

# THE IMPACTS OF FDI INFLOWS OF CHINA ON INTRA INDUSTRY TRADE OF INDONESIA'S MANUFACTURING INDUSTRY

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## ABSTRAK

Artikel ini menganalisa dampak dari FDI perusahaan manufaktur Tiongkok terhadap Indonesia dalam hal perkembangan perdagangan intra-industri antara kedua negara tersebut yang diukur dengan indeks Grubel-Lloyd. Dengan menggunakan metode regresi Pooled Least Square (PLS), artikel ini menunjukkan bahwa peningkatan investasi dari perusahaan-perusahaan Tiongkok di industri Indonesia, khususnya di industri manufaktur, menunjukkan dampak positif yang kuat terhadap indeks perdagangan intra-industri. Selanjutnya, artikel ini juga menyimpulkan bahwa komponen - komponen lain seperti keterbukaan perdagangan serta pendirian kerjasama perdagangan juga merupakan penentu dari perkembangan perdagangan intra-industri antar kedua negara.

**Kata Kunci:** Indonesia; Industri manufaktur; Penanaman modal asing; Perdagangan intra-industri; Tiongkok, China.

**JEL Classification:** F1, L20, R10

## ABSTRACT

*This article examines the impact of Chinese firms' FDI to Indonesia on the development of intra-industry trade between two countries, measured by Grubel-Lloyd index. Using Pooled Least Square (PLS) regression method, this article shows that the increase of Chinese firms' investment in Indonesia's industry, particularly in manufacturing industry, demonstrated strongly positive effect in the intensification of intra-industry trade. Additionally, this article also finds that the other components such as trade openness between two countries and the existence of trade integration are also important determinants of the development of intra-industry trade between two countries.*

**Keywords:** China; Foreign direct investment; Indonesia; Intra-industry trade; Manufacturing industry.

**JEL Classification:** F1, L20, R10

## 1. INTRODUCTION

Nowadays, international specialization does not only take the form of different countries specializing in the products of different industries, but instead, all countries may also specialize in different types of a given commodity from within the same industry. This intra-industry specialization results in intra-industry trade (hereafter IIT). Various theoretical and empirical researches regarding IIT patterns have been steadily advanced since Grubel and Lloyd (1971), which introduced an index measure of intra-industry trade known as G-L index. Most previous researches have been focusing on the studies of determinant factors of IIT pattern. IIT is considered to be more favorable because it can give more benefits, either for producers or consumers, such that minimizing cost, increasing productivity, expanding product varieties, staging up the manufacturing level, etc. Those benefits of intra industry trade can be raised since it is possible to transfer technology from the capital intensive country to the labor intensive country.

Helpman and Krugman (1985) and Falvey (1981) distinguished IIT into two types, which are vertical intra-industry trade (VIIT) and horizontal intra-industry trade (HIIT). For theoretical models with differentiated products (Helpman and Krugman, 1985), intra-industry trade increases with an increase in the similarity of endowment of two economies, result-

ing in more horizontal IIT (HIIT), or in other words, differentiated products of the same quality. On the other hand, Falvey (1981) pointed out, a country may export a product whose quality is different from its corresponding import. Demand for different quality products are driven by heterogeneity in consumers' income. This introduced a vertical IIT (VIIT), with price ratios of export to import deviating substantially from unity, which is more likely to be observed between countries with different incomes.

Furthermore, Greenway et al. (1995), Hu and Ma (1999), and Ando (2006) analyzed determinant factors of VIIT from HIIT. The main objectives of these studies were to analyze the determinant factors of each international trade pattern, and to verify the HIIT patterns as the traditional IIT concept which is essentially different from the VIIT patterns because the character of the VIIT patterns is based on the qualitative difference in products. These studies assert that HIIT is determined by various factors including levels of GDP per capita, GDP scale of trading partners, ratio of manufacturing industry trade to total trade, horizontal product differentiation, market size, and so on, while VIIT is determined by the difference in GDP per capita between trade partners, FDI amount, endowment ratio of human capital and so on.

There are some driving factors that can be used to explain intra in-

dustry trade pattern, one of which is foreign direct investment (FDI). The share of IIT is expected to be higher if the amount of FDI on the particular sectors is great and the FDI also makes the trade more intensified because the subsidiaries companies in the host country generally send their output to the home country. Several authors have researched the positive relationship between FDI and the share of IIT. However, the effect of FDI to the share of intra industry trade can be different, depending on the other factors. It was proved on the study by Yuqing (2007) about Japan and 'The United States' investment in China's manufacturing sectors. Japan's investment in China can boost the share of IIT while The US's investment has no effect to China's IIT because of different orientation, export growth for the former and expand the market for the latter.

After the implementation of ACFTA since early 2010, trade between China and Indonesia is on the rise. Indeed, while in 2003 trade between two countries reached only USD 3.8 billion, in 2010 it multiplied almost 10 times reached USD 36.1 billion. China's transformation into a major economic power in the 21st century has led to an increase of foreign investments in the bamboo network, a network of overseas Chinese businesses operating in the markets of Southeast Asia that share common family and cultural ties. However the free trade with China has caused much anxiety in Indonesia, since inflows of cheap products from

China could harm Indonesian industry. Indonesian private sector and civil society organizations vigorously lobbied the Indonesian government and members of parliament, insisting that Indonesia should either pull out of the agreement or renegotiate its terms with Beijing. China has also been one of Indonesia's key major trading partners in recent years, serving as the country's largest export and import market. By 2010, China had managed to overtake the United States as Indonesia's second-largest export destination after Japan reaching USD 14.0 billion. China is also becoming Indonesia's most important source of imports, reaching USD 19.6 billion in 2010. The balance however was in favor of China as Indonesia booked trade deficit USD -4.7 billion in 2010. From China's perspective, since 2010 ASEAN as a whole has become its fourth-largest trading partner after the European Union, Japan and the United States. Among ASEAN member countries, Indonesia was China's fourth-largest trading partner, which, according to data as of May 2010 from the Ministry of Commerce of the People's Republic of China, amounted to USD 12.4 billion, after Malaysia (USD 22.2 billion), Singapore (USD 17.9 billion) and Thailand (USD 15.7 billion).

Previous studies regarding IIT patterns have been mainly advanced to identify determinant factors of IIT patterns, even though such researches have also contributed to identify the characteristics of IIT patterns. In

recent years, some studies then divide IIT into HIIT and VIIT, and approach specific industries in details from microeconomic viewpoints. From those studies, there is much empirical evidence to suggest a positive effect of FDI on IIT. For example, the study by Zamroni (2005) analyzed IIT patterns between Indonesia and Japan in manufactured and agricultural products. Japan as one of Indonesia's leading FDI sources has been proven to have a big influence on the IIT between Indonesia and Japan. Moreover, the economic agreements such as those found in the Asia Pacific Economic Cooperation also yielded significant benefits to encourage IIT between Indonesia and Japan. Some studies also try to analyze the role of bilateral or multilateral trade agreement, and show that trade agreement promotes economic integration and later IIT between agreed countries. However, there is no single study directly testing the effect of FDI on IIT in manufacturing industry between Indonesia and China, and also particularly observing the role of regional trade integration (ACFTA).

To complement such limitations, this study will analyze international trade between Indonesia and China, classify the manufacturing industry as the representative of the whole spe-

cific industries, and examine the role of FDI on IIT before and after the implementation of ACFTA.

## **2. THEORETICAL FRAMEWORK**

According to new trade theory, trade can take place even if the endowments of inputs of countries are completely identical. This branch of theory does not build on the concept of comparative advantage. Instead new trade theory takes imperfect competition into account and assumes that the driving forces behind international trade are product differentiation and increasing returns to scale. Trade will now consist of importing those product varieties that are not produced domestically, and exporting those that are. This gives rise to intra-industry trade, i.e. two-way trade within the same product category.

According to Greenaway and Milner (1983) intra-industry trade is important for at least two reasons. First, accurate measurement of pure intra-industry trade can give some indication of the importance of determinants of international exchange other than relative factor proportions. Second, there is a possibility that adjustment to trade expansion may be easier when the expansion take the form of an increase in intra-as opposed to interindustry exchange.

**Table 1.** Differences between the inter-industry trade and intra-industry trade

Characteristics	Inter-industry Trade	Intra-industry Trade
International trade with products from...	different industries	the same industries
The underlying theory is...	neoclassical trade theory	new trade theory
The production function features...	constant return to scale	increasing return to scale
Consumer preferences are...	homogeneous	heterogeneous
The trade gains stem from...	the exploitation of comparative advantages in production	a wide range of product varieties and increasing return to scale

Sources: Jørgensen, J. G., Lüthje, T., & Schröder, P. (2001)

As explained by Table 1 above, inter-industry trade is defined as trade between two countries where the goods are from different sectors. Intra-industry trade (IIT) is then when the traded goods are of the same sector.

As asserted by Wieslander (1996), the existence and importance of intra-industry trade (IIT) became evident after a series of studies in the 1960's. Before that international trade was considered to be rather uncomplicated and simple. Countries traded because of supply side differences and produced according to their factor endowments and comparative advantages. Specialization increased the production and the surplus was exported, giving rise to international trade. The greater the differences in factor endowments were, the greater were the volumes of trade. The traded goods were of different industries, i.e. trade between industries or inter-industry trade. The trade was characterized by homogenous products and perfect competition. Inter-industry trade is best explained

by traditional trade theories e.g. the Heckscher-Ohlin model.

The term "Intra-Industry Trade" refers to the interchange of products that belongs to the same industry. In the international trade this means that the same kind of goods are imported and exported. This vision fits better the present economic and trade reality.

Helpman and Krugman (1985, p. 2) state in their book "*In practice, however, nearly half the world's trade consists of trade between industrial countries that are relatively similar in their relative factor endowments*". Since the creation of the European Economic Community (EEC) in 1957, the international trade experts noticed that the interchanges between these European nations (all of them developed economies), had a large increase due to the customs union, but that commerce did not respond to the guideline of the Heckscher-Ohlin-Samuelson's model (Inter-Industry trade), it was in great extent because of the Intra-Industry trade. About one-fourth of world trade consists of

intra-industry trade, it plays a large role in the trade of manufactured goods between high industrial developed countries, which accounts for most of world trade.

Kravis (1971) asserts that the conventional forces of comparative advantage operate on groups of products and therefore motivate the interindustry specialization and trade, but economies of scale in production lead each country to produce only a subset of the products within each group, so there is also intra-industry specialization and trade.

The intra-industry trade is present in different market structures. In perfect competition the intra-industry trade is present in similar countries because both countries has similar products, the products can be differentiated because the traders have similar factor prices.

In the monopolistic competition the intra-industry trade does not reflect comparative advantage. Even if the countries had the same overall capital-labor ratio, their firms would continue to produce differentiated products and the demand of consumers for products made abroad would continue to generate intra-industry trade. The economy of scale is the one that keep each country from producing the full range of products for itself; therefore economies of scale can be an independent source of international trade. In the oligopoly market is important that the markets are segmented in order to guarantee the idea of intra-industry trade; in

this market both countries have few firms and both produce homogenous goods so the domestic market is equal to the foreign market therefore both countries have the same size of market share in the foreign market and import and export of similar goods between countries occur.

During time the high industrial developed countries have become similar in their levels of technology and in the availability of capital and skilled labor, so there is no clear comparative advantage within an industry, so much of international trade takes the form of two-way exchange within industries, maybe driven in large part by economies of scale rather than interindustry specialization driven by comparative advantage.

Abd-el-Rahman (1991) first brought the idea to distinguish intra-industry trade into vertical and horizontal by using unit values in empirical analysis. Then Fontagné and Freudenberg (1997) divided trade into three types: inter-industry trade, vertical intra-industry trade and horizontal intra-industry trade. Greenaway et al. (1994, 1995, and 1999) give the seminal works by distinguishing the share of intra-industry trade into vertical and horizontal.

In order to discover the determinants of intra-industry trade, many studies have been done in the field of intra-industry trade. Lancaster (1980) argues that similar economies tend to have more mutual trade than dissimilar ones.

Greenaway et al. (1995) initiated the separation of vertical intra-industry trade and horizontal intra-industry trade in the case of UK. The result shows that over two thirds of total intra-industry trade is vertical. Market size and membership of a customs union are determinants of vertical intra-industry trade, while factor endowments do not have any significant impact. In a study of developing countries and United States by Clark and Stanley (1999), they demonstrate that intra-industry trade declines with increasing difference in factor endowment and economic size has positive effect while distance has a negative effect on intra-industry trade.

Kandogan (2003) studies intra-industry trade of transition countries. Our country group also includes transition economies. The result shows that production size, similar income per capita have positive effect on total intra-industry trade, especially horizontal intra-industry trade, while comparative advantages are not very important for vertical intra-industry trade.

In order to find the role of technology in intra-industry trade, Hughes (1993) does a research and proves a positive relationship between R&D intensity and intra-industry trade. However, Sharma (2000) finds that R&D and economy liberalization have no significant effect on intra-industry trade. Mora (2002) also tries to explain comparative advantage as a driving force of vertical intra-industry trade. The results show that only technological capital endowment is an important

determinant of intra-industry trade in EU.

Hansson (1989) studies Swedish manufacturing industries and finds that the more differentiated the products are, the higher intra-industry trade it has. In addition, he finds that countries have similar factor endowments and income level comparing to Sweden have more intra-industry trade with Sweden. Intra-industry trade is also found to be more intense with countries sharing a boarder with Sweden, which explains the short distance and low transport costs have positive effect on trade. Hansson also finds that industrialized countries which have higher capital intensity tend to have more intra-industry trade with Sweden. Yuan (2012) studies the intra-industry trade between Sweden and middle income countries in machinery industry, and the result shows that similar factor endowments and culture induce more intra-industry trade. Greenaway and Torstensson (1997) also study Sweden and OECD countries and find that factor endowment can determine intra-industry trade.

In all, researchers have focused on determinants of intra-industry trade. The determinants of intra-industry trade can be divided into two categories, country characteristics and industry characteristics. Country characteristics include GDP per capita, distance, tariffs and trade barriers, language, culture, and factor endowments. Industry characteristics include economies of scale, differentiated products. The result shows that coun-

try characteristics have more power on the degree of intra-industry trade (Balassa and Bauwens, 1987).

### 3. MEASUREMENTS AND METHODS

Since Grubel and Lloyd (1971) suggested a method to measure IIT for the first time, Grubel-Lloyd Index (hereafter GL Index) has been traditionally a convenient tool to measure IIT. This study also employs GL Index as a tool of analysis. GL Index is expressed as follows:

$$GL = \frac{(X_i + M_i) - |X_i - M_i|}{M_i} = 1 - \frac{|X_i - M_i|}{(X_i + M_i)}$$

$X_i$  represents export of  $i$  industry, and  $M_i$  represents income of  $i$  industry.  $(X_i + M_i) - |X_i - M_i|$  shows the amount of IIT, which is subtracting  $(X_i - M_i)$  showing the trade size of industry  $i$  from  $(X_i + M_i)$  showing the total trade amount of industry  $i$ . Consequently, GL Index is the IIT friction of total trade in the industry. If a country only imports or only exports commodities within the same sector, the fraction will be equal to one, so that the whole expression sums to zero. If a country exports the same monetary value as it imports, the fraction will be equal to zero and the whole expression will sum to one. The GL index is then a scale from zero to one, where zero denotes pure inter-industry trade and one denotes pure intra-industry trade.

Data from 2002 to 2014 are used in this study. In order to analyze the

IIT index between Indonesia and China, trade data are taken from UN Comtrade and include the amount and volume of the items of export and import. On the other hand, industrial statistics on FDI flows from China to Indonesia are taken from Indonesian Investment Coordinating Board (BKPM) that is provided by Lab Komputasi Departemen IE FEB UI. Further, GDPD represents the difference in GDP per capita and is obtained from the World Bank.

A statistical procedure called regression analysis is used to develop an equation showing how the variables are related. In regression terminology, the variable being predicted is called the dependent variable. The variable or variables being used to predict the value of the dependent variable are called the independent variables. The dependent variable in my case is IIT and independent variable is FDI. In this case the regression is so called simple linear regression, because analysis is involving one independent variable and one dependent variable.

In the case of a linear relationship between two variables, both the coefficient of determination and the sample correlation coefficient provide measures of the strength of the relationship. The coefficient of determination provides a measure between zero and one whereas the sample correlation coefficient provides a measure between -1 and +1.

Although the sample correlation coefficient is restricted to a linear

relationship between two variables, the coefficient of determination can be used for nonlinear relationships and for relationships that have two or more independent variables. In that sense, the coefficient of determination has a wider range of applicability. Applying this aspect author uses sample correlation coefficient because there is one independent variable in this case.

The basic theoretical assumption of the relationship between FDI and IIT is that FDI and the difference in factor endowments are important factors promoting IIT. Consequently, the author estimates a regression model using Pooled Least Square (PLS) regression of the following form:

$$IIT_{it} = \beta_0 + \beta_1 FDI_{it} + \beta_2 GDPD_t + \beta_3 OPEN_t + \beta_4 ACFTA_t + \varepsilon_{it}$$

Dependent variable  $IIT_{it}$  represents the intra-industry trade index between China and Indonesia, measured by the GL index, which assigned pure intra-industry trade a value of 1 and pure inter-industry trade a value of 0.

The variable  $FDI_{it}$  is defined as an investment made to acquire lasting interest in enterprises operating outside of the economy of the investor (IMF, 2009). It is the sum of equity capital, reinvestment of earnings, and other capital. In this case, it refers to the amount of FDI inflows by Chinese-affiliated manufacturing enterprises in Indonesia. This is introduced to verify the theoretical assumption that the active activities of production and sales by foreign affiliated enterprises will increase IIT of the two countries.

The variable  $GDPD_t$  is employed to proxy the difference in income level as well as demand structures. Linder (1961) advanced the hypothesis that similarities in income levels are associated with similarities in demand structures that, in turn, provide the basis for mutual trade in differentiated products. Subsequently, Helpman (1981) also provided proof for the proposition that the extent of intra-industry trade will be the greater, the more similar is the size of the trading partners. This proposition can be expressed using an index of relative inequality by Balassa (1986):

$$GDPD = 1 + \frac{[r \ln(r) + (1-r) \ln(1-r)]}{\ln 2}$$

$$\text{while } r = \frac{GDP_{ID}}{GDP_{ID} + GDP_{CH}}$$

This smoothen the difference of GDP per capita between the two trading economies and maps it into the range of 0 and 1, in which 0 represents no difference at all (Xing, 2007). We cannot use GDP for each countries together as variable instead of GDP difference because there is no benchmark in doing the summation, unless there has been empirical calculation of GDP Indonesia and China altogether.

The variable  $OPEN_t$  is defined the ratio of total export and import to GDP. Measures greater than unity (like what happen in Singapore, Luxembourg, or Hong Kong) indicate that the country's level of international trade exceeds its income. Such countries often perform minimal value

adding on imports which are then re-exported. Alternatively, some countries may heavily specialize in products in which they possess a comparative advantage, while extensively sourcing many other goods and services from the rest of the world. In either case, these countries are described as very open. By contrast, in cases where trade openness approaches zero, then trade represents a small proportion of a country's income and such countries are typically described as very closed (Squalli & Wilson, 2006).

Trade openness will improve country's competition in the market since government will impose less protection or lower trade barriers to the producers. This causes the industry to improve its productivity, to offer more vertically differentiated products as well as lower price, to increase consumer surplus welfare, and ultimately to increase IIT (Melitz, 2003).

The variable  $ACFTA_t$  is defined as the dummy variable 1 after ACFTA implementation and 0 before ACFTA implementation. This variable is included in the regression to observe the effect of ACFTA implementation in promoting IIT between Indonesia and China.

#### 4. RESULTS AND ANALYSIS

This paper analyzed foreign trade pattern of Indonesia and foreign direct investment flows to country between 2002 and 2014 particularly in

manufacturing industry. This period of time was chosen because: 1) China has joined WTO in 2001, and it has been growing significantly since 2002 onwards, and 2) This study was meant to analyze the IIT index, which was suspected to exist after China collected high economic growth and started to invest abroad during that period.

Recent trend is that IIT becomes a new pattern of international trade in various countries around the world. IIT especially plays a more important role in the specific regions including Asia, where international trade within a corresponding industrial sector increases as the economic integration pursues. Moreover, IIT have been recently attracting attention due to the trend of increasing volumes of FDI along with the globalization.

Table 2 above provides a statistical summary for all dependent and independent variables used in the estimation to show that there is no outlier in the data.

Figure 1 shows the trend of trade volume (export and import) between Indonesia and China. Export from Indonesia to China increased from 2002 to 2011, but slowly decreased until the end of 2014. On the other hand, import from Indonesia and China steadily increased with a slight fluctuation in 2008.

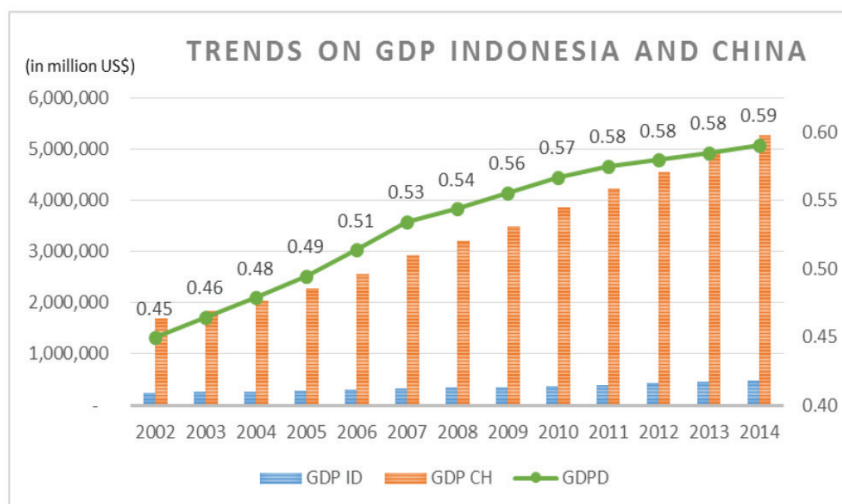
**Table 2.** Summary Statistics

Summary	FDI*	GDP ID*	GDP CH*	GDPD	OPEN	IIT
MIN	117.00	245,767.88	1,682,265.43	0.45	0.36	0.73
MAX	837.65	471,710.18	5,274,105.53	0.59	0.95	0.94
MEAN	355.19	346,392.16	3,297,067.20	0.53	0.64	0.88
STDEV	224.87	74,581.44	1,204,449.39	0.05	0.20	0.06

Notes: 1) \*: in million US\$; 2) Sources: UN Comtrade, World Bank, Lab Komputasi Departemen IE FEB UI, and author's calculation.

**Figure 1.** Trade Volume between Indonesia and China

Source: UN Comtrade

**Figure 2.** Recent Trends on GDP Indonesia and China

Source: World Bank

Furthermore, Figure 2 shows the trends on GDP Indonesia, GDP China, and GDP difference between two countries. The gap of income between

Indonesia and China are very high, and there is tendency that the GDP difference between those two countries to be substantially increasing over time.

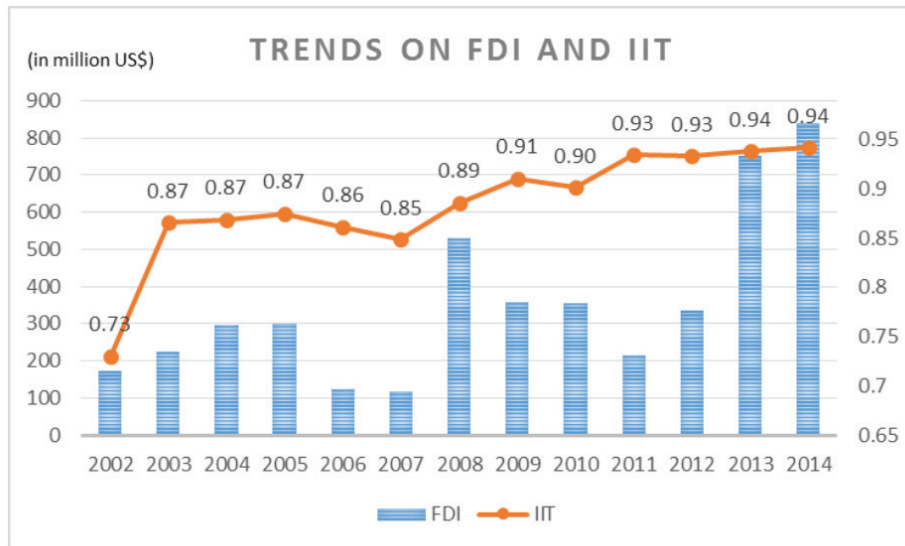


Figure 3. Recent Trends on FDI and IIT between Indonesia and China

Sources: Lab Komputasi Departemen IE FEB UI and author's calculation

As most of FDI by multinational corporations plays a key role in the fragmentation of production processes, it is likely to be a background on the increase of IIT. Over the past few decades, FDI from developed countries including China into East Asian developing countries like Indonesia has been fluctuatively increasing, and subsequently IIT has also been increasing as well. However, most researches regarding IIT patterns have focused on the basis of how to identify determining factors of IIT patterns mainly in the regional trade. Although a few scholars recently have divided IIT into HIIT and VIIT and analyzed a targeted individual industrial sector from the

microscopic perspective, their studies are limited to some specific industries only.

Estimation covers 6 sub-sectors of manufacture in Indonesia, which are: 1) textile industry; 2) leather goods & footwear industry; 3) wood industry; 4) chemical and pharmaceutical industry; 5) rubber and plastic industry; and 6) metal, machinery, and electronic industry. In this analysis, I adopt panel data regulation of which I use all data given the sectors respectively. All variables have been inserted based on respective sectors, therefore, each sectors have their own mentioned variables based on time series data.

This study conducted empirical analysis in order to supplement such limitations by targeting international trade between Indonesia and China, and then classifying manufacturing industry into typical individual industries.

This study also analyzed how several factors including FDI from China to Indonesia, difference in factor endowments (difference in GDP per capita), trade openness, and regional trade integration (ACFTA) affect IIT.

**Table 3.** Regression Results

Variables	Coefficient	Std. Errors	t-Statistics	Prob.	R2	F-stat	No. obs
FDI	0.000287	0.0000249	(11.54)***	0.000	0.9027	4323.77	156
GDPD	1.881233	0.3062371	(61.43)	0.478			
OPEN	0.3959565	0.0402887	(9.83)***	0.001			
ACFTA	0.0032928	0.0013678	(2.41)**	0.017			

Notes: 1) \*\*\*, \*\*, \*: significant at the 1%, 5%, and 10% level, respectively; 2) *t*-Statistics are in absolute value.

Above table shows the results of Pooled Least Square (PLS) analysis for six industries. In accordance with the results from empirical analysis, FDI and OPEN have a positive relationship with IIT and the relationship becomes statistically significant at the 1% level, while ACFTA statistically shows positive relationship at the 5% level. On the other hand, GDPD representing the difference in GDP per capita, namely the difference in factor endowments, has positive yet statistically insignificant relationship with IIT, which means that its impact on IIT remains low but potentially supports it. Thus, we cannot conclude the impact of GDP difference on bilateral IIT between those two countries. This result is contradicted with the results of Zamroni (2005) who finds that difference in GDP per capita has negative relationship with IIT in panel analysis, or Durkin and

Krygier (2000) who find positive relation between income differences and IIT in OLS regressions.

Further, Fukao et al. (2003) predicts that GDP per capita difference between two trading nations bears no positive relationship with VIIT when the difference is below \$10,000 (with PPP applied), although it does positively affect the significance of VIIT in terms of nations' total trade in case where the difference is above \$10,000 (with PPP applied). However, the assumption of Fukao et al. (2003) is not necessarily applicable to this study because the empirical analysis shows that the difference in GDP per capita has a positive yet insignificant impact on IIT, albeit the absolute GDP per capita difference between Indonesia and China has been over \$1,000,000 during entire period of analysis. In theory, the difference in capital intensity of each

industrial sector is required to reflect the difference in factor endowments for each industrial sector but such data are not available in China.

This regression doesn't show strong significant linear relation as expected, but according to Anderson, Sweeney and Williams (2014, p. 525) *"Regression analysis cannot be interpreted as a procedure for establishing a cause-and-effect relationship between variables. It can only indicate how or to what extent variables are associated with each other. Any conclusions about cause and effect must be based on the judgement of the individual or individuals most knowledgeable about the application"*.

After considering all the factors above, it is possible to reach the following conclusions: Namely, 1) in the case of international trade and investment between Indonesia and China, the higher value of FDI inflows from China to Indonesia in the specific industry sector, the greater IIT in the corresponding industry sector. 2) There is a tendency that an increase in the trade openness between Indonesia and China is also associated with an increase of IIT. Further, 3) there is a tendency that the establishment of regional trade integration (in this case, ACFTA) will increase IIT. The above conclusions from empirical analysis are identical with the hypothesis of this study. However, 4) the results from this empirical study cannot support the hypothesis that there is a tendency that the difference in GDP per capita, namely the difference in factor endowments is associated with IIT with qualitative difference.

## 5. CONCLUSION

This study has attempted to provide an empirical analysis using panel data on six manufacturing industries of: 1) textile industry; 2) leather goods & footwear industry; 3) wood industry; 4) chemical and pharmaceutical industry; 5) rubber and plastic industry; and 6) metal, machinery, and electronic industry. In conclusion, the estimation results has confirmed that IIT between Indonesia and China increased because:

- a) The value of FDI inflows from China to respected industry in Indonesia has increased;
- b) Trade openness between Indonesia and China is getting higher; or
- c) The existence of a regional trade integration (ACFTA) between Indonesia and China has been found.

However, contrary to the hypothesis of this study, the difference in GDP per capita, namely difference in factor endowments, did not have a significant impact on IIT given statistical findings. Further studies on these relationships are necessary since the results from the previous studies also report the relationship between the GDP per capita difference and IIT to be either negative or positive without much consistency.

Finally, a number of variables influencing IIT such as variation of exchange rates, trade imbalance, size of industries, etc, is beyond of this model construction. There are still rooms to complete this study in responding its limitation.

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