

Analysis of Intra-Industry Trade between Indonesia and Japan: A Case Study in Manufactured and Agricultural Products

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Abstract

This study analyzes the intra-industry trade (IIT) patterns between Indonesia and Japan in manufactured and agricultural products and explores its determinants. As one of the biggest importers of Indonesian products, it is expected that Japan has a big influence on the IIT between Japan and Indonesia. The Asian financial crisis, as one determinant, disrupted the extent of intra-industry trade between Indonesia and Japan. To reduce trade barriers, economic agreements such as those found in the Asia Pacific Economic Cooperation had a positive effect on bilateral intra-industry trade between the two countries. In simulations, the bilateral trade policies imposed yielded significant benefits to encourage bilateral intra-industry trade between Indonesia and Japan.

Key words : *Intra-industry trade -Indonesia and Japan*
JEL Classification: *F14- F17*

1. INTRODUCTION¹

Indonesia and Japan have a long history of trade and other economic transactions. Indonesia and Japan signed an economic partnership in 2003 under the Association of Southeast Asian Nations (ASEAN)-Japan Economic relationship. With the signing of this bilateral agreement it is expected that the two-way flow of products across their borders will significantly increase in the following years. Empirical data show increasing trade between Japan and ASEAN from 1999-2000 onwards. In the case of Indonesian-Japan trade, it can be seen that bilateral trade flow increased sharply from 1999 to 2000. Bilateral trade between Indonesia and Japan covers not only manufactured products but also agricultural commodities and services.

This study analyzes the intra-industry trade (IIT) pattern of Indonesia's trade with Japan and explores the determinants of Japan-Indonesia IIT. The results of this analysis are expected to indicate those factors to which the trading countries, Indonesia and Japan, should pay more attention to promote an expanded and mutually profitable relationship in trade. This study is expected to explain the position of bilateral trade policies between Indonesia and Japan in promoting their trade. In addition, simulations of possible trade policies will be recommended to expand bilateral trade.

2. THEORETICAL AND EMPIRICAL ASPECTS OF INTRA-INDUSTRY TRADE

Intra-industry trade is defined as the simultaneous export and import of products that belong to the same industry (Grimwade, 1989). Within the same industry, the products are close substitutes for each other in terms of factor inputs and consumption (Tharakan, 1985; Grimwade, 1989; Wong, 1997). IIT involves products that are differentiated and not homogenous. In recent decades, individual countries have not concentrated on whole industries; rather, they have undertaken a much narrower type of specialization. This has involved specialization in the production of specific products or groups of products within a given industry. Such specialization is known as an *intra-industry specialization*, in contrast to *inter-industry specialization* in which a country specializes in a whole industry.

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Countries that have very different factor endowments will engage in Heckscher-Ohlin trade (where the comparative advantage leading a country to export or import a given product depends on the variations in factor endowments they have and on factor intensities by commodity), whereas countries that have similar factor endowments will engage in intra-industry trade (Krugman, 1981). The theoretical explanation behind this is that the existence of economies of scale in the production process encourages each country to produce only a subset of the products within each group, so that there is intra-industry specialization in trade. Countries with similar factor endowments will still trade because of economies of scale, and their trade will be largely intra-industry trade (Krugman, 1981; Markusen & Wigle, 1990).

High and growing levels of IIT are commonly interpreted as a reason to expect low adjustment costs following trade liberalization. A rise in IIT greatly facilitates trade liberalization by reducing the pressure on each country to concentrate its production on a narrow range of industries according to comparative advantage (Brulhart, 1994; Grimwade, 1989). Hamilton and Kniest (1991) consider the impact of trade liberalization, such as the creation of free trade areas, to encourage a greater degree of intra-industry trade. They found significant correlations between lower adjustment costs and trade liberalization in industries characterized by a high degree of IIT. In principle, *intra-industry trade* enhances the gains from trade through better exploitation of economies of scale rather than through comparative advantage as trade leads countries to concentrate on a limited number of products within a particular industry. Specialization within industrial categories may also stimulate innovation (Ruffin, 1999).

3. EMPIRICAL STUDIES ANALYZING IIT

Intra-industry trade analysis has emerged as a tool to examine the extent of international trade in the presence of differentiated products under economies of scale (McCorrison & Sheldon, 1991). Some studies have been devoted to investigating IIT patterns of countries with different development levels. But the majority of IIT studies have been directed at trade between developed countries, with only a small portion of research focusing on relationships between developed and developing countries or between different developing countries. The studies focusing on IIT between developed and developing countries were first conducted by Balassa and Bauwens (1987). While studies featuring developing countries' IIT were researched by Harvylyshyn and Civan (1985).

Due to the increasing amount and types of IIT, there is no single model that perfectly covers all of its determinants. Instead, a wide range of models has been developed, each of which emphasizes a set of main

determinants. Some of these have been reviewed. By studying IIT between Australia and its trading partners, Matthews identified the main determinants which could explain trends in Australia's bilateral trade IIT, namely average and relative per capita income, distance and trade destination. For these main factors he found that Australia's highest level of IIT was with its closest neighbor New Zealand at around 50 percent, largely reflecting the high degree of economic integration under the ANZCERTA agreement.

Markusen et al. (1995) used a simple model to examine the role of per capita income in analyzing the total volume of trade and the direction of trade. They concluded that trade between the North (developed countries) and the South (developing countries) fits into either the traditional Heckscher-Ohlin trade model based on differences in factor endowments or inter-industry trade. Meanwhile, trade flow among North countries is primarily trade in differentiated products, that is, intra-industry trade. Parallel to these findings, Murshed (2001) proposed that in IIT patterns, the North exports higher quality products that point to its greater skills in human resources, while the South tends to export more traditional products that reflect cheaper labor costs.

Empirical studies on IIT in agricultural products are limited, as most studies have focused on manufactured products. Industrial products are easier to differentiate than agricultural products, as these are naturally more homogenous. But the increasing use of technology is likely to lead to the production of differentiated agricultural products (Christodoulou, 1992). Studies analyzing the existence of IIT in agricultural products include those by McCorrison and Sheldon (1991); Christodoulou (1992); Hirschberg, Sheldon, and Dayton (1994) and Qasmi and Fausti (2001).

Hirschberg, Sheldon, and Dayton (1994) analyzed the determinants of bilateral intra-industry trade in the food-processing sector. They found that intra-industry trade is a positive function of a country's per capita income and equality in per capita income between two trading partners. Other determinants found to be significant were the existence of a common border and the membership in either a customs union or free trade area. Meanwhile, fluctuations in exchange rate and distance were found to lessen IIT in bilateral trade. McCorrison and Sheldon (1991) found that any changes in international trade in processed agricultural products for the US were mostly characterized by inter-industry specialization (with the exclusion of exports to Canada), while EC trade was characterized by IIT.

Another study focusing on agricultural products was conducted by Qasmi and Fausti (2001). They found that bilateral intra-industry trade in food products in NAFTA countries increased significantly over the

period of study, especially for trade in food products involving a greater degree of processing. This increase in bilateral intra-industry trade in food products was due to the creation of the NAFTA agreement. USA-Canadian bilateral trade has been higher relative to Mexico's bilateral trade in the framework of NAFTA, because per capita income levels of the USA and Canada are more similar.

4. BILATERAL AND REGIONAL TRADE AGREEMENTS

To more closely integrate their economies, ASEAN countries and Japan signed bilateral and regional trade agreements. These agreements were aimed at facilitating not only economic cooperation but also other types of cooperation focused on social and human development. Intensive cooperation exists in the Japanese-Singapore economic partnership agreement. Agreements were also signed with bigger ASEAN countries such as Indonesia, Malaysia, the Philippines and Thailand. The agreement between Indonesia and Japan was signed on December 10, 2003 and signaled the intention of both the Japanese and Indonesian Governments to strengthen their bilateral cooperation to promote economic relationships (including bilateral trade), social development and also the transfer of technology from Japan to Indonesia.

In signing trade agreements with other Asian countries such as ASEAN member countries, Japan can obtain advantages such as access to bigger markets and the possibility of lower average tariffs.² But, in promoting such trade liberalization, the participating countries have to gradually open their markets to a broad range of products from other trade partners. The Ministry of Foreign Affairs (MOFA) argued that Japan cannot obtain the advantages of free trade agreements without experiencing some problems from opening its markets (MOFA Japan, 2002).

To facilitate stronger trade relations, Japan and ASEAN member countries signed the Japan-ASEAN Closer Economic Partnership (CEP) in 2003. The objectives of this agreement are to (ASEAN Secretariat, 2003): (a) strengthen economic integration between Japan and ASEAN through the creation of a CEP; (b) enhance the competitiveness of Japan and ASEAN in the world market through strengthened partnership and linkages; (c) progressively liberalize and facilitate trade in goods and services as well as create a transparent and liberal investment regime; (d)

² Trading with East Asia countries including ASEAN countries will create additional benefits through liberalization even though East Asia countries have high tariffs on average. Liberalization of trade with East Asia will also facilitate the activities of Japanese businesses, which are facing competition from ASEAN and China (MOFA Japan, 2002).

explore new areas and develop appropriate measures for further cooperation and economic integration; and (e) facilitate the more effective economic integration of the newer ASEAN Member states and bridge the development gap among the ASEAN Member States. This CEP agreement began as consultations on the liberalization of trade in goods and services, and also investment, in 2004. Outstanding issues include the basic principles of Japan-ASEAN cumulative rules of origin and customs classification and collecting and analyzing trade and custom data (MOFA, 2003).

Although Japan is a dominant economic power in East Asia, it cannot neglect its neighbors in international trade. Let us glance at the international trade relationship between Japan and other countries. According to data from the Ministry of Foreign Affairs and Trade (MOFA-Japan), in 2001 the major trading partners of Japan were East Asia (including ASEAN member countries), North America and Europe. These regions together accounted for 80% of Japan's international trade. In the case of Japan-ASEAN trade, from 1993-2000, the share of Japan's trade with ASEAN accounted for 15.04%, while the share of ASEAN's trade with Japan accounted for 14.74%. On an annual basis, the value of exports from Japan to ASEAN and vice-versa during the same period were respectively US\$ 62.7 billion and US\$ 46.4 billion on average. In addition, the trade volume between these countries was valued at US\$101.64 billion in 2001. In 2001, 15.4% of ASEAN's exports went to Japan while ASEAN absorbed 14.4% of total Japanese exports (ASEAN Secretariat, 2004).

In examining Indonesia and Japan's trade relationship, Indonesia had a relatively bigger share than other ASEAN countries on average. Indonesia's exports to Japan, even after the Asian financial crisis, were around 26-27% (1997-2001) of total ASEAN exports to Japan. However, Indonesia's imports from Japan were lower.

Most of Indonesia's foreign trade is conducted with Japan. Japan absorbed the highest share of Indonesia's exports from 1993 to 2001. In 1997, for example, Indonesia's exports to Japan accounted for 23.32% of its total exports. This share slightly decreased in the following years and then recovered again in 2000-2001 to 23% of Indonesia's total exports. On the import side, Japan also supplied the Indonesian market by the highest percentage. In 1997, when the Asian financial crisis erupted, Japan's exports to Indonesia accounted for 19.8% of Indonesia's total imports. In the following years this share dropped to 15.15% of total Indonesia imports.

Japan's exports to Indonesia are dominated by electrical machinery (26.1% of Japan's total exports went to Indonesia in 2002), followed by transport equipment (15.2% in the same period). Meanwhile, Indonesia's

exports to Japan are dominated by mineral fuels (46.6% of Indonesia's total exports of mineral fuels were destined for Japan in 2002). A large part of Indonesia's manufactured exports consist of machinery equipment, which accounts for 11.4% of Indonesia's total export to Japan. In the trade of agricultural products with Japan, Indonesia's exports were dominated by raw materials and food stuffs at 11.8% and 7.32% respectively.

5. METHODOLOGY

5.1. Intra-industry Trade Model

Most empirical efforts in studying intra-industry trade are based on the use of the Grubel and Lloyd (GL) Index. This index is expressed as (Grubel & Lloyd, 1975):

$$GL_t = IIT_t = \left[1 - \frac{|X_t - M_t|}{(X_t + M_t)} \right] \dots\dots\dots (1)$$

where, X_t and M_t denote exports and imports of a given industry in year t . As the degree of IIT increases, the GL Index approaches 1 and as either exports or imports dominate bilateral trade in the particular industry (or inter-industry trade exists), the value of the GL Index approaches zero.

As the dependent variable (IIT) is valued between 0 and 1, a logistic function is used to obtain the maximum likelihood estimates of the parameters of the model and to ensure that the predicted values of IIT are also in that range. The logistic function of the IIT is given by:³

$$\ln \left[\frac{IIT_{ijt}}{1 - IIT_{ijt}} \right] = \Pi_{ijt} = \lambda_1 \ln V_{ijt} + \dots\dots\dots + \lambda_n \ln V_{ijt} + Dummy_{ijt} + \mu_{ijt} \dots\dots\dots (2)$$

where V_{ijt} = possible determinants of IIT between Indonesia and Japan at time t and $Dummy$ is the APEC variable. By solving equation (2) for IIT_{ijt} it can be seen that the value of IIT_{ijt} is:

$$IIT_{ijt} = \left[\frac{1}{\{1 + e^{(-\Pi_{ijt})}\}} \right] \dots\dots\dots (3)$$

³ More discussion on the logistic function can be found in Ramanathan (1998), pp. 607-610.

If the value of Π_{ij} is $\rightarrow +\infty$ then $IIT_{ij} \rightarrow 1$, and when $\Pi_{ij} \rightarrow -\infty$ then $IIT_{ij} \rightarrow 0$. Thus, the value of IIT_{ij} always lies in the range $[0, 1]$.

The study is conducted as a quantitative analysis and further elaborates supporting trade policies between Indonesia and Japan.

5.2. Setting-Up the Hypotheses

In analyzing intra-industry trade patterns between Indonesia and Japan, we use the hypotheses that are the underlying determinants of the existing intra-industry trade. Empirical studies analyzing intra-industry trade are based on using either country characteristics or industry characteristics or a combination of both. In this study, the hypotheses employ country characteristics only, referencing the original hypotheses. The lack of data on industry characteristics, especially in Indonesia, is the logical reason behind this choice. Assuming economies of scale and product differentiation, there are a number of hypotheses that can be generated from the implications of the theoretical model. These hypotheses are constructed as follows:

1. Per Capita Income of Reporting Country (PGDP_i).

The extent of intra-industry trade is expected to be positively correlated to per capita income of the reporting country; country *i*. Per capita income represents the influence of the endowment of capital per worker (the capital-labor ratio). The larger the endowment of capital per worker the larger the intra-industry trade will be (Hirschberg, Sheldon and Dayton, 1994).

2. Differences in per Capita Income (DIF-INCOME_{ij}).

The extent of intra-industry trade is negatively correlated to the differences in per capita incomes between the reporting country (country *i*) and partner country (country *j*). Differences in per capita income represent differences in demand structures and or differences in endowment factors (Balassa and Bauwens, 1987). Inequalities between per capita income of the exporting country (country *i*) and the importing country (country *j*) are defined as (Balassa and Bauwens, 1987):

$$DIF - INCOME_{ij} = 1 + \frac{[w \ln(w) + (1-w) \ln(1-w)]}{\ln(2)} \dots \dots \dots (4)$$

in which

$$w = \frac{PGDP_i}{(PGDP_i + PGDP_j)} \dots\dots\dots (5)$$

3. Variation of Exchange Rate (VAREX)

The terms of exchange rates used in the study are related to greater uncertainty in the value of currency of the reporting country relative to its partner's. Exchange rate uncertainty is expected to be negatively correlated to the extent of intra-industry trade, as this leads to higher premiums and therefore causes the prices of certain products to increase. The more unstable the exchange rate of the exporting country against the exchange rate of the importing country, the lower the level of intra-industry trade. The volatility of the exchange rate is calculated as:

$$VAREX_{ij} = \left[\frac{(ER_{it} - ER_{it-1})}{(ER_{it} + ER_{it-1})} \right] \cdot \left[\frac{ER_{jt}}{ER_{jt}} \right] \dots\dots\dots (6)$$

4. Asian Financial Crisis (AFC)

The Asian Financial crisis that occurred in 1997 had a negative impact on most Asian economies, especially in Southeast Asian countries. This economic downturn depressed economic activity in production, consumption and trade in the infected countries, including Indonesia. As intra-industry trade is a part of foreign trade, it is expected to involve not only exports but also imports. AFC is thus a dummy variable.

5. Level of Openness (OPENNESS)

The level of openness implicitly shows the degree of trade barriers imposed by one country in its international trade. In this case, openness is estimated from the ratio of total trade (exports and imports) to Gross Domestic Products. A higher ratio of OPENNESS means that the specific country imposes lower barriers to international trade.

6. Regional Trade Arrangements (APEC)⁴

As proposed by Balassa (1986), the existence of regional trading arrangements fosters intra-industry trade. In this study, APEC is used to

⁴ The absence of agreement between ASEAN and Japan as a proposed determinant is because this agreement was signed outside the range period of IIT data (1980-2000).

show its influence on Indonesian-Japanese Bilateral IIT patterns. The APEC membership variable is used as a dummy variable.

7. Foreign Direct Investment (FDI)

The last determinant used in the model is foreign direct investment. In this model, FDI is applied to Indonesia's IIT only. This is because investment refers to Japanese FDI in Indonesia only and there is no similar data of the reverse. FDI is expected to intensify IIT between trading partners as there is a strong tendency for investors to continue have economic relationships with partner countries in which they have profited.

By encompassing all hypothesized determinants, the IIT model becomes:

$$\ln \left[\frac{IIT_{ij}}{1-IIT_{ij}} \right] = \Pi_{ij} = \lambda_1 \ln PGDP_i + \lambda_2 \ln DIF-INCOME_{ij} + \lambda_3 \ln VAREX_{ij} + \lambda_4 AFC_{1997} + \lambda_5 \ln OPENNESS_j + \lambda_6 APEC + \lambda_7 \ln FDI_{ij} + \nu_{ij} \quad (7)$$

in which $PGDP_i$ = per capita GDP of reporting country i ; $Dif-Income_{ij}$ = the differences between per capita GDP of country i and j ; $VAREX_{ij}$ = the volatility in the exchange rate of the reporting country's currency against its partner's currency; AFC_{1997} = binary variable of Asian financial crisis in 1997, valued at 1 in the presence of crisis and 0 otherwise; $OPENNESS_j$ = the ratio of total trade (exports plus imports) to GDP of the partner country; $APEC$ = memberships in APEC settled since 1989, valued at 1 since 1989 and 0 otherwise; and the last determinant, FDI_{ij} is FDI of Japan in Indonesia.

8. Data

The data used in this study encompasses intra-industry trade data and related data regarding the determinants of bilateral intra-industry trade. IIT data was obtained from the product categorization in the Standard Industrial Trade Classification (SITC). Data used in this study is limited from 1980 to 2000. The IIT Indices of manufactured and agricultural products were found in the National Asia Pacific Economic and Scientific (NAPES) Database. GDP and per capita GDP data⁵ of reporting and partner countries and population were obtained from the World Bank Database. Variations of exchange rates (VAREX) were calculated from

⁵ The GDP and per capita GDP used are in current prices (in thousands of US Dollars)

data obtained from Alan Heston, Robert Summers and Bettina Aten, Penn World Table (PWT) 6.0. The VAREX is estimated in terms of the reporting country's currency against the partner's currency.

6. RESULTS AND DISCUSSION

Determinants of Bilateral IIT

The empirical results of the IIT model for bilateral trade between Japan and Indonesia are presented in Tables 1 and 2. Table 1 provides information on the variables that determine intra-industry trade between Indonesia and Japan in agricultural products. Significant determinants include per capita GDP, differences in income per capita, the level of openness, the Asian financial crisis and APEC. These variables are explained in more detail below:

Table 1
Bilateral Intra-Industry Trade in Agricultural Products

	Indonesia's Exports to Japan	Japan's Exports to Indonesia
Determinants	Coefficients (T-Ratio)	Coefficients (T-Ratio)
PGDP _i	1.3585 (1.8329)*	2.9663 (2.1123)**
DIF-INCOME _{ij}	-0.52338 (-2.3685)**	-1.1068 (-2.1083)**
VAREX _{ij}	-0.09728 (-0.44363)	-0.36609 (-1.6476)
OPENNESS _i	0.35752 (0.75853)	0.15391 (0.29183)
AFC	-0.28874 (-1.5086)	-0.09538 (-0.43610)
APEC	0.10767 (0.47155)	-0.16063 (-0.54636)
FDI _{ij}	0.08919 (1.2967)	-
R-Square	0.7700	0.6360
No. Observation	21	21
DW	1.69473	2.09105

* significant at $\alpha=10\%$, ** significant at $\alpha=5\%$, *** significant at $\alpha=1\%$

Table 2
Bilateral Intra-Industry Trade in Manufactured Products

Determinants	Indonesia's Exports to Japan Coefficients (T-Ratio)	Japan's Exports to Indonesia Coefficients (T-Ratio)
PGDP _i	0.62662 (0.60531)	10.910 (5.110)***
DIF-INCOME _{ij}	-0.07777 (-2.5200)	-3.9834 (-4.990)***
VAREX _{ij}	0.27124 (0.88566)	0.062937 (0.1863)
OPENNESS _j	2.1223 (3.2239)***	0.58901 (0.7246)
AFC	1.1765 (4.4010)***	0.59345 (1.791)*
APEC	1.1670 (3.6593)***	0.50542 (1.131)
FDI _{ij}	0.012453 (0.12963)	-
R-Square	0.9557	0.9476
No. Observation	21	21
DW	2.11454	1.40790

* significant at $\alpha=10\%$, ** significant at $\alpha=5\%$, *** significant at $\alpha=1\%$

PGDP

As explained in the hypothesis, per capita GDP of exporting countries is expected to shape bilateral intra-industry trade. In this case, per capita GDP of Indonesia and Japan influence the increasing value of intra-industry trade between the two countries. Japan's per capita GDP has statistically significant effects on Japanese IIT in both manufactured (at $\alpha=1\%$) and agricultural trade (at $\alpha=5\%$). Indonesia's per capita GDP had only a significant effect on Indonesia's IIT in agricultural products at $\alpha=10\%$. These results mean that the capital endowment per worker (the capital-labor ratio) in Japanese manufacturing and agriculture exists to support the extent of its intra-industry trade.

DIF-INCOME

Balassa and Bauwens (1987) proposed that income differences determine the form of IIT. In this study, by analyzing bilateral IIT between Japan (a developed country) and Indonesia (a developing country), we found that the effect remains similar. This variable significantly affects bilateral IIT between Indonesia and Japan. As shown by the coefficients of the DIF-INCOME variable in the IIT model, the less equal the income of Indonesia and Japan the less bilateral IIT.

VAREX

Fluctuation in the national currencies of the trading partners is expected to decrease trade. As shown in Tables 1 and 2, VAREX did not significantly affect bilateral IIT, as even in the case of agricultural products it was negative. Most trade transactions between Indonesia and Japan was conducted in hard currency, i.e. the US dollar. In Japan's case, export and import transactions between Japan with Indonesia as trading partners were lower compared to Japan's trade with other Southeast Asian countries such as Singapore.⁶

OPENNESS

Openness is defined as the ratio of total trade (export plus imports) to GDP of the respective country. The bigger the share of exports and import the more open a country and the greater the ratio of openness, the fewer barriers to trade (either tariff or non-tariff barriers) at the borders. OPENNESS was positively insignificant in determining the level of bilateral IIT between Indonesia and Japan in agricultural products. OPENNESS had a statistically significant effect on Indonesia's IIT in manufactured products (at $\alpha=1\%$), but not on Japan's IIT.

AFC

As expected, the AFC variable obstructed the flow of bilateral intra-industry trade between Indonesia and Japan. After the crisis erupted in the second semester of 1997 in Thailand, the contagion effects of the crisis spread rapidly to other Asian countries with relatively weak financial structures, even though these countries recorded outstanding economic performance, including Indonesia. In the case of bilateral IIT between Indonesia and Japan in agricultural products, the Asian financial crisis had no significant effect. But, the Asian financial crisis had a statistically significant effect on the decline of bilateral IIT in manufactured products

APEC

APEC shows how economic and trade agreements enhance and improve bilateral trade between Japan and Indonesia as. Equality in regional agreements allows negotiations and consultations by members to be effective and efficient. Such agreements also enable the effective promotion of cooperation in regional and bilateral trade. APEC encourages open regional cooperation among members as it tries to replace barriers to trade between member countries with suitable deregulations that support regional trade. Regional economic

⁶ Share of Indonesia's exports to Japan and Japan's exports to Indonesia.

cooperation in turn leads to the expansion of imports and exports, creating more efficient industrial structures and in general improving the competitive environment.

In Tables 1 and 2 it can be seen that the APEC variable has positive effects on Indonesia's IIT with Japan in agriculture and manufactured products. But, significantly positive effects only occur for Indonesia's manufactured products (statistically significant at $\alpha = 1\%$) but not for agricultural products. The APEC determinant does not significantly shape the IIT of Japan in either manufactured or agricultural trade. Interestingly, Japan's IIT in agriculture as an APEC variable is negative and thus, in this matter, is statistically insignificant.

It is quite hard to explain the underlying factors behind this, and we should therefore interpret it cautiously. One explanation could be that APEC trade and economic agreements do not cover specifically traded products among members. Unlike other regional trade organizations, APEC requires no treaty obligations of its participants. Decisions on trade created within APEC are achieved by consensus and commitment, and are accepted on a voluntary basis. One could suspiciously argue that Japan strongly protects its agricultural sector. Indeed, not only Japan protects its agricultural sector, most other developed countries such as the European Union and the United States engage in similar practices.

FDI

Foreign direct investment (FDI) is not an important factor in Indonesia's IIT with Japan in agriculture or manufactured products. This is quite probably due to the decreasing amount of Japanese investment in Indonesia during the period of study. Increases in FDI occurred before the Asian economic crisis (1997) and decreased significantly in Indonesia over the next several years.

7. BILATERAL TRADE POLICY SIMULATION

This section explores bilateral trade policy simulations. The rationale for making these simulations is due to the lack of economic agreements between Indonesia and Japan prior to and during the period of study. The only economic agreement which Indonesia and Japan signed was the Treaty of Amity and Commerce in 1961.

The simulation is carried out to observe the effects of the agreement in fostering bilateral IIT between Indonesia and Japan during the period of study. The IIT model is run using related trade agreement determinants, i.e. APEC and other proposed bilateral agreements. In this way, possible bilateral agreements are divided into five scenarios

depending on time preferences: trade agreements which are reviewed every five years (5-year agreements), 7-years, 10-years, 15-years and 20 years.

Table 3
Simulation of a Bilateral Trade Agreement to Expand Bilateral Intra-Industry Trade between Japan and Indonesia (Agricultural Products)

Steps to Trade Agreement	Countries	5-Yearly	7-Yearly	10-Yearly	15-Yearly	20-Yearly
1 st	Indonesia	0.01464 (2.391)**	0.49510 (2.931)***	0.60758 (5.0338)***	0.65214 (4.2760)***	0.48189 (1.156)
	Japan	0.13881 (0.9390)	0.15993 (1.077)	0.38793 (3.8203)***	0.35067 (2.6046)**	0.41872 (1.377)
2 nd	Indonesia	0.42112 (2.717)**	0.19068 (1.177)	0.18047 (0.63916)	0.32205 (1.0598)	
	Japan	0.33715 (2.284)**	0.21712 (1.524)	0.22627 (0.95254)	0.33277 (1.2405)	
3 rd	Indonesia	0.041678 (0.02689)	0.21234 (0.6553)			
	Japan	-0.03642 (-0.2467)	0.23103 (0.8109)			
4 th	Indonesia	0.17890 (0.6663)				
	Japan	0.24467 (0.9568)				

* significant at $\alpha=10\%$, ** significant at $\alpha=5\%$, *** significant at $\alpha=1\%$

Table 4
Simulation of Bilateral Trade Agreement to Expand the Bilateral Intra-Industry Trade between Japan and Indonesia (Manufactured Products)

Steps to Trade Agreement	Countries	5-Yearly	7-Yearly	10-Yearly	15-Yearly	20-Yearly
1 st	Indonesia	1.0342 (3.226)***	1.5885 (5.180)***	2.0746 (6.8439)***	2.0701 (4.5793)***	2.0269 (1.583)
	Japan	1.2168 (4.384)***	1.4449 (5.323)***	1.7256 (5.3384)***	1.9605 (5.1087)***	2.2206 (1.921)*
2 nd	Indonesia	1.1786 (3.680)***	1.1725 (3.986)***	0.99769 (1.4069)	1.5195 (1.6870)**	
	Japan	0.61195 (2.207)**	1.0584 (4.063)***	1.3645 (1.8045)*	1.7401 (2.2757)**	
3 rd	Indonesia	0.76530 (2.390)**	0.79929 (1.359)			
	Japan	1.0194 (3.677)***	1.1092 (2.130)**			
4 th	Indonesia	0.61648 (1.111)				
	Japan	0.85649 (1.784)*				

* significant at $\alpha=10\%$, ** significant at $\alpha=5\%$, *** significant at $\alpha=1\%$

The results of the simulations are shown in Tables 3 and 4 above. The trade agreement simulations with five scenarios were positive in almost all cases, encouraging bilateral trade agreements between Japan and Indonesia. The outcomes of the simulations follow the real conditions of trends in bilateral IIT between Indonesia and Japan during the period of study as shown in Appendix 1 and 2. If we look at the determinants more closely, we find more significant outcomes in the agreements on trade in manufactured products (Table 4) than those experienced in agricultural trade (Table 3). This suggests that trade agreements (reviewing or issuing) for manufactured products are easier to manage than those for agriculture.

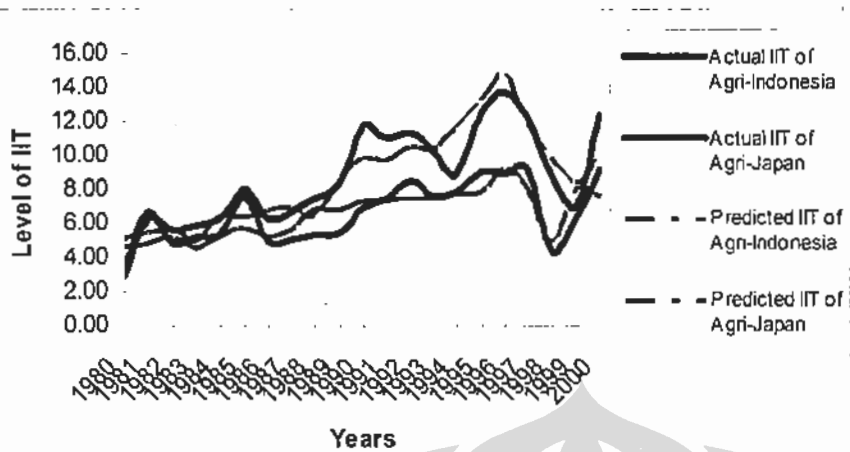
Issues related to trade in agricultural products have been complicated by negotiations for preferential trade agreements (Josling, 1993; dell'Aquila, Sarker and Meilke, 1999; Rae, Charterjee and Shakur, 2001), making it difficult to liberalize this sector. In the case of agricultural trade, a scheduled review of trade agreements every 10 to 15 years may be slightly more effective. These should be signed under intense lobbying and equal bargaining power.

8. CONCLUSION

The per capita GDP of Japan had significant positive effects in fostering Japan's IIT with Indonesia in both agricultural and manufactured products, while Indonesia's per capita GDP had significant positive effects only on its agricultural products. Differences in per capita income between the two trading countries were significant determinants in the decline of bilateral IIT. Fluctuations in the national currency of the reporting country against the national currency of the trading partner did not significantly affect bilateral IIT. Openness between the trading partners only significantly affected Indonesia's IIT in manufactured products. The Asian financial crisis, as one of the determinants, disrupted the extent of intra-industry trade between Indonesia and Japan in agricultural products but not manufactured products. Agreements such as those in the Asia Pacific Economic Cooperation only positively affected Indonesia's trade in manufactured products. FDI was not a significant determinant in bilateral IIT between Indonesia and Japan. The bilateral trade agreement simulations pointed to possible significant benefits, encouraging the prospects for bilateral intra-industry trade between Indonesia and Japan.

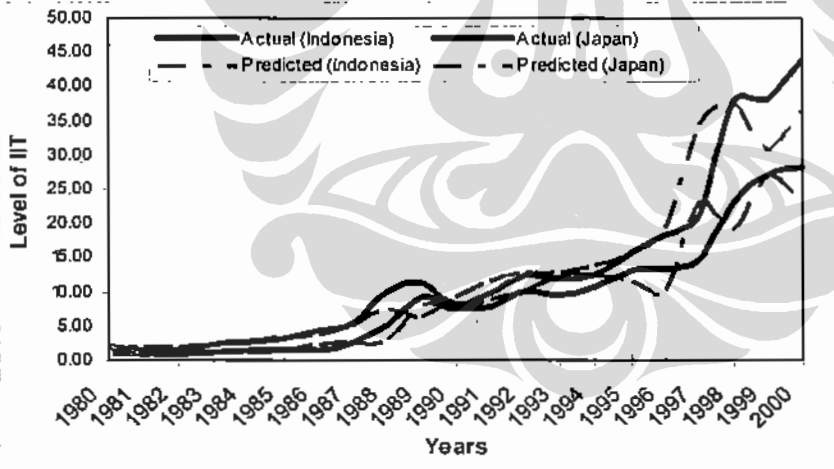
Appendix 1

Movement of Bilateral IIT in Indonesian and Japanese Agricultural Products



Appendix 2

Movement of Bilateral IIT in Indonesian and Japanese Manufactured Products



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