PATTERNS AND DETERMINANTS OF INTRA-INDUSTRY TRADE BETWEEN INDONESIA AND IT'S TRADING PARTNER COUNTRIES

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ABSTRACT

This study discussed about the patterns and determinants that influenced the intra-industry trade between Indonesia and its trading partner countries, such as China, Japan, USA, South Korea and Singapore during 2004 to 2014. This study used an index of Grubel-Lloyd from four categories of manufacturing industry SITC 5-8 Rev. 3, 2 digits. In addition, this study also examined the determinants of IIT using panel data regression. Cross section in this study was between Indonesia with each trading partner countries (China, Japan, USA, South Korea and Singapore) and with its time series is 2004 to 2014. The results showed that IIT between Indonesia with each trading partner countries is high. Japan has the highest IIT among the other trading partner countries. The distance variable and the difference in GDP per capita did not affect the IIT. The average GDP variable has a positive and significant effect on the IIT, while the differences in value added per establishment at industry level has a negative effect on IIT.

Keywords: Intra-Industry Trade, International Trade, Manufacture Industry
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Introduction

The development of international trade implemented by many countries in the world has successfully emerged immense interest in research of commerce in developing nations,for instance Indonesia. International trade has become a phenomenon that overcomes the challenges of global commerce, thus it also has become a significant factor of economic growth of a country. International trade also provides a range of benefits, such as, promoting domestic natural resources for exporting purposes, expanding market share, developing new innovations, as well as facilitating capital flows between countries. In addition, international trade encourages industrialization, transportation, and globalization of multinational companies.

International trade is divided into two components which are Inter-Industry Trade and Intra-Industry Trade. Inter-Industry Trade occurs if more than one country trades with products that have comparative advantages in different sectors. Meanwhile Intra-Industry Trade occurs if more than one country trades with products that have comparative advantagesin the same sectors/classifications. Intra-Industry Trade is based on a strong desire among countries that aspires to obtain profit from economical scale of production indicated by lower production costs by trading similar products (Salvatore, 2014:165).

A country could earn larger profit by obtaining additional benefit from international trade rather than comparative advantages trade. This is because Intra-Industry Trade activities are capable of creating larger market share. On top of that, by implementing Intra-Industry

trade, a country could reduce its own types of products and enhance the diversity of available goods for domestic consumers. Consequently, Intra-Industry Trade (IIT) is considered vital to be implemented in Indonesia due to its competition issues on an international scale. Today, nearly a quarter of total trade activities have materialized in the form of mutual exchange of different variety of products, or in other words, the IIT has been implemented by international trade (Salvatore, 1997:197).

Since 1980s, numerous of studies about IIT have been conducted, either through the characteristics of the industry or the country. Krugman (1981) stated that economic scale and consumer tastes of a product are IIT main determinant points. However, in the opinion of others, country-specific variables such as the size of the country, per capita income, distance and orientation of the trade are major determinant points of IIT (Stone and Lee, 1995). According to Greenaway, et al. (1995), industry-specific variables such as economic scale, concentration ratio of the company and product differentiation are determinant points of IIT. Clark and Stanley (1999) and Greenaway, et al. (1999), both said that the variables of country-specific and industry-specific are the determinants of IIT.

However, up to now, researches on the determinants of IIT are mostly focused on country-specific variables and tend to ignore industry-specific aspects. In fact, the industry-specific variables are considered important to measure the intensity of intra-industry trade in terms of the demands of commodities/industries as well as the characteristics of supply. One of the industry-specific variables, namely the differences in value added growth in the industrial sector, where the sample is a manufacturing industry. Manufacturing industry has contributed nearly a quarter of the GDP of Indonesia, where the industry also plays a role in the international trade in improving the quality and quantity of output in order to increase competitiveness in the global market.

According to Ab-del-Rahman (1991) in recent years the industry shows the declining trend of its contribution to the trade balance of Indonesia. One of the factors that contribute to the tardiness of growth in manufacturing sector in Indonesia is due to macro conditions of Indonesia that are not able to create a competitive product, in terms of value and quality. This has led domestic consumers to consume more imported products than domestic ones. This condition is even exacerbated by government policies which give a little protection to domestic products by allowing large amount of incoming imported goods. In addition, the implementation of intra-industry trade patterns in Indonesia is still sub-par because it relies on comparative advantage rather than its internationally competitive advantages.

Related with the problems faced by the manufacturing sector, this bring interest to investigate further intra-industry trade in Indonesia and other five trade partner countries that have highest total net export trade based on UN Comtrade. These trading partner countries are namely China, Japan, USA, Singapore and South Korea.
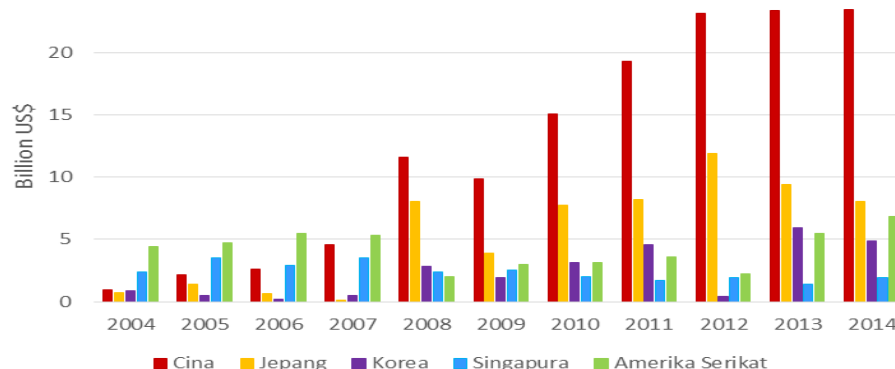
Source: UN Comtrade & World Bank (2016)

Figure 1: Total Trade between Indonesia and its Trading Partner Countries circa 2004-2014

Figure 1 shows the trend of total trade between Indonesia's fifth trading partner countries: China, Japan, USA, Singapore and South Korea during 2004 to 2014. The total trade between China and Indonesia was the highest during the years 2008 to 2014, which about 11 billion dollars up to 23 billion dollars, followed by Japan, the United States and South Korea, whereas total trade of Singapore was the lowest as 1 billion to 3 billion.

Based on the above, this research aimed to identify how the trading patterns and determinants of IIT between Indonesia and the countries trading partners including China, Japan, USA, Singapore and South Korea to be very important to conduct. This research will estimate the IIT index in the year 2004-2014.

The whole trade conducted by Indonesia which is 5-8 SITC in the category of manufacturing industry Rev. 3, by two digits, is calculated using Grubel-Lloyd index to determine the IIT. Panel data would be used as computing method. Variables used in thestudy ie, geographical distance, average GDP, the differences and deviations in per capita income and value added in the growth of industrial sectors.

Literature Review
Comparative Advantage Theory

Law of comparative advantage is one of the most significant international trade laws and still holds a fundamentally unmatched economic law, thus its versatility. This is in contrast with the absolute advantage law that is considered to have many shortcomings andits ability to only explain a small part of world trade. Hence David Ricardo introduced the theory of comparative advantage in 1817.

According to the law of comparative advantage, despite a country is less efficient compared to other countries in producing both commodities, but there is still the basis for trade that would be beneficial to both sides. The first country is to specialize in producing andexporting a commodity that has smaller absolute disadvantage and importing commodities that have larger absolute losses (Salvatore, 2014: 34).

Table 1: Law of Comparative Advantage

	USA	UK
Wheat (bushels/hour)	6	1
Fabric (meter/hour)	4	2

Source: Salvatore (2014)

International Trade Theory

International trade is the exchange of goods, services and factors of production across borders of nations. Based on Markusen, et al. (1995) there are several circumstances that could lead to international trade, such as, technological differences, available resources,government policies, unfair competition in the domestic market and economic scale, as well as public demands, tastes, and earnings per capita.

Technological dissimilarities between countries may encourage international trade. When the two countries own different production technologies, the differences can be exploited to create a trade. Each country will specialize in producing that intensifies the advantage of their production technology. Then later to export them to be exchanged for products that do not have a technological advantage in production. This technological discrepancy will create diverse abilities to produce which in turn, births a comparative advantage. Comparative advantage is what causes the variations in price, so as to allow each country to have a profit by trading.

In addition, variety in the domestic resources may also encourage trade; this further

can be explained by Heckscher-Ohlin model. The model elaborates that comparative advantage and trade carried out by a country will be determined by the difference in the endowments factor or abundance factor, which is relative between countries. If it is assumed that every country has an abundance of factors that are relatively different than others, owned production factors in both capital and labor can be moved easily (perfect capital mobility), owning the same production technology, the production function is a constant return to scale, the unavailability of transportation costs, tariffs or other obstacles to the flow of free international trade, then a country will export commodity; which are in the production process requires intensive use and the production factors are relatively plentiful and cheap in the country, they will also import commodities that require the intensive use of scarce and expensive factors of productions.

If the Heckscher-Ohlin models assume that production factors are in perfect mobility, then in the specific factor model, only workers who are assumed so. Meanwhile capital, such as physical capital, is fixed in short term at every industry in a country. This model said that every country would export a product that has an abundance of capital; if it is assumed that both countries have the same availability of mobile labors. However, if the abundance of labor is owned by two different countries, the trade would depend on the function of production and capital allocation.

Oppositely, the Heckscher-Ohlin theory and other models of specific factors, the policy of the government may also foster trade between countries if there are obstacles to trade although often such policies are not shown to boost trade. Tax policy and government subsidies can also encourage their international trade. Tax policy can lead to reduced consumption of domestic consumption, which then directs to increased exports or reduced imports. While the production tax may lead to reduced production, followed by reduced exports or increasing imports, government policies could also bring distortions in the welfare of society, in which tax policy may cause reduced public welfare. Thus it becomes involved in the trade as its implications.

Meanwhile, regarding imperfect competition, Markusen, et al. (1995) explains that impact of imperfect competition in a country, such as monopoly, could be eliminated with international trade, or in other words, a state would reap the benefits of trade (the gain from trade). If in there are manufacturers with monopoly power in a country, it would tend to produce lower output rate than it should have been in the competitive market, resulting in higher price level. However, if international trade is implemented, the producers who monopolize the domestic market would face world prices and causing its market power reduced, so that it would produce more and set a lower price.

If a country has an economic scale, the trade could still occur between two countries which have the same economy level. Even more, it could occur between two countries that are not mutually having a comparative advantage. A nation would undertake a specialization in the event of increasing returns to scale, although the resulting welfare affecting the trade depends on the type of goods that are specialized. The lower the production costs and the more diverse products are some of the implications of the creation of economic scales. This is exactly what causes a country has its own advantages, which in turn encourages trade.

The relations of a country with the international community, particularly international trade, would affect the performance of the country, especially in the long-term performance. Firstly, international trade could broaden channels of communication that will facilitate the dissemination of technical information. Secondly, the international competition will encourage entrepreneurship in their respective countries to continue to innovate, both in terms of ideas and technologies. Next, international integration could expand the market where the company operates. Lastly, international trade could push a country to specialize production that would affect output growth of a country.

Intra-Industry Trade Theory

Intra-industry trade is a two-way trade of products included in the same classification of industries. Intra-industry trade occurs when more than one country trades with products that have a comparative advantage in the same sectors. Intra-industry trade is based on a strong desire among the countries that want to benefit from economies of scale in production indicated by lower production costs (Salvatore, 2014: 165). Moreover, although the countries that conduct trade have similar whole capital-labor ratio, their factories would keep producing different products. As with the inter-industry trade, ie trade reflects comparative advantage, so that when a country is rich in capital then the country would export capital intensive goods and import goods that are labor intensive (Krugman and Obstfeld, 2003).
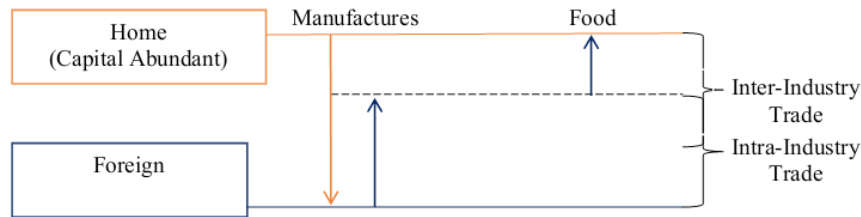
Source: Krugman & Obstfeld (2003)
Figure 2: Patterns of Inter-Industry Trade and Intra-Industry Trade

Figure 2 showed that the characteristics of the goods in the manufacturing industryare a monopolistic competition, where the country of origin (home) and other countries (foreign) would produce differentiated items. Although the country of origin (home) is a net exporter of manufactured goods, it would import goods that are similar to the export of manufactured goods, so this would boost intra-industry trade.

The pattern of intra-industry trade is not foreseeable. Many economists until now has not been able to mention exactly which countries produce manufactured goods and the type within the manufacturing industry, due to the unexplainable nature of this model. Each country would produce similar manufactured products, however each own differentiated products.

Through intra-industry trade, a country would be able to earn greater profits, especially for domestic consumers which goods provided are diversified and is available at a price that could possibly lower because of economies of scale in production and country added advantage of international trade (Salvatore, 2014:165).

Data and Research Methods

To view the determinants of intra-industry trade between Indonesia and the trading partner countries, the following quantitative methods with panel data regression is to be used.Econometric equations can be formulated as follows:

$$IIT_{it} = C + log\ DIST_{it} + log\ AGDP_{it} + log\ DPCGDP_{it} + log\ DVAEST_{it} + \varepsilon_i \qquad (1)$$

Annotations :

IIT_{it} = The Index of intra-industry trade between Indonesia and trading partners in t

$log\ DIST_{it}$ = The distance between Indonesia and the trading partner countries in t

$log\ AGDP_{it}$ = The average GDP between Indonesia and trading partners in t

$log\ DPCGDP_{it}$ = The differences or deviations in per capita income between Indonesia and trading partners in t

$log\ DVAEST_{it}$ = The differences in value added of the growth of industrial sector between Indonesia and trading partners in t

ε_{it} = Error term

Research Methods

This research uses two variables, independent variables and the dependent variables. Independent variables used are IIT index, calculated using Grubel-Lloyd formula in four SITC categories in the manufacturing industry. Independent variables used are the geographical distance, the average GDP, the difference or deviations in per capita income, as well as the differences in value added of the growth of industrial sectors. Research is also using panel data regression, with cross section data of Indonesia and every country of trading partners, namely China, Japan, USA, Singapore and South Korea circa 2004-2014. Research data sourced from several international websites, such as the World Bank Data, the United Nations Commodity Trade (UN Comtrade) and Ships Database. Variables of distance are obtained by measuring the distance between the main port of Indonesia and the trading partners' that did most of the import-export activities of trading goods. Average variable GDP is obtained by adding the total GDP of Indonesia with one of trading partner countries, and then divided by two to generate an average GDP of the two countries. Variable of differences in GDP per capita and in value added in the growth of industrial sectors are taken from World Bank Data. Furthermore, each of the independent variable data would be transformed into logarithms.

Finding and Discussion
Analytical Results

This study uses panel data that is the combined data from the time series and cross section. Panel data could be estimated using three methods, namely, Pooled Least Square (PLS), Random Effects Model (REM) and Fixed Effects Model (FEM). To determine which method is appropriately used, three tests could be conducted; the F-restricted test and Hausman Lagrange Multiplier test. F-restricted test is used to decide between Pooled Least Square (PLS) or Fixed Effect Model (FEM). Hausman test is used to select between Fixed Effects Model (FEM) or Random Effects Model (REM), while the Lagrange Multiplier test isuseful to choose between Pooled Least Square (PLS) or Random Effects Model (REM). This research has been conducting regression using Pooled Least Square, Random Effect Model and Fixed Effect Model. Furthermore, the classic assumptions test is to see if the result of the regression meets OLS assumptions. Classic assumption test aims to determine whether the estimates used have to be BLUE (Best Linear Unbiased Estimator). Classic assumption test that would be carried are multicollinearity test, heteroscedasticity and autocorrelation. In this study, FEM cannot be used because there is a variable of distance which can not beestimated, the variability in the variable distance between countries is very low, causing parameter left not estimated. Lagrange Multiplier test is conducted to choose between the PLS and REM, so that the results show the PLS is better used than REM. However in the analysis of the classical assumption test, it was found a problem of autocorrelation.

Then to resolve the issue, is to use Feasible Generalized Least Squares (FGLS)methods. This model has been spared from autocorrelation problem so that subsequentanalysis could be made.

Table 2: Test Results of Classical Cure Assumptions

Dependent Variable: Indeks IIT	
Cons	0.8742048
	(0.408)
DIST	0.0364939
	(0.439)
AGDP	0.142352
	(0.070)*

Dependent Variable: Indeks IIT	
DPCGDP	0.172283
	(0.326)
DVAEST	-0.1746809
	(0.002)***
Number of obs	55
Wald chi-squared	32.06
Prob Chi-Squared	0.0000

Annotation: *** Significance level 1%, ** Significance level 5%, * Significance level 10% Numbers in brackets ( ) p-value

Based on Lagrange Multiplier test, the best model obtained is the Pooled Least Square model. Model estimated using Pooled Least Square is calculated in the following results:

$$IITi_t = 0.8742048 + 0.0364939\,(DIST_{it}) + 0.142352\,(AGDP_{it}) + 0.0172283\,(DPC\text{-}GDP_{it}) - 0.1746809\,(DVAEST_{it}) + \varepsilon_{it} \qquad (2)$$

Variables of distance (DIST) has a probability of 0439 which means that the probability is greater than the significance level (α) of ten percent is a variable of distance (DIST) that did not significantly affect the IIT variables.

Variable of average GDP (AGDP) has a probability of 0.070 which means that the probability is less than the level of significance (α) ten percent, so that H0 is rejected and H1 received an average GDP (AGDP) which significantly affects intra-industry trade (IIT) between Indonesia and the trading partners during 2004-2014. Variable of average GDP (AGDP) has a value of 0.142352 and the coefficient is positive. This means that every one percent increase of the average GDP (AGDP) would increase by 0.142 percent of IIT.

Variable of differences and deviations in GDP per capita (DPCGDP) has a probabilityof 0.326, which means that the probability is greater than the significance level (α) ten percent which indicates that the GDP per capita (DPCGDP) did not significantly affect the IIT variables.

Variable of differences of value added in the growth of industrial sector (DVAEST) significantly affects intra-industry trade. This is shown from the probability of variable of value added in the growth industrial sector (DVAEST) of 0.002, which means that the probability is less than the level of significance (α) by ten percent.

Variable of difference of value added in the growth of industrial sector (DVAEST) has a coefficient value of -0.1746809 and negative mark. In other words, any increase in differences in value added in the growth of industrial sector by one per cent of the IIT would decrease by 0.175 percent.

Discussion

Intra-industry trade is a two-way trade of products included in the same classification of industries. Through intra-industry trade, a country could reap a greater benefit with the added advantage of international trade, which is worth more than the trade of comparative advantage. This is because IIT was able to create a larger market. Furthermore, this is implemented in order to benefit from economic scale, which is indicated by lower production costs than the trade of similar products. Lower production costs could be achieved by limitingthe types of products. Moreover, countries that implement IIT could import similar goods from other countries. To conclude, by doing IIT, a nation could reduce the variety of the products and increase its diversities available to domestic consumers at a lower price due to their economies of scale (Salvatore, 2014: 165).

Based on the research problem, this research is not only seeing the effects of variable of distances, average GDP, the deviations in GDP per capita and the differences in value added in the growth of industrial sector, but also the pattern of IIT between Indonesia and other trading partner countries. The pattern in question is to view the index value of IIT in trading partner countries and on every manufacturing industry, which in this research means SITC 5-8, by 2 digits.

Patterns of IIT Between Indonesia and Trading Partner Countries

Figure 3 shows the development of intra-industry trade between Indonesia and the trading partner countries. It is apparent that these countries have a high IIT with an average ofeach: China by 0.44, Japan by 0.65, United States by 0.46, South Korea and Singapore 0.61 and 0.63 respectively. Japan, South Korea and Singapore have high IIT. This is due to the countries belonged to the classification of developed countries. Developed countries usually have higher levels of IIT than developing countries for that the higher level of GDP per capita is associated with a greater demand for products and a variety of enabling consumers to purchase goods. However unlike these countries, China is actually still part of a middle- income country. This is due to the large number of the population and less evenly spread distribution of the income. Thus causes the GDP per capita of this country stays below average of developed countries, although essentially the country's GDP is qualified to be in the average of developed countries.
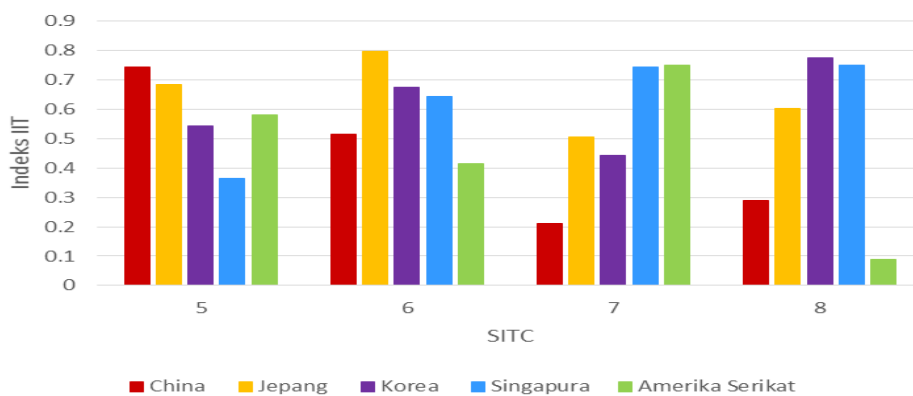
Source: UN Comtrade, (2016)

Figure 3: Average SITC 5-8 between Indonesia and Trading Partner Countries

Figure 3 shows that the IIT remains high, except for the United States in the SITC 8 category. Although it appears high, average IIT in SITC 8 occupies the lowest category among others. In other words, the average IIT in manufactured goods tend to be lower by 0.50 among other eight SITC categories compared with chemical products and related products in SITC 5 category, that is 0.58. SITC 6 category that is manufactured goods classified by material, is on 0.61, as well as machinery and transport equipment SITC 7 category, is 0.53. The high index of SITC 5-8 IIT strengthens the conclusions from previous studies on the pattern of trade between Indonesia and partner countries, that intra-industry trade is more common for the manufacturing category.

In addition, the manufacturing category of SITC 5-8 tends to increase in a relatively high level of the index. Relatively high intra-industry trade for manufacturing category in Indonesia and other trading countries indicates that supporter industries are still relatively limited for the production of export commodities. Be it the raw materials, intermediate inputs and other supporting components. The condition also showed a high dependence of the domestic manufacturing industry on the supply of raw materials and other production components from abroad.

Table 3: The Average SITC 5-8 between Indonesia and Trading Partner Countries

	5	6	7	8
Average	0,58	0,61	0,53	0,50

Source: UN Comtrade, (2016)

The Determinants of IIT Between Indonesia and Trading Partner Countries

This research aims to determine the determinant of IIT between Indonesia and the trading partner countries by counting all trades conducted by Indonesia and each of its trading partners from SITC 5-8. Variables tested were: variable of distance, average GDP, the difference or deviations in GDP per capita and the differences in value added in the growth of industrial sector within Indonesia's five major trading partner countries.

Trade is inseparable from their transportation costs. Krugman (1980) stated that transportation costs would reduce trading volume. In the case of intra-industry trade that occurs in differentiated goods, their product characteristics become very important information, such as machinery and transport of goods. The availability of such information increases transportation costs and even more if the distance between the countries is farther. This indicates that the distance has a negative effect on intra-industry trade. However, this research showed that the distance does not significantly affect the IIT. It can be assumed that the distance does not have a significant effect on the trading undertaken by both countries. The more advanced the transportation and the increasing number of community needs for goods and services, thus making the distance a miniscule obstacle.

In this study, the average GDP gives significant positive effect on IIT, where the country that has a large GDP may be able to increase IIT. This is due to circa 2004-2014, the average GDP between Indonesia and other trading partners was increasing. With the increase in the average GDP, Indonesia and the trading partners also were also able to produce more diverse goods in each industry, so that it boosted the increase of the IIT.

According to Helpman and Krugman (1985), determinant of IIT is a similarity in the factors of production between trading countries as indicated by the differences or the deviations in GDP per capita (DPCGDP). The differences or the deviations in GDP per capita capture to which extent the variations of the demand for diversity of products in the trading partner countries. IIT will tend to be more intense in countries that have a similar level of per capita income, whereas if the per capita income is far different from the trading partner countries, the lower IIT would be. Therefore, the per capita income gives a negative effect. However, the results show that the deviations in GDP per capita does not significantly influence the IIT, thus making the existing theory does not apply in this study. Possible explanation is that the difference in GDP per capita between Indonesia and the trading partners is very large. The greater the difference in GDP per capita between countries that trade, then the trade would even more support comparative and not intra-industry trade (Ito and Umemoto, 2004). The difference in GDP per capita between Indonesia and other countries trading partners is quite large, reported more than $ 10,000 (except China), because China has a GDP per capita which is almost equal to Indonesia so the deviations in GDP per capita between Indonesia and China is not significantly big compared to other trading partners.

Differences in value added in the growth of industrial sector are used as a proxy for economic scales. The linkage between the industrial sectors and IIT concepts which can be explained through product differentiation and economic scale makes a difference in market structure in every country. The increasing difference value added in the growth of industrial sector between developing countries and developed countries make indifferentiated products produced between the two countries. This is due to the small market structure, where the developing countries have not been able to compete with the products of developed

countries. Other factors, is that the developing countries tend to own centralized factories with the lack of technological developments and innovations, creativity and productivity. They are dependent on technology developed countries. Differences in value added in the growth of industrial sector are expected to affect significantly to the IIT that marked with negative sign. Thus, these variables are correlated to existing theories accordingly.

Conclusion

Based on the analysis and the discussion above, The conclusions are as follows:

1. Index of between Indonesia and its five major trading partner countries, namely China, Japan, USA, Korea and Singapore are relatively high. Japan is the country with the highest IIT index with an average of 0.65 points. Meanwhile, China is the country with the lowest IIT index with an average of 0.44 points.

2. Variables of distance is not significant to IIT.

3. Variables of average GDP significantly affects the IIT and is marked positive.

4. Variable of differences and deviations in per capita income is not significant to IIT.

5. Variable of differences in value added in the growth of industrial sector significantly affects the IIT and is marked negative.

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