82  83  84  85  87  88  89 | 0.29  0.30  0.31  0.03  0.10  0.09  0.65  0.73  0.29  0.14  ***1.34***  0.04  0.34  ***1.53***  0.33  0.88  0.26  0.73  0.29  0.54  0.52  0.62  ***2.59***  ***3.95***  ***2.08***  0.97  ***1.27***  0.25  0.14  0.65  ***1.62***  0.51  0.24  0.39  0.59 | ***1.48***  0.59  ***1.05***  0.12  0.25  ***2.18***  ***1.76***  0.80  0.73  ***2.86***  0.31  0.25  0.47  ***1.78***  0.70  ***2.12***  0.99  0.52  0.84  ***2.93***  ***2.89***  ***1.23***  ***1.18***  ***1.57***  ***1.94***  0.39  ***1.00***  0.25  0.25  0.09  0.12  0.38  ***1.31***  ***1.15***  0.34 | 0.42  0.18  0.33  0.00  0.02  0.19  ***1.14***  0.59  0.21  0.40  0.42  0.01  0.16  ***2.73***  0.24  ***1.87***  0.25  0.38  0.24  ***1.59***  ***1.50***  0.76  ***3.06***  ***6.19***  ***4.03***  0.38  ***1.27***  0.06  0.03  0.06  0.19  0.19  0.31  0.44  0.20 | 0.04  0.01  0.01  0.06  0.01  0.00  0.02  0.01  0.02  0.00  0.01  0.01  0.03  0.02  0.02  0.03  0.02  0.03  0.04  0.03  0.01  0.05  0.05  0.04  0.08  0.18  0.03  0.00  0.01  0.00  0.02  0.01  0.03  0.01  0.05 | 0.02  0.00  0.00  0.00  0.00  0.00  0.02  0.01  0.00  0.00  0.01  0.00  0.00  0.06  0.00  0.05  0.00  0.01  0.01  0.05  0.01  0.04  0.15  0.27  0.34  0.07  0.04  0.00  0.00  0.00  0.00  0.00  0.01  0.01  0.01 | 0.50  0.43  0.31  0.04  0.11  0.27  0.79  0.78  0.25  0.28  ***1.41***  0.03  0.27  ***1.15***  0.33  ***1.37***  0.38  0.79  0.41  0.93  ***1.19***  0.66  ***1.34***  ***5.07***  ***1.90***  0.87  ***1.92***  0.14  0.14  0.18  0.51  0.16  ***1.02***  0.54  0.45 | ***1.05***  ***1.14***  ***1.03***  0.24  0.36  0.66  ***1.47***  ***1.12***  ***1.01***  ***2.46***  0.42  0.17  0.31  ***1.23***  0.67  ***1.07***  ***1.21***  0.64  ***1.05***  ***2.25***  ***3.52***  ***1.50***  0.73  0.82  ***2.30***  0.49  ***1.71***  0.18  0.24  0.24  0.14  0.16  ***1.45***  ***1.87***  0.43 | 0.53  0.50  0.32  0.01  0.04  0.18  ***1.16***  0.87  0.25  0.68  0.59  0.01  0.08  ***1.42***  0.22  ***1.46***  0.46  0.50  0.43  ***2.09***  ***4.21***  0.98  0.98  ***4.18***  ***4.37***  0.43  ***3.30***  0.03  0.03  0.04  0.07  0.03  ***1.48***  ***1.00***  0.19 | 0.04  0.01  0.01  0.07  0.01  0.00  0.02  0.01  0.02  0.00  0.01  0.01  0.02  0.01  0.02  0.05  0.03  0.03  0.05  0.04  0.01  0.06  0.03  0.05  0.07  0.16  0.03  0.01  0.01  0.00  0.02  0.00  0.03  0.01  0.05 | 0.02  0.00  0.00  0.00  0.00  0.00  0.03  0.01  0.00  0.00  0.01  0.00  0.00  0.02  0.00  0.07  0.01  0.02  0.02  0.08  0.04  0.06  0.03  0.20  0.32  0.07  0.09  0.00  0.00  0.00  0.00  0.00  0.05  0.01  0.01 |
| Standard  Deviation | 0.81 | 1.05 |  | ∑=1 | ∑=1.21 | 0.90 | 1.01 |  | ∑=1 | ∑=1.17 |
| Covar. &  Corr.  Coeff. | *COV* (*SK , RC*)  *rKC*  0.21 0.31 | | | | | *COV* (*SK , RC*) *rKC*  0.17 0.24 | | | | |

On top of these products, as mentioned in sub-sections 3.3 and 3.4, Korea in 2003 used to have comparative advantage in the production of (a) 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, China has comparative disadvantage in the production of (a) labor-intensive products, such as *SITC 61* and *SITC 65* and (b) capital/technology-intensive products, such as *SITC 72, SITC 73, SITC 56, SITC 67, SITC 77, SITC 57, SITC 76, SITC 51, SITC 87, SITC 74, SITC 75, SITC 88, SITC 53,* and *SITC 79* in 2003.

In 2008, China continues to have comparative disadvantage in the production of (a) labor-intensive products, such as *SITC 61* and *SITC 65* and (b) capital/technology-intensive products, such as *SITC 73, SITC 77, SITC 72, SITC 88, SITC 79, SITC 74, SITC 57, SITC 87, SITC 68, SITC 52, SITC 58, SITC 67, SITC 51, SITC 71, SITC 53,* and *SITC 59.*

Consequently, Korea's promising and potential exportable products to China (i.e., the products which have a high value of *SKh · RCh*in Table 6) 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 75, SITC 67, SITC 72, SITC 73, SITC 79,* and*. SITC 57.*

In 2008, Korea's promising and potential exportable products to China changes to (a) labor-intensive product, such as *SITC 65* and (b)capital/technology-intensive products, such as *SITC 77, SITC 73, SITC 76, SITC 79, SITC 72, SITC 87, SITC 67, SITC 57,* and *SITC 88.*

As mentioned in sub-sections 3.3 to 3.4, the standard deviation of *SKh* increases in the period of 2003-2008, which means that Korea's export specialization becomes more concentrated over time. The standard deviation of *RCh*, however, decreases from 1.05 in 2003 to 1.01 in 2008, which means that China’s import specialization becomes **more diversified** over time for the last five years.

Since Korea's pattern of export specialization and China’s pattern of import specialization were positively correlated in 2003 (i.e., COV (*SK , RC*) = 0.21), *CKC* (i.e., Korea’s trade complementarity with China) reached 1.21, which means that Korea's export structure and China’s import structure were complementary with each other in 2003. As this positive correlation coefficient between Korea's pattern of export specialization and China’s pattern of import specialization was weakened in 2008 (i.e., COV (*SK , RC*) = 0.17), *CKC* reached 1.17, which means that Korea's export structure and China’s import structure became **less** **complementary** with each other in 2008.

Accordingly, the correlation coefficient between Korea's export specialization structure and China’s import specialization structure (i.e., *rKC*), which is the measure of the degree of match of the two patterns neutral from the degree of concentration or diversification decreased from 0.31 in 2003 to 0.24 in 2008, which implied that Korea's export structure and China’s import structure became **less complementary** with each other for the period of 2003-2008.

4. Summary and Concluding Remarks

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

Firstly, it was found that Korea’s trade intensity with the USA decreased from 1.74 in 2003 to 1.70 in 2008 due to decrease in Korea’s special country bias with the USA from 1.60 in 2003 to 1.55 in 2008 even if Korea’s trade complementarity with the USA increased from 1.08 in 2003 to 1.10 in 2008. Therefore Korea’s special country bias with the USA should be enhanced by (a) increasing capital movements and economic cooperation and (b) reducing discriminatory tariffs and other import restrictions between Korea and the USA. In this respect, FTA (i.e., Free Trade Arrangement) agreement signed by the previous governments of both the USA and Korea should be passed soonest as possible by the legislative bodies of both countries.

Secondly, it was also found that Korea’s trade intensity with Japan increased from 4.66 in 2003 to 6.51 in 2008 due to (a) increase in Korea’s special country bias with Japan from 4.72 in 2003 to 7.47 in 2008 and (b) decrease in Korea’s trade complementarity with Japan from 0.99 in 2003 to 0.87 in 2008. Therefore Korea’s special country bias with Japan should further be enhanced by (a) reducing discriminatory tariffs and other import restrictions and (b) increasing capital movements and economic cooperation between Korea and Japan. In this regard, FTA negotiation between Japan and Korea, which was processed a few years ago but suspended later due to sharp conflicts of national interests and sentiments, should be continued.

Thirdly, it was found that Korea’s trade intensity with China increased from 7.32 in 2003 to 9.64 in 2008 due to (a) increase in Korea’s special country bias with China from 6.06 in 2003 to 8.24 in 2008 and (b) decrease in Korea’s trade complementarity with China from 1.21 in 2003 to 1.17 in 2008. Therefore Korea’s special country bias with China should further be enhanced by (a) increasing capital movements and economic cooperation and (b) reducing discriminatory tariffs and other import restrictions between Korea and China. In this respect, FTA discussion between China and Korea, in which the Chinese government is quite interested, should be started soonest as possible.

Fourthly, Korea's trade intensity with the USA in 2008 is found to be lower than her trade intensity with Japan due to the fact that Korea's special country bias with the USA is much lower than her equivalent value with Japan even if Korea's trade complementarity with the USA is higher than her equivalent value with Japan. Therefore the higher discriminatory tariffs and other import restrictions which are prevalent in the economic relations between Korea and the USA should gradually be reduced. Furthermore, capital movements and economic cooperation between the USA and Korea should be facilitated to increase Korea's special country bias with the USA and accordingly enhance her trade intensity with the USA. In this regard, FTA between Korea and USA should be effective as early as possible.

Fifthly, Korea's trade intensity with China in 2008 is found to be higher than her trade intensity with the USA due to the following two facts: (a) Korea's special country bias with China is much higher than her equivalent value with the USA and (b) Korea's trade complementarity with China is higher than her equivalent value with the USA. Therefore special measures should be pursued in order to enhance Korea’s special country bias with the USA by adopting the same strategy as listed in the above paragraph. In this respect, it is urgent that the legislative bodies of both Korea and the USA pass FTA.

Sixthly, Korea's trade intensity with Japan in 2008 is found to be lower than her trade intensity with China due to the following two facts: (a) Korea's special country bias with Japan is lower than her equivalent value with China (b) Korea's trade complementarity with Japan is lower than her equivalent value with China. Therefore the higher discriminatory tariffs and other import restrictions which are prevalent in the economic relations between Korea and Japan should gradually be reduced. Furthermore, capital movements and economic cooperation between Korea and Japan should be facilitated to increase Korea's special country bias with Japan and accordingly enhance her trade intensity with Japan. In this regard, FTA negotiation between Japan and Korea should be continued.

Seventhly, 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.

Eighthly, Korea's promising and potential exportable products to the USA in the manufacturing sector in 2008 are found to be capital/technology-intensive products, such as *SITC 76, SITC 77, SITC 79, SITC 87, SITC 73, SITC 75, SITC 78,* and *SITC 62*. Therefore Korea should try to export more of these products to the USA from now on.

Ninthly, 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 is not desirable for avoiding any potential economic loss associated with unfavorable trade-environmental changes against these export products, it should be diversified very soon.

Tenthly, Korea's promising and potential exportable products to Japan in the manufacturing sector in 2008 turn out to be (a) labor-intensive product, such as *SITC 83* and (b)capital/technology-intensive products, such as *SITC 79, SITC 76, SITC 87, SITC 77, SITC 88, SITC 52, SITC 72, SITC 75,* and *SITC 73.* Therefore Korea should try to export more of these products to Japan from now on.

Eleventhly, Korea's promising and potential exportable products to China in the manufacturing sector 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 76, SITC 79, SITC 72, SITC 87, SITC 67, SITC 57,* and *SITC 88.* Therefore Korea should try to export more of these products to China from now on.

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1. It is desirable to extend our analysis to the period after 2008. The latest version of OECD trade matrix, however, is only up to 2008. If the more recent data are published in the near future, we will update our analysis immediately. [↑](#footnote-ref-1)
2. The gravity model assumes that trade between two countries will mechanically be determined by the gross national products of exporting and importing countries and economic distance between the two. The GNP of an exporting country represents the size of her supply capacity and that of an importing country her total demand. The volume of trade between the two trading countries tends to increase if the GNP of either country increases, and tends to decrease, if the economic distance between them (measured in terms of transportation cost) increases. If this relationship holds between any pairs of countries, country i’s export to country j(*Xij*) can be defined as follows :

   *Xij = α Yiβ Yjγ Dij-δ*

   where *Yi, Yj*be the GNP's of country i and j, *Dij* be the measure of economic distance between two countries, and *α, β, γ, δ* be positive constants. [↑](#footnote-ref-2)
3. The data for X.. is supposed to use the total volume of world trade. We, however, use total OECD trade volume which is smaller than world trade volume. This can cause some bias to calculate trade intensity indices. Furthermore, we could not utilize the trade data of China which is not an OECD country but is one of the largest countries in the trade volume. This also can cause a bias of the indices. These biases that might not repair until when the world trade volume is available are one of the flaws of our research. [↑](#footnote-ref-3)
4. Refer to footnote 4 in p 62 in Yamazawa (1970). [↑](#footnote-ref-4)
5. *Sih* is nothing but an RCA (Revealed Comparative Advantage) index of country i for commodity h, which was firstly introduced into a pure trade theory by Balassa (1965). [↑](#footnote-ref-5)
6. Refer to pp. 65-66 in Yamazawa (1970). [↑](#footnote-ref-6)
7. According to Equation (9),  =  = 1.

   Furthermore,  = 1. [↑](#footnote-ref-7)
8. By Equation (8). [↑](#footnote-ref-8)
9. Refer to the example of Table 1 in p 66 in Yamazama (1970). [↑](#footnote-ref-9)
10. In the bottom part of Table 3, Korea's trade intensity, complementarity, and special country bias with three major OECD West European countries (i.e., UK, France, and Germany) are tabulated just for the purpose of comparison. The detailed explanation for these three countries, however, was skipped due to space limitation of paper. [↑](#footnote-ref-10)
11. If Korea's FDI to the USA was made in the manufacturing sector, Korea's trade intensity with the USA will increase by promoting trade volume between two countries. For example, Hyundai Automobile Company made FDI to the USA in order to build an automobile factory over there a few years ago. Then this would result in increases of the US imports of Korean automobile parts and components from Korea. Accordingly Korea’s trade intensity with the USA would increase. [↑](#footnote-ref-11)
12. As shown in Tables 4 to 6, the numbers whose value is bigger than one are italicized. On top of that, if the relevant product is labor-intensive, the value is printed in red. If the relevant product is capital/technology intensive, the value is printed in blue. [↑](#footnote-ref-12)