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East Asia's Pattern of Export Specialization: Does Indonesia Compete with Japan, China, Hong Kong, Korea and Singapore?

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East Asia's Pattern of Export Specialization: Does Indonesia Compete with Japan, China, Hong Kong, Korea and Singapore?

Abstract

The purpose of this paper is to analyze the comparative advantage of East Asian countries (China, Japan, Hong Kong, South Korea, Singapore and Indonesia) and to investigate whether Indonesia is competing in the similar groups of products - based on the 3-digit SITC Revision 2 for 237 groups of products published by the UN-COMTRADE. *First*, we calculate the Revealed Symmetric Comparative Advantage (RSCA) index to know the pattern of comparative advantage for each the East Asian countries. *Second*, we calculate the distribution of RSCA (value of mean, median, standard deviation and skewness of comparative advantage) from each the East Asian countries to analyze the dynamics of comparative advantage. *Third*, we examine the correlation of Indonesia's RSCA with the RSCA of each the East Asian countries for the period 1995-2015 to determine whether Indonesia has a similar pattern of specialization and whether competing in the same product market with the East Asian countries. The result of the analysis shows that China is the biggest competitor for Indonesia, and Japan has very different patterns of specialization.

JEL classification : F10, F14, F17

Keywords : RSCA, Distribution of RSCA, RSCA Correlation, Specialization Pattern

1. Introduction

Liberalization, globalization, economic integration, bilateral and multilateral agreements have encouraged international strategic alliances conducted by countries. Trade liberalization might not only offer opportunities for the export development but also carry more competitive environment in the international, regional and domestic markets. Ng and Yeats (2003) found that since the mid-1980s intra-regional trade in East Asia had grown at a rate approximately double that of world trade and at a rate much higher than the intra-regional trades in either the North America Free Trade Agreement (NAFTA) or the European Union (EU). In addition, there have been linkages and interdependences in the East Asian economic activities - such as production sharing and foreign direct investment (Athukorala, 2003; Athukorala and Yamashita, 2006; Ng and Yeats, 2001, 2003). Most of trade expansion occurs in developed countries such as Western Europe and North America while in Asia region was geographically concentrated in East Asia,

especially in Japan and China. For the purposes of international trade, the World Bank classifies countries in the world into seven trading area, namely: (1) East Asia and Pacific (EAP); (2) South Asia (SAS); (3) Europe and Central Asia (ECA); (4) North America (NAM); (5) Latin America and Caribbean (LAC); (6) Middle East and North Africa (MENA); (7) Sub-Saharan Africa (SSA). In this study, the trading area which analyzed is the East Asian region. For the purposes of analysis, the authors have separated the East Asia from EAP and Central Asia from ECA trading area to see the comparison between regions in Asia. Figure 1 below represents an overview of world trade (export of goods and services) by region, according to the World Bank classification in the period 2011-2014.

Figure 1. about here

Europe region dominates export of goods and services to the world trade during the period 2011 to 2014 (Figure 1). While the East Asian region is the second largest of export value, but when compared to regions in Asia, the East Asia region is the region with the largest contribution of export value of goods and services to world trade. This is consistent with the reason in determining the selection of the countries in the East Asian region as subjects in this study, in which the countries in the East Asian region are the countries that have succeeded in creating high export and the trade expansion for Asia was concentrated geographically in the East Asian region. Based on data from the United Nations Commodity Trade Statistics Database (UN-COMTRADE) during 2004-2014 China is a country with the highest trade value, export, and import among the East Asian countries and the second highest trade value was Japan, so both countries known as the economic main motor in the East Asian region. Figure 2 below shows the export value of the East Asian countries during the period 1993-2014.

Figure 2. about here

During the period 1993-2003, Japan is a country that has the highest export value in the East Asia region, but during the period 2004-2014 China is a country that has the highest export value with a trend that continues to increase very high. While the third highest export value are South Korea. Then the next sequence respectively are Hong Kong, Singapore, and Indonesia. In this study, the countries analyzed are the East Asian countries. Based on the World Bank classification, the East Asian countries in this study includes China, Japan, the countries that are members of the New Industrialized Economies (NIEs) are Hong Kong, South Korea (Republic of Korea), and Singapore, then Indonesia as the main country. The East Asian countries selection is

based on several reasons. First, the East Asian countries have created a very high export such as Japan, China, and South Korea. The significant export of the East Asian countries mostly based on government support in planning the economy and promoting the sectors of export industry as an economic pillar. Second, the successes of the NIEs in changing the structure of the economy from unskilled-labor intensive production to skilled-labor intensive production and eventually into capital intensive production, so NIEs become a pioneer in changing the focus of export from primary commodities into manufactured products then followed by many other countries. Third, the success of Japan, South Korea, Hong Kong and Singapore have now become a leading exporter of world class. The successful of these countries are not only based on market mechanism but also on the determination of the level and composition of export production, which planned directly by the government and not based on the market mechanism. Fourth, trade expansion generally occurs in developed countries such as Western Europe and North America, but for the Asian region is geographically concentrated in the East Asia, especially in Japan and China. Fifth, based on the data from World Integrated Trade Solution (WITS) in the period 2010-2014, it shows the three countries of Indonesia's main trade partners for both exports and imports are Japan, China, and Singapore where these countries are located in the same region with Indonesia. Sixth, the NIEs are examples of countries that succeed in the strategy of export promotion as well as the earliest countries that carried out an export promotion strategy.

The existence of the problems in which the trade value of Indonesia is lower than other countries in East Asia region, while the East Asian countries have succeeded in creating very high export, such as China, Japan, South Korea and Hong Kong, then the two largest exporting countries in East Asia (China and Japan) are the Indonesia's main trade partners for exports and imports in the last five years (2010-2014). This study investigates the relation between trade specialization pattern of Indonesia and each country in the East Asia region. The rest of this paper is organized as follows: the second section discusses the literature review about the comparative advantage and trade specialization. The third section describes the methodology that consists of data and analytical tools that are used. The fourth section discusses the results and analysis of RSCA, distribution of RSCA, and the correlation between Indonesia RSCA with each RSCA of East Asian countries, then the conclusions are discussed in the fifth section.

2. Literature Review: Comparative Advantage and Trade Specialization

David Ricardo's theory of comparative advantage states that a country will export the products that have a comparative advantage. Comparative advantage is the country benefits in the specialization to produce the products that have a lower relative price than in other countries. The principle of comparative advantage states that a country which in competition conditions will specialize in producing and exporting goods with the lowest relative cost.

Hecksher-Ohlin's neoclassical theory states that the comparative advantage of a country is determined by the factor endowment or ownership. This theory argues that the pattern of international trade is determined by differences in the contributing factors. Neoclassical theory of Hecksher-Ohlin also suggests that the countries with capital abundant will specialize in capital-intensive products then export some of these products and import the products which requires a lot of land or labor-intensive.

Revealed Comparative Advantage (RCA) index is a measurement that used to test the comparative advantage and to determine the pattern of trade specialization however it has a non-symmetrical value. This study will use an index that will generate symmetric value namely Revealed Symmetric Comparative Advantage (RSCA). Some methods used to measure the comparative advantage of a country are Balassa (1965), Vollrath (1991), Lafay (1992), and Laursen (1998). An export commodity from a country that has a comparative advantage, so the country can specialize in that commodity. In this study, to determine whether a country competing in the same products market with other countries, we used the pattern of specialization. If the two countries have similar patterns of specialization then that two countries will compete in the same products market (Lederman et al, 2008). In the empirical analysis, to determine whether a country has a similar specialization pattern to another country, we used the calculation of RSCA correlation between both countries.

Previous studies on trade specialization is the study conducted by Laursen (1998) which measures the international trade specialization from the 19 countries of the OECD (Organization for Economic Cooperation and Development) using the RCA and RSCA. Observations carried out every year (1970-1993) of the 22 sectors, comparing between sectors of each country and each sector between countries. Econometric analysis showed that when using the RCA should be always adjusted to get the symmetrical value, then using the adjusted RCA namely RSCA. Yilmaz (2005) conducted a study of the foreign trade pattern and foreign trade specialization using export and import data from the six of the European Union (EU) primary candidate

countries (Turkey, Bulgaria, Hungary, Romania, Poland, the Czech Republic) and the EU/15 in the period 1996-2002. The interest of Yilmaz study was examined the international competitiveness of the six of EU candidate countries and compared the structure of foreign trade specialization of each country with the EU/15. To test the international competitiveness, Yilmaz uses the Trade Entropy Index (TEI), Revealed Comparative Advantage (RCA), Comparative Export Performance (CEP), the Trade Overlap (TO), Export Similarity (ES), and Conformity Coefficient (CC). The results showed that the catch up from six of the EU candidate countries is still slowing.

Research conducted by Ferto and Soos (2008) is about trade specialization in the European Union (EU) and in the Post-Communist European countries using the Classic Balassa index (RCA) and Hillman's condition in the period 1995-2002. Ferto and Soos using data from 30 countries that grouped into four regional groups: the EU, Central and Eastern Europe countries (CEE), Balkan countries, and the Newly Independent States countries (NISs). The results showed that the trend of trade specialization was declining so that the European countries are continuing to lose comparative advantage. The trade patterns for the 18 European countries tend to converge and the specialization index for a specific group of products illustrates the high variation. Later research conducted by Lederman et al (2008) examined the impact of trade expansion of China and India in the world market on the trade specialization pattern of Latin American countries using RCA index. Lederman et al used the export and import data on sector level (three-digit ISIC) in the period 1990-2004 from the Latin American countries, China, and India. The empirical analysis conducted to examine the relationship between the Latin America RCA and China-India RCA. Estimation of econometric shows the results that the trade specialization pattern of Latin American countries moving in an opposite direction to the trade specialization pattern of China and India, its indicating that the trade specialization of Latin American countries is complementary to the specialization pattern of China and India or the Latin American countries is specialized in different products with China and India. It means that the trade expansion of China and India in the world market can increase the exports of Latin American countries.

3. Methodology

3.1 Data

The data used in this study are the international trade data (exports) published by the United Nations (UN) namely the United Nations Commodity Trade Statistics Database (UN-COMTRADE). The countries analyzed consist of six countries in East Asia region includes China, Japan, Hong Kong, South Korea, and Singapore, as well as the main countries in the study is Indonesia. In this study, we use data on the structure of the classification 3-digit¹ SITC Revision 2 and focuses on 237 groups of products, published by the UN-COMTRADE for the period 1995-2015. The election of 3-digit SITC Revision 2 is based on several reasons. First, the 3-digit SITC can provide a description and a picture of a more detailed and specific than the 1-digit or 2-digit SITC. 3-digit SITC can also avoid too much information when using 4-digit or 5-digit SITC. Second, this study takes time series data with long-range and data in SITC Revision 2 were already available from 1976 and has been used as a standard report in the International Trade Statistics Yearbook-United Nations. Although SITC Revision 1 is already available from 1962 and consists of 177 groups, but SITC Revision 2 classification in more detail when compared with SITC Revision 1 (Widodo, 2010).

3.2 RSCA (Revealed Symmetric Comparative Advantage)

The RCA (Revealed Comparative Advantage) index is used to determine the pattern of trade specialization and measure the competitiveness of trade between countries. The value of RCA index has the range from 0 to infinity ($0 \leq RCA \leq \infty$) so this value is not symmetrical. Since the RCA turns out to produce values that cannot be compared on both sides to 1, the index is made to be a symmetric index. Therefore, in this study used a measure that generate symmetric values, namely RSCA (Revealed Symmetric Comparative Advantage) index, which has a range of -1—0— +1 or ($-1 \leq RSCA \leq 1$) so it can be compared to both sides of values because its value is symmetrical. An export commodity from a country that has the RSCA value greater than zero, then these commodities have comparative advantage and the country can specialize in these commodities. If the RSCA value is less than zero, then the country cannot specialize in these commodities.

In this study, the authors use the RCA index from Vollrath (1991) and RSCA index from Laursen (1998) which is formulated as follows:

¹ According to Grubel Lloyd, the 3-digit SITC means industry level.

$$RCA_{ij} = \frac{(X_{ij}/X_{Tj})}{(X_{iw}-X_{ij})/(X_{Tw}-X_{Tj})} \quad (1)$$

$$RSCA_{ij} = (RCA_{ij}-1)/(RCA_{ij}+1) \quad (2)$$

where RCA_{ij} denotes revealed comparative advantage for group of products (SITC) i from country j ; $RSCA_{ij}$ denotes revealed symmetric comparative advantage for group of products (SITC) i from country j ; X_{ij} represents exports for group of products (SITC) i from country j ; X_{Tj} represents total exports from country j ; X_{iw} represents the world exports for group of products (SITC) i ; and X_{Tw} represents the world total exports.

3.3 Distribution of RSCA

RSCA distribution can be used to analyze the dynamic of comparative advantage. To examine the dynamic of comparative advantage from a country, we use descriptive statistical measures such as the arithmetic mean, standard deviation, and skewness (Widodo, 2010). In this study, to examine the dynamic of comparative advantage, the authors use the RSCA distribution using arithmetic mean, standard deviation, and skewness.

$$\overline{X}_{RSCA_{j,t}} = \frac{\sum_{i=1}^n RSCA_{ij,t}}{n} \quad (3)$$

$$stdev_{RSCA_{j,t}} = \sqrt{\frac{\sum_{i=1}^n \left(RSCA_{ij,t} - \overline{x}_{RSCA_{j,t}} \right)^2}{n}} \quad (4)$$

$$Sk_{RSCA_{j,t}} = \frac{3(\text{mean}_{RSCA_{j,t}} - \text{median}_{RSCA_{j,t}})}{stdev_{RSCA_{j,t}}} \quad (5)$$

where \bar{X} RSCA_{j,t} is the mean of RSCA for country j at time t; i is a specific export product (SITC); n is the number of products; stdev RSCA_{j,t} is the standard deviation of RSCA for country j at time t; SkRSCA_{j,t} is the skewness coefficient of RSCA variable (Karl Person formula) for country j at time t. The RSCA skewness coefficient of a country at time t is positive, indicating that the country is more concentrated (specializing) in products with low comparative advantage, and vice versa (Widodo, 2010).

3.4 Correlation between RSCA

In this study, the authors use the pattern of specialization to determine whether a country is competing in the same products market with other countries. If two countries have similar patterns of specialization then both countries will compete in the same products market (Lederman et al, 2008). To determine whether Indonesia has the same specialization pattern with the East Asian countries, then used the calculation of correlation between Indonesia RSCA with RSCA of each country in the East Asia region.

The positive correlation indicates that both countries have similar specialization patterns (specialize in the same products) and compete in the same products market or specialization patterns are substitution each other, so an increase in trade of a country in East Asia region give an opportunity on Indonesia's exports to decrease. When the correlation value is negative, it means that the two countries have different specialization patterns and compete in the different products market or specialization patterns are complement each other, so an increase in trade of a country in East Asia region provide opportunities for Indonesia's exports to increase. When the correlation value is zero or near to zero, it indicates that the Indonesian trade specialization is unrelated with a specialization pattern of a country in East Asia region (Lederman et al, 2008).

4. Results and Discussion

4.1 Comparative Advantage of East Asian Countries

Following Yue and Hua (2002); Yilmaz (2005); and Widodo (2010), in this study, the comparative advantage of East Asian countries is determined by calculating the RSCA index value of each East Asian country (Indonesia, China, Japan, Hong Kong, South Korea, and Singapore) using the UN-COMTRADE data on a structural classification of the 3-digit SITC (Standard International Trade Classification) Revision 2 for 237 groups of products (SITC) in

1995 and 2015. The higher of RSCA index value from a product group, the higher of comparative advantage from that product group in a country compared to the other product groups in that country. After calculating the RSCA index value of 237 SITC, then it is ranked based on the value of the RSCA index and selected twenty SITC with the highest RSCA value as the comparative advantage products of the country concerned. To simplify the interpretation of the results of the comparative advantage analysis, the authors classified 237 SITC into 6 product classifications based on the classification of Empirical Trade Analysis (ETA) namely: primary products (83 SITC), natural-resource intensive products (21 SITC), unskilled-labor intensive products (26 SITC), technology intensive products (62 SITC), human-capital intensive products (43 SITC), and not classified products (5 SITC), see Appendix 1. Table 1-6 below shows the changes in comparative advantage of each East Asian country that shown through products that include on top-twenty SITC of comparative advantages in 1995 and 2015.

Table 1. about here

Table 1 reports the top-twenty comparative advantages of Indonesia in 1995 based on ETA classification are dominated by product groups which are included in the classification of primary products, there are 13 SITC i.e. SITC 232, 341, 075, 245, 424, 287, 431, 072, 036, 322, 074, 071, and 333. Then in 2015 Indonesia's comparative advantage is still dominated by primary products with the number of SITC increasing to 16 SITC i.e. SITC 424, 232, 322, 431, 245, 091, 075, 267, 072, 289, 036, 071, 287, 037, 251 and 341. Then we say that from 1995 to 2015, the product classification of Indonesia's comparative advantage has not changed but there has been an increase in the number of SITC, changes in rank position and changes in product group composition. Since the end of the World War II, the industrial and trade policies in the ASEAN countries, including Indonesia, might be distinguished into three stages. First, the ASEAN countries implemented import-substitution policies with very high protection. Second, due to lack of government financial support and crisis of the balance of trade, the policies were replaced by more export-oriented policies, which were generally quite effective in increasing growth and stimulating industrialization. Masuyama (1997) found that the policies faced at least three challenges in pushing further liberalization i.e. the need to attract more foreign direct investment (FDI), competition with other countries in the North American and European markets, and the necessity of more decentralized and market-oriented decision making. Third, realizing

these challenges, the East Asian countries pursued more market-oriented policies, not only in industrial and trade policies but also in macroeconomic (fiscal and monetary) policies

Table 2. about here

Based on the ETA classification, table 2 represents the top-twenty comparative advantages of China in 1995 are dominated by a group of products included in the unskilled-labor intensive products classification i.e. SITC 848, 658, 831, 842, 666, 844, 843, 652, 851 and 894 (10 SITC). In 2015 it is still dominated by unskilled-labor intensive products with increasing SITC amounts to 14 SITC i.e. SITC 666, 812, 658, 653, 845, 652, 831, 851, 894, 847, 655, 843, 842, and 848. Then for 20 years, although the change in rank position and product group composition but China's comparative advantage product group is still dominated by the unskilled-labor intensive products classification. The increase of comparative advantage was closely related with the early stage of liberalization process. China implemented the form of 'decentralization' of trade i.e. giving expansion of entities with independent right to export and import activities. Having initiated decentralization of trade, China considered three main instruments to limit the flow of imports (Panagariya, 2006). *First*, China applied import licensing to control over inflows of certain goods. *Second*, China introduced the imports of certain product through exclusive trading rights to state agencies. *Third*, tariffs were elevated with increased decentralization. There was a major overhaul of the tariff regime in 1985, which brought the average tariff down to 43 percent (Lardy, 2002).

Table 3. about here

Table 3 shows the top-twenty comparative advantages of Japan in 1995 based on the ETA classification are dominated by product groups included in the classification of technology intensive products, there are 14 SITC i.e. SITC 881, 871, 751, 736, 713, 882, 884, 776, 737, 712, 711, 724, 728, and 778. Twenty years later in 2015, Japan's comparative advantage is still dominated by technology intensive products, although the number of SITC decreased to 11 SITC i.e. SITC 882, 712, 584, 736, 728, 511, 884, 723, 737, 713, and 774. Then for 20 years Japan also did not experience a change in comparative advantage in the classification of products, but changed in ranking position, different product group composition, and decreased in the number of SITC, where in 2015 appeared new 4 SITC classification of primary products that did not exist in top-twenty comparative advantage in 1995. Following a 'flying geese' formation Japanese companies have invested heavily in the East Asian region since 1960s. There are two

types of Japan's FDI i.e. pro-trade-oriented and anti-trade-oriented. Kojima (1995) found that Japan's investment in East Asian economies also expanded and was generally of the pro-traded-oriented type. The increase in comparative advantage of the ASEAN was supported by the increase of comparative advantage in manufacture sector in which Japan put greatly its investment.

Table 4. about here

Table 4 reports the top-twenty comparative advantages of Hong Kong in 1995 are dominated with unskilled-labor intensive products by 11 SITC i.e. SITC 831, 894, 851, 845, 655, 843, 844, 652, 846, 848, and 842, whereas in 2015 it is dominated by technology intensive products as much as 8 SITC i.e. SITC 759, 776, 764, 771, 883, 772, 881, and 884. Then we say that from 1995 to 2015 Hong Kong has changed the comparative advantages from unskilled-labor intensive products into technology intensive products.

Table 5. about here

From table 5 we can see that in 1995 the top-twenty comparative advantages of South Korea are dominated by product groups included in human-capital intensive products classification i.e. SITC 691, 786, 763, 761, 677, 696, and 625. While in 2015 is dominated by technology intensive products i.e. SITC 871, 711, 511, 776, 513, 724, 778, 582, 583, and 884. It is show that from 1995 to 2015 South Korea has changed the comparative advantages from products with the classification of human-capital intensive products into products with the classification of technology intensive products.

Table 6. about here

While Singapore based on the ETA classification in 1995, the top-twenty comparative advantages are dominated by 8 SITC primary products (table 6) i.e. SITC 075, 334, 232, 431, 122, 277, 269, and 072. Then in 2015, the top-twenty of Singapore's comparative advantages are dominated by 11 SITC technology intensive products i.e. SITC 776, 881, 514, 759, 512, 723, 714, 511, 728, 583, and 515. It means that during the period 1995-2015, Singapore's comparative advantage has changed from primary products to technology intensive products.

4.2 The Dynamics of Comparative Advantage

In this study, following Widodo (2010), to analyze the dynamics of comparative advantage of East Asian countries, the authors used RSCA distributions by applying some

descriptive statistics measures such as median, arithmetic mean, standard deviation and skewness. We calculate the RSCA index value of each East Asian countries in the period 1995-2015 using the UN-COMTRADE data on a structural classification of the 3-digit SITC Revision 2 for 237 groups of products (SITC), then we calculate the value of median, arithmetic mean, standard deviation and skewness of RSCA. Figure 3 shows the results of trend calculations in the median, arithmetic mean, standard deviation and skewness of RSCA from each of the East Asian countries (Indonesia, China, Japan, Hong Kong, South Korea and Singapore) in 1995-2015 using UN-COMTRADE 3-digit SITC Revision 2 for 237 product groups.

Figure 3. about here

Positive value of skewness coefficient of RSCA indicates that a country is more specialized on products with low comparative advantages. In contrast, the negative value of skewness coefficient of RSCA indicates that a country is more specialized on products with high comparative advantages (Widodo, 2010). From Figure 3 above, it is shown that during the study period 1995-2015 all of East Asian countries (Indonesia, China, Japan, Hong Kong, South Korea and Singapore) had positive value of skewness coefficient of RSCA. It indicates that Indonesia, China, Japan, Hong Kong, South Korea and Singapore during the period 1995-2015 more specialized in product groups with low comparative advantages.

The increased value of standard deviation indicates that the difference in comparative advantage between product groups tends to increase over time, which indicating increased-specialization, whereas the decreased standard deviation value indicates that the difference in comparative advantage among product groups tend to be smaller over time which indicating de-specialization (Widodo, 2010). From figure 3 above, Indonesia's standard deviation value of 1995-2011 is decreasing, but its decline is small, this indicates that in the period 1995-2011 Indonesia was de-specialization. While in the period 2012-2015 there is an increase in the standard deviation value despite the small increase, this indicates that in the period of 2012-2015 Indonesia was increased-specialization. While the value of China's standard deviation for 1995-2007 is declining, but the decline is small, it indicates that in the period 1995-2007 China was de-specialization. Then in the period 2008-2015 occur an increase in the value of China's standard deviation despite the small increase, this indicates that in the period of 2008-2015 China was increased-specialization. The value of Japan's standard deviation of 1995-2008 tend to remain, this indicates that no change in comparative advantage among its product groups in

Japan in the period 1995-2008. While in the period 2009-2014 the value of Japan's standard deviation increased, this indicates that Japan was increased-specialization. Then in Hong Kong in the period 1997-2008, the value of standard deviation is increasing which indicates that Hong Kong was increased-specialization whereas for the period 2009-2015 the value of the Hong Kong standard deviation decreased indicates that Hong Kong de-specialization. South Korea and Singapore during the period 1995-2015, the value of standard deviation tended to remain unchanged, indicating no change in comparative advantage among product groups, but for South Korea in 1999-2007 the value of the standard deviation declined slightly, indicating that in the period 1999-2007 South Korea was de-specialization and Singapore in the period 2010-2014 the standard deviation value slightly increased indicating increased-specialization.

A country more specialized in products with high comparative advantages is also indicated by high mean and median values. On the other hand, the low mean and median values indicate that the country is more specialized in products with low comparative advantages (Widodo, 2010). From Figure 3 above it is shown that all East Asian countries (Indonesia, China, Japan, Hong Kong, South Korea and Singapore) have low mean and low median values represented by negative values of mean and median, it means that during the period 1995-2015 Indonesia, China, Japan, Hong Kong, South Korea and Singapore had specialized in product groups with low comparative advantages.

4.3 Patterns of Trade Specialization: Does Indonesia Competing in the Same SITC Market with Each of East Asian Countries?

Similar pattern of trade specialization with the East Asian has made Indonesia's export value still low due to competition in the same products market with the East Asian countries. Following Lederman et al (2008), in this study, to determine whether Indonesia has the same specialization pattern with the East Asian countries, we used the calculation of RSCA correlation between Indonesia and each country in the East Asia region. A positive of RSCA correlation indicates that both countries have the same specialization pattern. Both countries specialize in the same product so these two countries compete in the same product market. Specialization pattern of both countries substitute each other and indicates that the increase in the East Asian region decrease Indonesian exports. If the correlation is negative, it means that the two countries have different patterns of specialization. Both countries specialize in the different product so these two

countries compete in different product markets or complementary specialization patterns, so that increased trade from a country in East Asia region gives an opportunity to increase Indonesian exports. Whereas if the correlation value is zero or near to zero, indicates that the Indonesian trade specialization is unrelated with the specialization pattern of a country in East Asia region.

Here are the results of correlation calculation between Indonesia RSCA and the RSCA of each country in the East Asia region used UN-COMTRADE data on the structure of the classification 3-digit SITC Revision 2 for 237 groups of products for the period 1995-2015.

Figure 4. about here

Figure 4 shows the evolution of correlation between Indonesia and China RSCA from 1995 to 2015 which is a positive value. During the period 1995-2015 Indonesia has the same specialization pattern with China. Both countries specialize in the same products so these two countries compete in the same products market. Specialization pattern of Indonesia and China substitute each other and indicates that the increase in China's trade decreases the Indonesia's exports. During the period 1995-2015, the trend of RSCA correlation between Indonesia and China showed a declining trend. At the beginning of the period, the correlation showed a great positive value closer to the value of 0.4 and then continued to decline. At the end of the period, the correlation value is low but still positive that is approaching 0.1. Trend of RSCA correlation between Indonesia and China are declining indicates that the structure of Indonesia's trade with China is diverging, it means that Indonesia specialization patterns are getting away from the specialization pattern of China. This indicates that China's exports will provide opportunities for improved Indonesian exports in the future. Although the increase in China's trade gives an opportunity on Indonesia's exports to decrease, but because of its trend continues to decline, the declining on Indonesia's exports has narrowed, so it will lead to an increase in Indonesia's export prospects.

Figure 5. about here

The evolution of correlation between Indonesia and Japan RSCA is shown in Figure 5. During the period 1995-2015, RSCA correlation between Indonesia and Japan showed a negative value. It means that both countries have different patterns of specialization and compete in the different products market. Specialization pattern of Indonesia and Japan complement each other, so that the increase in Japan's trade provide opportunities to increase the Indonesia's exports (import demand of Japan will be greater when the export supply of Indonesia is large). The trend

of RSCA correlation between Indonesia and Japan shows the rising trend. It means that the structure of Indonesia's trade with Japan is converging and the specialization pattern of Indonesia increasingly closer to specialization pattern of Japan. This indicates that Japan's exports will threaten Indonesia's export prospects. Although the increase in Japan's trade provides opportunity for Indonesia to increase the export value, but because of its trend continues to rise so the increasing on Indonesia's exports has narrowed. It can lead to a decline in Indonesia's export prospects.

Figure 6. about here

The correlation between Indonesia with Hong Kong RSCA has a similar pattern with correlation of Indonesia-China RSCA. Figure 6 illustrates the RSCA correlation between Indonesia with Hong Kong during the period 1995-2010 showed a positive value. This shows that in the period 1995-2010, Indonesia has the same specialization pattern with Hong Kong (specialize in the same products) and compete in the same products market. Specialization pattern of Indonesia and Hong Kong substitute each other, so an increase in Hong Kong's trade decrease the Indonesia's exports. In the period 2011-2015, the correlation value is closer to zero. It means that the pattern of Indonesia trade specialization unrelated to the specialization pattern of Hong Kong. While the trend of Indonesia-Hong Kong RSCA correlation is decreasing. It illustrates that the structure of Indonesia's trade with Hong Kong is diverging, which means that Indonesia specialization patterns getting away from the Hong Kong specialization pattern. This indicates that the export of Hong Kong will give an opportunity to increase on Indonesia's export prospects.

Figure 7. about here

Figure 7 shows the correlation between Indonesia and South Korea RSCA in the period 1995-2015. At the beginning of the period in 1995-2008, the correlation indicates a positive value. It means that during the period 1995-2008 Indonesia has a similar pattern of specialization with South Korea. Both countries specialize in the same products so compete in the same products market. Specialization pattern of Indonesia and South Korea substitute each other, this indicates that the increase in South Korea's trade decrease the Indonesia's exports. From 2009 to 2015 the correlation indicates a negative value, it means that both countries have a different specialization pattern and compete in a different products market. Specialization pattern mutually complementary, so that the increase in South Korea's trade provide opportunities for Indonesia to

increase an export value. Although in 2012, the correlation value is positive and closer to zero, then in 2014-2015 the correlation value is negative and closer to zero, it means that the pattern of Indonesia trade specialization unrelated to the specialization pattern of South Korea. When we viewed on its trend, during the period 1995-2015 the RSCA correlation between Indonesia and South Korea showed a declining trend, although in the period 1998-2000 the trend increased, that happened because of the period of economic crisis. The declining trend indicates that the structure of Indonesia's trade with South Korea is diverging, it means that the specialization patterns of Indonesia become different from a South Korea specialization pattern. This indicates that South Korea's exports provide opportunities for improvement of Indonesian export prospects.

Figure 8. about here

The correlation between Indonesia and Singapore RSCA shown in Figure 8. In the period 1995-2015 the correlation shows a positive value. This indicates that both countries have similar patterns of specialization (specialize in the same products) and compete in the same products market. Specialization pattern mutually substituted, so that the increase in Singapore's trade decreases the Indonesia's exports. The trend of correlation between Indonesia and Singapore RSCA is declining. It illustrates that the trade structure of Indonesia with Singapore was diverging, it means that Indonesia specialization patterns getting away from the Singapore specialization pattern, so that Singapore's exports provide opportunities for improvement of Indonesian export prospects.

5. Conclusions

During the period 1995-2015, Indonesia's comparative advantage was in primary products classification, while China had a comparative advantage on products with unskilled-labor intensive products classification, and Japan had a comparative advantage in products with technology intensive products classification. While in Hong Kong, South Korea and Singapore during the period 1995-2015 were countries that experienced a change of comparative advantage to a comparative advantage in products with technology intensive products classification.

The dynamics of comparative advantage shows that during the period 1995-2015 all of East Asian countries in this study (Indonesia, China, Japan, Hong Kong, South Korea and

Singapore) more specialized on product groups with low comparative advantages. It is based on a positive value of skewness coefficient, as well as low and negative mean and median values.

The countries in the East Asia region competing in the same products market with Indonesia due to the similar pattern of specialization are China during the period 1995-2014, Hong Kong during the period 1995-2007, South Korea in the period 1995-2003, and Singapore in the period 1995 -2007 then in 2010-2011. In this period, an increase in trade from each of East Asian countries result in a decrease of Indonesia's exports. Among the countries in East Asia region, China is the biggest competitor country for Indonesia, indicated by the large and positive value of RSCA correlation. Japan is a country that has a very different pattern of specialization. The trend of RSCA correlation of Japan is increasing which indicate that Japan's exports could threaten the Indonesia's export prospects because Japan specialization pattern continues to closer to the Indonesia specialization pattern. The specialization pattern of Indonesia differ to the specialization pattern of Hong Kong, South Korea, and Singapore. This indicates that exports of Hong Kong, South Korea, and Singapore provide opportunities for improvement of Indonesian export prospects.

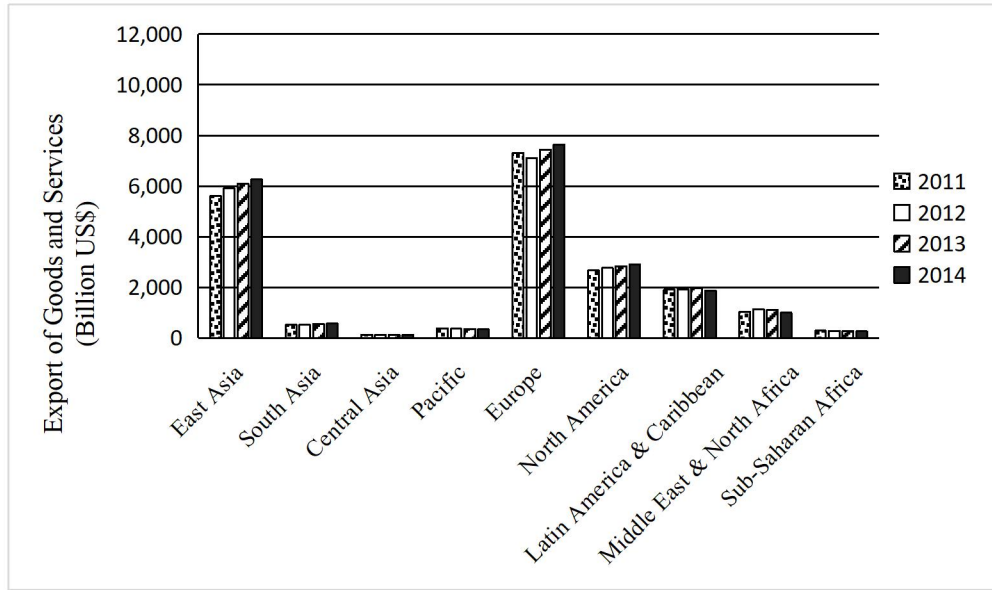
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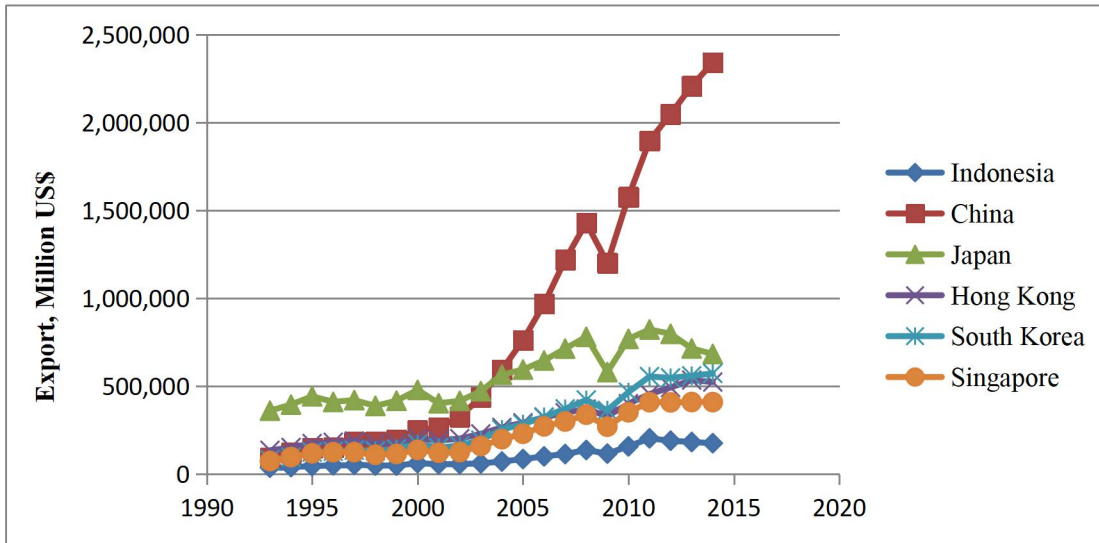
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Figure 1. Export Value of Goods and Services by Region, 2011-2014



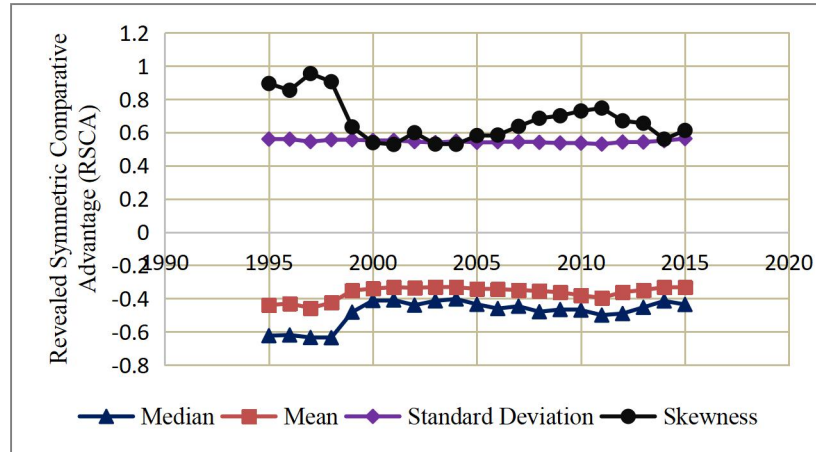
Source: World Bank, the data processed by authors.

Figure 2. Export Value of the East Asian Countries, 1993-2014

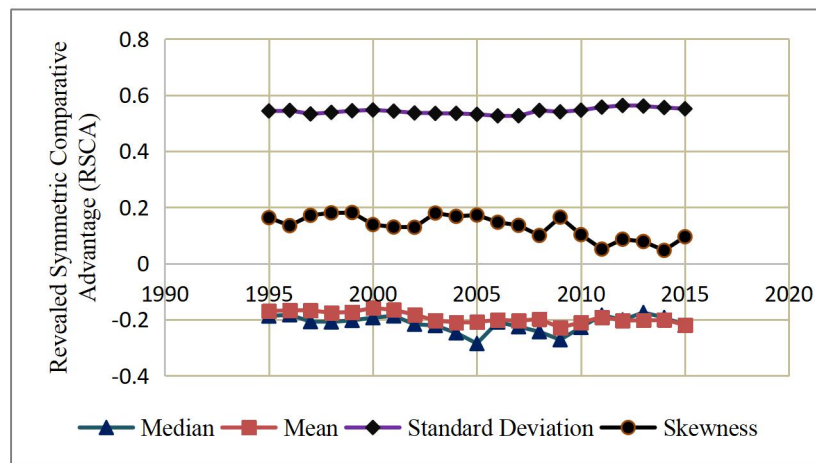


Source: UN-COMTRADE, the data processed by authors.

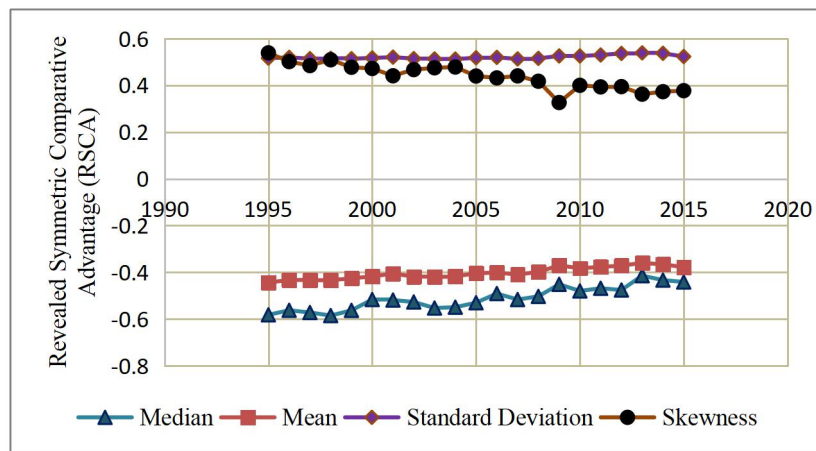
Figure 3. Trends in Median, Mean, Standard Deviation and Skewness of Comparative Advantages from East Asian Countries, 1995 - 2015



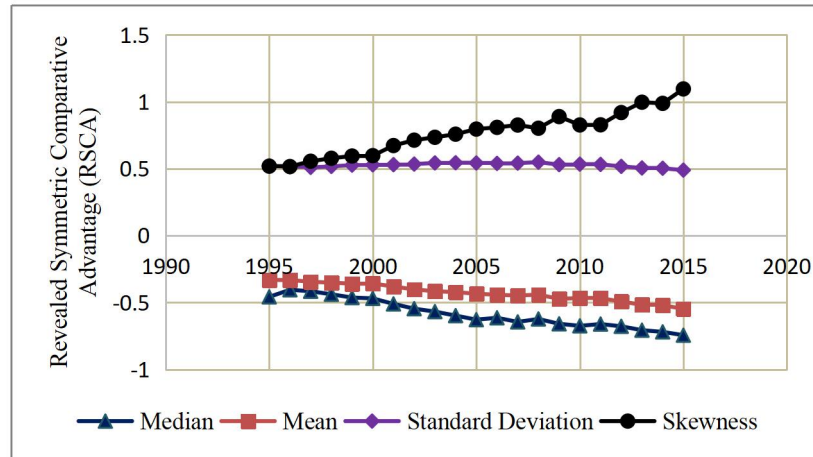
(a) Indonesia



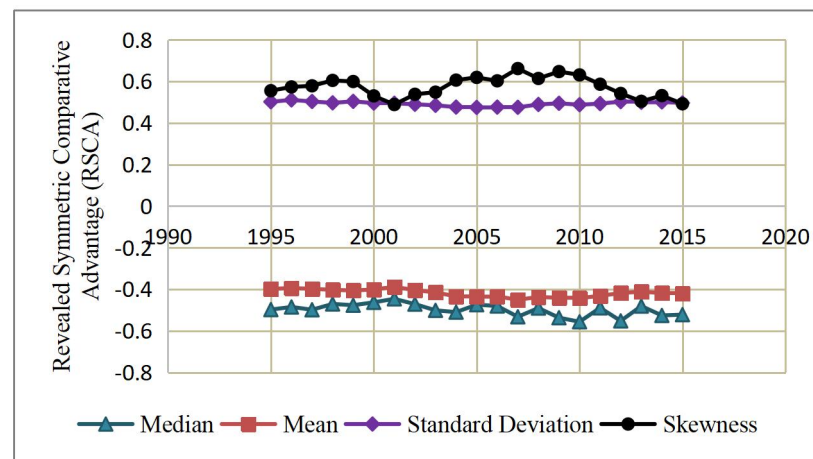
(b) China



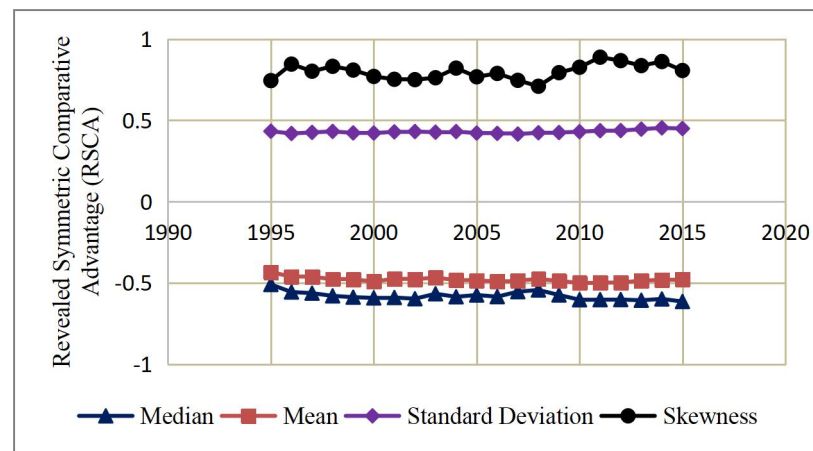
(c) Japan



(d) Hong Kong



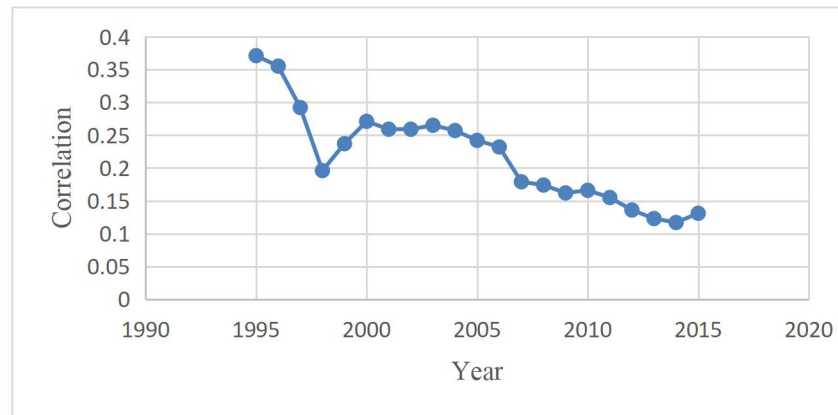
(e) South Korea



(f) Singapore

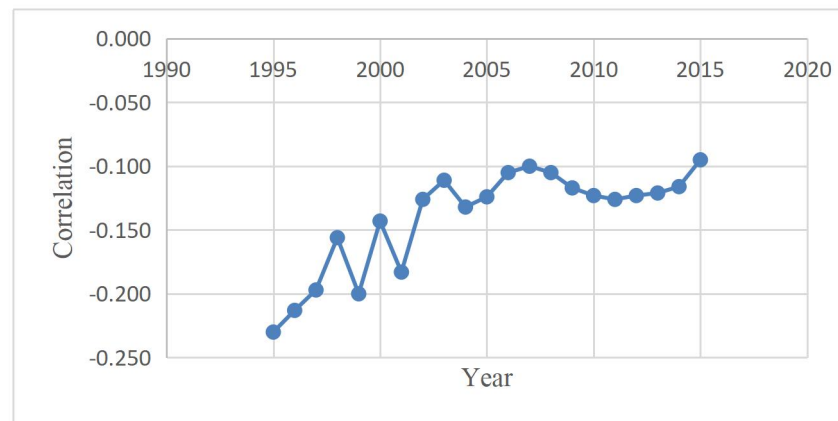
Source: UN-COMTRADE 3-digit SITC Revision 2, author's calculations.

Figure 4. Correlation between Indonesia and China RSCA, 1995-2015



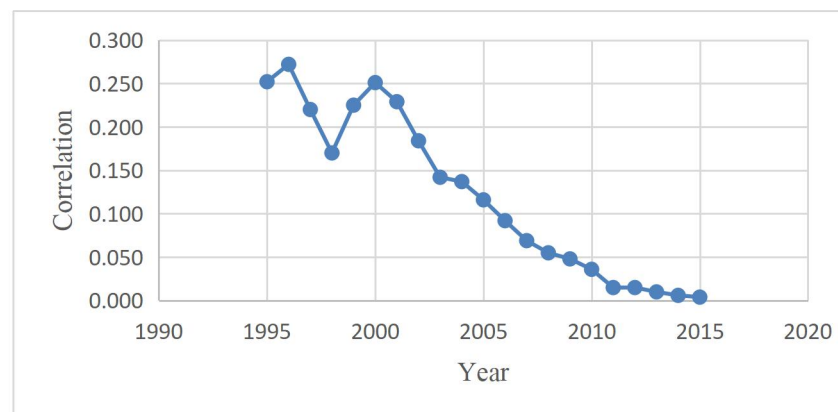
Source: UN-COMTRADE, author's calculations.

Figure 5. Correlation between Indonesia and Japan RSCA, 1995-2015



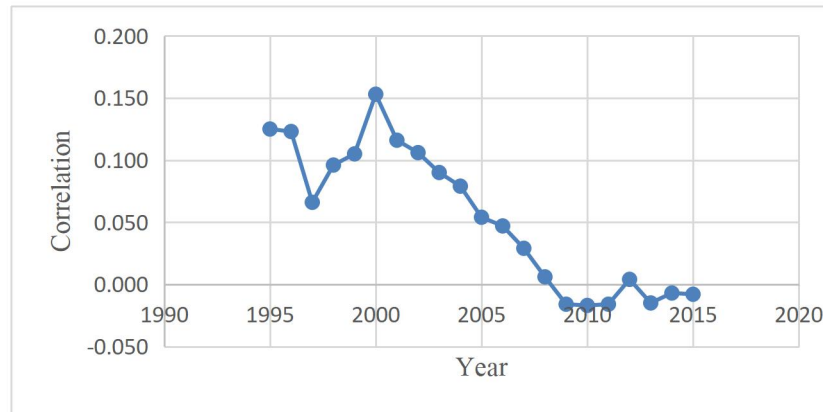
Source: UN-COMTRADE, author's calculations.

Figure 6. Correlation between Indonesia and Hong Kong RSCA, 1995-2015



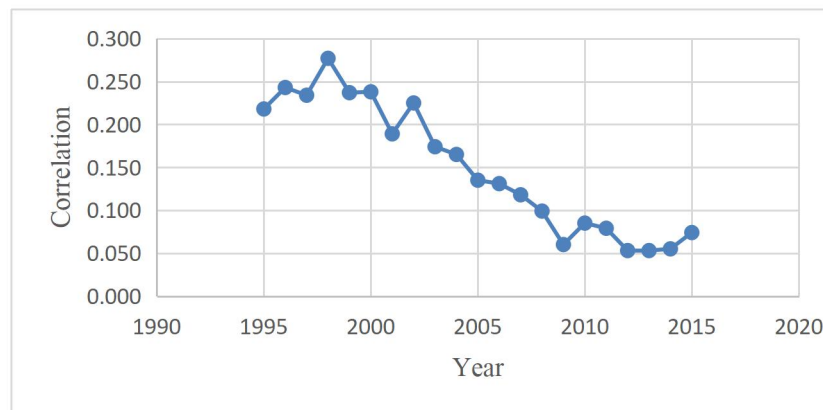
Source: UN-COMTRADE, author's calculations.

Figure 7. Correlation between Indonesia and South Korea RSCA, 1995-2015



Source: UN-COMTRADE, author's calculations.

Figure 8. Correlation between Indonesia and Singapore RSCA, 1995-2015



Source: UN-COMTRADE, author's calculations.

Table 1. Top-Twenty SITC of Indonesia Comparative Advantage 1995 and 2015

1995				2015		
No	SITC	Commodity	RSCA	SITC	Commodity	RSCA
1	232	Natural rubber latex; rubber and gums	0.95	424	Other fixed vegetable oils, fluid or solid, crude, refined	1.00
2	634	Veneers, plywood, "improved" wood and other wood, worked	0.95	232	Natural rubber latex; rubber and gums	0.98
3	687	Tin	0.90	687	Tin	0.96
4	341	Gas, natural and manufactured	0.90	322	Coal, lignite and peat	0.95
5	075	Spices	0.89	431	Animal and vegetable oils and fats, processed, and waxes	0.93
6	245	Fuel wood and wood charcoal	0.89	245	Fuel wood and wood charcoal	0.91
7	424	Other fixed vegetable oils, fluid or solid, crude, refined	0.88	091*	Margarine and shortening	0.87
8	287	Ores and concentrates of base metals	0.85	075	Spices	0.87
9	431	Animal and vegetable oils and fats, processed, and waxes	0.79	634	Veneers, plywood, "improved" wood and other wood, worked	0.85
10	072	Cocoa	0.78	267*	Other man-made fibres suitable for spinning, and waste	0.80
11	036	Crustaceans and molluscs, fresh, chilled, frozen, salted, etc.	0.78	072	Cocoa	0.79
12	635 [#]	Wood manufactures	0.74	289*	Ores and concentrates of precious metals, waste, scrap	0.70
13	322	Coal, lignite and peat	0.73	036	Crustaceans and molluscs, fresh, chilled, frozen, salted, etc.	0.70
14	851	Footwear	0.69	651*	Textile yarn	0.69
15	074 [#]	Tea and mate	0.68	071	Coffee and coffee substitutes	0.68
16	071	Coffee and coffee substitutes	0.65	287	Ores and concentrates of base metals	0.68
17	844 [#]	Under garments of textile fabrics, not knitted or crocheted	0.62	037*	Fish, crustaceans and molluscs, prepared or preserved	0.65
18	333 [#]	Crude petroleum and oils obtained from bituminous minerals	0.62	251*	Pulp and waste paper	0.64
19	653 [#]	Fabrics, woven, of man-made fibres (not narrow or special fabrics)	0.58	341	Gas, natural and manufactured	0.63
20	763 [#]	Gramophones, dictating machines and other sound recorders	0.56	851	Footwear	0.63

Note: [#] not listed in the top-twenty in comparative advantage 2015; * not listed in the top-twenty in comparative advantage 1995.

Source: UN-COMTRADE SITC 3-digit Revision 2, author's calculation.

Table 2. Top-Twenty SITC of China Comparative Advantage 1995 and 2015

1995				2015		
No	SITC	Commodity	RSCA	SITC	Commodity	RSCA
1	261	Silk	0.96	261	Silk	0.93
2	323 [#]	Briquettes; coke and semi-coke; lignite or peat; retort carbon	0.86	666	Pottery	0.88
3	848	Articles of apparel, clothing accessories, non-textile, headgear	0.80	812*	Sanitary, plumbing, heating, lighting fixtures and fittings	0.75
4	658	Made-up articles, wholly or chiefly of textile materials	0.77	658	Made-up articles, wholly or chiefly of textile materials	0.70
5	291 [#]	Crude animal materials	0.77	653*	Fabrics, woven, of man-made fibres (not narrow or special fabrics)	0.70
6	831	Travel goods, handbags etc, of leather, plastics, textile, others	0.77	845*	Outerwear knitted or crocheted, not elastic nor rubberized	0.70
7	671 [#]	Pig and sponge iron, spiegeleisen, etc, and ferro-alloys	0.77	697*	Household equipment of base metal	0.70
8	842	Men's and boys' outerwear, textile fabrics not knitted or crocheted	0.75	652	Cotton fabrics, woven (not including narrow or special fabrics)	0.69
9	666	Pottery	0.75	831	Travel goods, handbags etc, of leather, plastics, textile, others	0.69
10	844 [#]	Under garments of textile fabrics, not knitted or crocheted	0.74	851	Footwear	0.68
11	572 [#]	Explosives and pyrotechnic products	0.73	894	Baby carriages, toys, games and sporting goods	0.67
12	843	Womens, girls, infants outerwear, textile, not knitted or crocheted	0.72	847*	Clothing accessories, of textile fabrics	0.67
13	689 [#]	Miscellaneous non-ferrous base metals, employed in metallurgy	0.72	655*	Knitted or crocheted fabrics (including tubular, etc, fabrics)	0.65
14	687 [#]	Tin	0.71	752*	Automatic data processing machines and units thereof	0.65
15	652	Cotton fabrics, woven (not including narrow or special fabrics)	0.71	843	Womens, girls, infants outerwear, textile, not knitted or crocheted	0.64
16	851	Footwear	0.70	842	Men's and boys' outerwear, textile fabrics not knitted or crocheted	0.62
17	074 [#]	Tea and mate	0.69	764*	Telecommunication equipment; parts and accessories	0.61
18	056 [#]	Vegetables, roots and tubers, prepared or preserved	0.68	763*	Gramophones, dictating machines and other sound recorders	0.60
19	899 [#]	Other miscellaneous manufactured articles	0.68	848	Articles of apparel, clothing accessories, non-textile, headgear	0.60
20	894	Baby carriages, toys, games and sporting goods	0.68	696*	Cutlery	0.59

Note: # not listed in the top-twenty in comparative advantage 2015; * not listed in the top-twenty in comparative advantage 1995.

Source: UN-COMTRADE SITC 3-digit Revision 2, author's calculation.

Table 3. Top-Twenty SITC in Japan Comparative Advantage 1995 and 2015

1995				2015		
No	SITC	Commodity	RSCA	SITC	Commodity	RSCA
1	881 [#]	Photographic apparatus and equipment	0.68	882	Photographic and cinematographic supplies	0.80
2	793 [#]	Ships, boats and floating structures	0.63	712	Steam engines, turbines	0.77
3	871 [#]	Optical instruments and apparatus	0.59	584*	Regenerated cellulose; derivatives of cellulose; vulcanized fibre	0.69
4	763 [#]	Gramophones, dictating machines and other sound recorders	0.56	736	Metalworking machine-tools, parts and accessories thereof	0.67
5	751 [#]	Office machines	0.53	267*	Other man-made fibres suitable for spinning, and waste	0.65
6	736	Metalworking machine-tools, parts and accessories thereof	0.53	728	Other machinery, equipment, for specialized industries; parts	0.59
7	713	Internal combustion piston engines, and parts thereof	0.51	672*	Ingots and other primary forms, of iron or steel	0.58
8	882	Photographic and cinematographic supplies	0.51	781	Passenger motor vehicles (excluding buses)	0.56
9	884	Optical goods	0.47	511*	Hydrocarbons, and derivatives	0.55
10	776 [#]	Thermionic, microcircuits, transistors, valves, etc	0.47	676*	Rails and railway track construction materials, of iron or steel	0.54
11	782 [#]	Lorries and special purposes motor vehicles	0.44	266*	Synthetic fibres suitable for spinning	0.53
12	737	Metalworking machinery (other than machine-tools), and parts	0.42	233*	Synthetic rubber, latex, etc; waste, scrap of unhardened rubber	0.53
13	712	Steam engines, turbines	0.41	884	Optical goods	0.51
14	711 [#]	Steam boilers and auxiliary plant; and parts thereof	0.40	723*	Civil engineering, contractors' plant and equipment and parts	0.49
15	724 [#]	Textile and leather machinery, and parts thereof	0.39	674	Universals, plates, and sheets, of iron or steel	0.43
16	728	Other machinery, equipment, for specialized industries; parts	0.39	737	Metalworking machinery (other than machine-tools), and parts	0.43
17	781	Passenger motor vehicles (excluding buses)	0.38	713	Internal combustion piston engines, and parts thereof	0.42
18	895 [#]	Office and stationary supplies	0.38	282*	Waste and scrap metal of iron or steel	0.41
19	778 [#]	Electrical machinery and apparatus	0.37	663*	Mineral manufactures	0.40
20	674	Universals, plates, and sheets, of iron or steel	0.36	774*	Electro-medical and radiological equipment	0.39

Note: [#] not listed in the top-twenty in comparative advantage 2015; * not listed in the top-twenty in comparative advantage 1995.

Source: UN-COMTRADE SITC 3-digit Revision 2, author's calculation.

Table 4. Top-Twenty SITC in Hong Kong Comparative Advantage 1995 and 2015

1995				2015		
No	SITC	Commodity	RSCA	SITC	Commodity	RSCA
1	831	Travel goods, handbags etc, of leather, plastics, textile, others	0.85	613*	Furskins, tanned or dressed; pieces of furskin, tanned or dressed	0.81
2	885	Watches and clocks	0.81	759*	Parts of and accessories for machines of headings 751 or 752	0.74
3	894	Baby carriages, toys, games and sporting goods	0.81	885	Watches and clocks	0.72
4	261 [#]	Silk	0.75	971*	Gold, non-monetary (excluding gold ores and concentrates)	0.70
5	762 [#]	Radio-broadcast receivers	0.74	776*	Thermionic, microcircuits, transistors, valves, etc	0.69
6	851 [#]	Footwear	0.71	764*	Telecommunication equipment; parts and accessories	0.69
7	845 [#]	Outerwear knitted or crocheted, not elastic nor rubberized	0.70	667*	Pearl, precious and semi-precious stones, unworked or worked	0.67
8	655	Knitted or crocheted fabrics (including tubular, etc, fabrics)	0.67	212*	Furskins, raw	0.65
9	899 [#]	Other miscellaneous manufactured articles	0.67	771	Electric power machinery, and parts thereof	0.59
10	843 [#]	Womens, girls, infants outerwear, textile, not knitted or crocheted	0.64	883*	Cinematograph film, exposed and developed	0.52
11	844 [#]	Under garments of textile fabrics, not knitted or crocheted	0.64	656*	Tulle, lace, embroidery, ribbons, trimmings and other small wares	0.52
12	652 [#]	Cotton fabrics, woven (not including narrow or special fabrics)	0.61	611*	Leather	0.50
13	696 [#]	Cutlery	0.59	772*	Electrical apparatus for making and breaking electrical circuits	0.48
14	846 [#]	Under-garments, knitted or crocheted	0.59	831	Travel goods, handbags etc, of leather, plastics, textile, others	0.44
15	848 [#]	Articles of apparel, clothing accessories, non-textile, headgear	0.58	894	Baby carriages, toys, games and sporting goods	0.42
16	277 [#]	Natural abrasives	0.56	897*	Gold, silver ware, jewelry and articles of precious materials	0.41
17	881	Photographic apparatus and equipment	0.56	655	Knitted or crocheted fabrics (including tubular, etc, fabrics)	0.40
18	572 [#]	Explosives and pyrotechnic products	0.53	763*	Gramophones, dictating machines and other sound recorders	0.37
19	842 [#]	Men's and boys' outerwear, textile fabrics not knitted or crocheted	0.52	881	Photographic apparatus and equipment	0.34
20	771	Electric power machinery,	0.52	884*	Optical goods	0.33

and parts thereof

Note: # not listed in the top-twenty in comparative advantage 2015; * not listed in the top-twenty in comparative advantage 1995.

Source: UN-COMTRADE SITC 3-digit Revision 2, author's calculation.

Table 5. Top-Twenty SITC in South Korea Comparative Advantage 1995 and 2015

1995				2015		
No	SITC	Commodity	RSCA	SITC	Commodity	RSCA
1	883 [#]	Cinematograph film, exposed and developed	0.87	793	Ships, boats and floating structures	0.83
2	653 [#]	Fabrics, woven, of man-made fibres (not narrow or special fabrics)	0.79	871*	Optical instruments and apparatus	0.80
3	266	Synthetic fibres suitable for spinning	0.77	711*	Steam boilers and auxiliary plant; and parts thereof	0.69
4	793	Ships, boats and floating structures	0.75	511	Hydrocarbons and derivatives	0.69
5	971 [#]	Gold, non-monetary (excluding gold ores and concentrates)	0.68	266	Synthetic fibres suitable for spinning	0.68
6	776	Thermionic, microcircuits, transistors, valves, etc	0.62	233*	Synthetic rubber, latex, etc; waste, scrap of unhardened rubber	0.60
7	655	Knitted or crocheted fabrics (including tubular, etc, fabrics)	0.62	655	Knitted or crocheted fabrics (including tubular, etc, fabrics)	0.55
8	691 [#]	Structures and parts of iron, steel or aluminium	0.61	686*	Zinc	0.51
9	611 [#]	Leather	0.61	674*	Universals, plates, and sheets, of iron or steel	0.49
10	786 [#]	Trailers, and other vehicles, not motorized	0.58	685*	Lead	0.49
11	656 [#]	Tulle, lace, embroidery, ribbons, trimmings and other small wares	0.57	776	Thermionic, microcircuits, transistors, valves, etc	0.49
12	763 [#]	Gramophones, dictating machines and other sound recorders	0.56	513*	Carboxylic acids, and their derivatives	0.46
13	761 [#]	Television receivers	0.53	672*	Ingots and other primary forms, of iron or steel	0.45
14	847 [#]	Clothing accessories, of textile fabrics	0.49	677	Iron or steel wire (excluding wire rod), not insulated	0.43
15	778	Electrical machinery and apparatus	0.48	724*	Textile and leather machinery, and parts thereof	0.39
16	657 [#]	Special textile fabrics and related products	0.48	778	Electrical machinery and apparatus	0.38
17	677	Iron or steel wire (excluding wire rod), not insulated	0.45	269*	Old clothing and other old textile articles; rags	0.37
18	696 [#]	Cutlery	0.45	582*	Condensation, polycondensation and polyaddition products	0.36
19	511	Hydrocarbons and derivatives	0.42	583*	Polymerization and copolymerization products	0.35
20	625 [#]	Rubber tires, tire cases, inner and flaps, for wheels of all kinds	0.41	884*	Optical goods	0.34

Note: [#] not listed in the top-twenty in comparative advantage 2015; * not listed in the top-twenty in comparative advantage 1995.

Source: UN-COMTRADE SITC 3-digit Revision 2, author's calculation.

Table 6. Top-Twenty SITC in Singapore Comparative Advantage 1995 and 2015

1995				2015		
No	SITC	Commodity	RSCA	SITC	Commodity	RSCA
1	752 [#]	Automatic data processing machines and units thereof	0.75	687	Tin	0.81
2	687	Tin	0.73	776	Thermionic, microcircuits, transistors, valves, etc	0.75
3	075 [#]	Spices	0.71	881*	Photographic apparatus and equipment	0.65
4	763 [#]	Gramophones, dictating machines and other sound recorders	0.65	898*	Musical instruments, parts and accessories thereof	0.64
5	334	Petroleum products, refined	0.63	683*	Nickel	0.56
6	776	Thermionic, microcircuits, transistors, valves, etc	0.62	334	Petroleum products, refined	0.55
7	762 [#]	Radio-broadcast receivers	0.61	514*	Nitrogen-function compounds	0.50
8	232 [#]	Natural rubber latex; rubber and gums	0.61	759	Parts and accessories for machines of headings 751 or 752	0.45
9	759	Parts and accessories for machines of headings 751 or 752	0.60	512*	Alcohols, phenols etc, and their derivatives	0.43
10	761 [#]	Television receivers	0.52	723*	Civil engineering, contractors' plant and equipment and parts	0.42
11	431 [#]	Animal and vegetable oils and fats, processed, and waxes	0.48	277	Natural abrasives	0.41
12	686 [#]	Zinc	0.47	714*	Engines and motors, non-electric; parts; group 714, item 71888	0.40
13	764 [#]	Telecommunication equipment; parts and accessories	0.41	511*	Hydrocarbons and derivatives	0.37
14	122	Tobacco, manufactured	0.40	551*	Essential oils, perfume and flavour materials	0.35
15	277	Natural abrasives	0.36	122	Tobacco, manufactured	0.35
16	771 [#]	Electric power machinery, and parts thereof	0.30	931*	Special transactions, commodity not classified according to class	0.32
17	716 [#]	Rotating electric plant and parts thereof	0.30	728*	Other machinery, equipment, for specialized industries; parts	0.31
18	269 [#]	Old clothing and other old textile articles; rags	0.29	553*	Perfumery, cosmetics, toilet preparations, etc	0.31
19	681 [#]	Silver, platinum and other metals of the platinum group	0.29	583*	Polymerization and copolymerization products	0.30
20	072 [#]	Cocoa	0.26	515*	Organo-inorganic and heterocyclic compounds	0.30

Note: [#] not listed in the top-twenty in comparative advantage 2015; * not listed in the top-twenty in comparative advantage 1995.

Source: UN-COMTRADE SITC 3-digit Revision 2, author's calculation.

Appendix 1

Classification by Empirical Trade Analysis (ETA)

No	Product Classification	Amount of SITC	The 3-digit SITC Revision 2
1	Primary Products	83	001, 011, 012, 014, 022, 023, 024, 025, 034, 035, 036, 037, 041, 042, 043, 044, 045, 046, 047, 048, 054, 056, 057, 058, 061, 062, 071, 072, 073, 074, 075, 081, 091, 098, 111, 112, 121, 122, 211, 212, 222, 223, 232, 233, 244, 245, 246, 247, 248, 251, 261, 263, 264, 265, 266, 267, 268, 269, 271, 273, 274, 277, 278, 281, 282, 286, 287, 288, 289, 291, 292, 322, 323, 333, 334, 335, 341, 351, 411, 423, 424, 431, 941
2	Natural-resource intensive products	21	524, 611, 612, 613, 633, 634, 635, 661, 662, 663, 667, 671, 681, 682, 683, 684, 685, 686, 687, 688, 689
3	Unskilled-labor intensive products	26	651, 652, 653, 654, 655, 656, 657, 658, 659, 664, 665, 666, 793, 812, 821, 831, 842, 843, 844, 845, 846, 847, 848, 851, 894, 895
4	Technology intensive products	62	511, 512, 513, 514, 515, 516, 522, 523, 541, 562, 572, 582, 583, 584, 585, 591, 592, 598, 711, 712, 713, 714, 716, 718, 721, 722, 723, 724, 725, 726, 727, 728, 736, 737, 741, 742, 743, 744, 745, 749, 751, 752, 759, 764, 771, 772, 773, 774, 775, 776, 778, 792, 871, 872, 873, 874, 881, 882, 883, 884, 893, 951
5	Human-capital intensive products	43	531, 532, 533, 551, 553, 554, 621, 625, 628, 641, 642, 672, 673, 674, 675, 676, 677, 678, 679, 691, 692, 693, 694, 695, 696, 697, 699, 761, 762, 763, 781, 782, 783, 784, 785, 786, 791, 885, 892, 896, 897, 898, 899
6	Not classified	5	911, 931, 961, 971, 999

Source: <http://www2.econ.uu.nl/users/marrewijk/eta/>