

The Effect of Yuan *Renminbi* to Yen Toward Indonesia's Export To Japan 2004:10 – 2012:12

Yudistira Hendra Permana¹ and Ike Yuli Andjani²

Aim of this research is to identify the effect of Yuan Renminbi to Yen toward import value of Japan from Indonesia. We use the monthly data for the period of October 2004 – December 2012 in which Indonesia is under regime of President Susilo Bambang Yudhoyono. Co-integration test is performed in order to estimate the long-run relationship between import value of Japan from Indonesia and other related economy indicators, including exchange rate of Yuan Renminbi to Yen. The error correction model (ECM) of Engle-Granger, then, will be performed to analyze the short-run relationship of the variable used in this paper. According to the analysis, we found that there is no long-run relationship between both exchange rates, Yuan Renminbi and Rupiah to Yen, and import value of Japan from Indonesia. The only variable that has effect on the import value of Japan from Indonesia is export value of China to Japan.

Keywords: *Renminbi* revaluation, Co-integration test, Error-Correction Model.

JEL Codes: C51; F10; F40

1. Introduction

Study of relationship between international trade and exchange rate have been one of important issue in economy in these recent days (Krugman, Obstfeld & Melitz 2010; Arize, Osang & Slottje 2000; Kalyoncu et al. 2008). The exchange rate, in the economy, plays role as comparison of the commodities for the respective countries in the international trade. Devaluation of the exchange rate oftentimes could be a strategy on the international rate to increase the export value of a country. Also, this strategy is expected to increase the national output and economic growth as the demand of export is raising (Kalyoncu et al. 2008).

Nowadays, development on the international trade has been more complex, so that more factors to affect the international trade value. Since exchange rate has been an instrument on the international trade policy, determination of exchange rate can be classified into three general forms: a) fixed exchange rate; b) managed floating; and c) floating exchange rate. Krugman, Obstfeld & Melitzet (2010, pp. 463-465) concluded that the determination of the exchange rate should be coordinated with other policies to have a proper monetary strategy, in which it is executed by central bank. Nevertheless, the exchange rate strategy will always consider the current condition of both international trade and balance of payment. Another important thing to be considered in this context is relationship and interaction of the countries in international trade (Speller 2006).ⁱ This issue, thus far, has an impact on the

¹ Lecturer at the Vocational School of Economics and Business, Universitas Gadjah Mada, Indonesia. Contacts are provided on phone: +62274 513367 and email: yudistira_hp@yahoo.com

² Lecturer at the Vocational School of Economics and Business, Universitas Gadjah Mada, Indonesia. Contacts are provided on phone: +62274 560924 and email: ikkeyuliandjani@gmail.com

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fluctuations of both exchange rate and export/import value as globalization and liberalization of world's market are also implemented on the developing countries.

Problems on the exchange rate's determination, according to the interaction of countries, is the current condition of both micro and macro economy of the related country (Xing 2011). The likes of consumption level, national saving, inflation and etc., on the macro side, and market structure, segmentation and distribution, on the micro side, will be determining the international relationship of a country. The implication will take a part not only on the advantage of a commodity (absolute, comparative and competitive), but also its regulation related to the international relationship between countries. Hence, this international relationship oftentimes will create an openness of the market to reduce the barriers and increasing the advantage of a commodity (Krugman, Obstfeld & Melitz 2010). In this case, those barriers are considered as the distortion on both supply and demand side, yet will cause an increasing of a commodity's price on the global market.ⁱⁱ

Indonesia has been implementing the strategy of exchange rate determination by making international relationship since new order era (1967). That openness brings Indonesia to have a managed-floating system (1967 – 1997) and floating system (1998 – current) with short-run adjustment by intervention to keep the balance of payment stabilized.ⁱⁱⁱ The international relationship includes bilateral, regional (ASEAN, AFTA and ASEAN-China) and the membership of world organizations (WTO, OECD, IMF, OPEC and etc.). Those policies basically are aimed to capture the international market share and also supporting the export strategy. But, the main problem of Indonesia is the lower bargaining power on the global market, compared to other countries (Dowling 2008).

To the point of view of bilateral relationship with Japan, Indonesia started the official relationship in 2005, even though both countries have been a partner on international trade.^{iv} Dowling (2008, p.18) stated that flying geese paradigm has brought Japan as an industrial country, especially on manufacture, which demands most of its input from developing countries.^v Market share of Indonesia's export to Japan, however, takes a big portion annually, even though it had decreased in 2005 – 2011. According to the flying geese paradigm, Indonesia's export to Japan is dominated by raw material for input factors only.

On the other hand, China is a big country which making a trade with Japan since a long time ago yet located on the trade path of Indonesia – Japan. China's export to Japan reached more than USD151.627 trillion in 2012, even though it had experienced a decreasing value on the last decade. On the import side, China import from Japan took a percentage of 21.27% out of total in 2012 and make China to be one of the biggest importers for Japan. However, in 2005, China's government revaluated its *Renminbi* to the level 8.11/US\$ as many countries demand for it, especially US, on the urge of international trade (Baskoro 2012). Furthermore, Bank of China announced that their exchange rate system turned into managed-floating system in 2010. This policy is expected to drive the *Renminbi* to be more volatile and increasing export value.

Since it is considered as a big economy in early 2000, many China's policies could have brought an impact to other economy. The ACFTA (ASEAN-China Free Trade

Area) cooperation in which it was started in 2003 would have also encouraged other cooperation between ASEAN and other countries (Yeoh and Ooi, 2007). It is likely to happen since the countries in one regional have related each other or interlaced on an international trade before.

Thus far, this paper aims to identify the international relationship, in terms of international trade, between Indonesia and Japan by capturing also the effect of Yuan *Renminbi* for the period of October 2004 – December 2012. In addition, the period taken is known to be under President Susilo Bambang Yudhoyono who reach the official cooperation with Japan, known as IJEPA (Indonesia-Japan Economic Partnership Agreement), in 2006. This cooperation allows Indonesia and Japan to have a free trade area since then. However, it should be taken into account that the cooperation is likely to be affected by China, which is located on the distribution path of both countries. The existing of ACFTA would have triggered the ASEAN people to prefer the China's commodity and decreasing the demand for import from other countries (Yeoh & Ooi 2007).

It should be noted that the relationship between Indonesia and Japan needs support from a good management of exchange rate, especially for direct exchange rate (Insukindro & Rahutami 2007). It is because the exchange rate, according to macroeconomics theory, can be a determination of trade volume among those countries. The exchange rate of Yen to Rupiah will be competing with Yuan *Renminbi* to achieve the market share of both countries (Indonesia and Japan). We propose several questions on this research regarding those problems: i) does China's exchange rate to Indonesia affect the export of Indonesia to Japan?; ii) does the international trade between China and Japan affect the export of Indonesia to Japan?; and iii) does the economy's activity of Japan affect to the export of Indonesia to Japan?

This paper divided into five sections, including Introduction, Literature Review, Methodology, Analysis Results, and Conclusion. Introduction explains about this research in general, the back ground of this research such as motivation or reason behind this research, and the difference between this research and another research. Literature Review contains another relating research in the past, the explanation about the problem that was not answered by the past research, and also basic theory relating to this research. Methodology contains the research process, model specification, and the method of data analysis. Analysis Results explains the result of data analysis specifically. And the last section is Conclusion, it explains the answer of the research's purpose based on the data analysis's results.

2. Literature Review

The exchange rate is known to be endogenous factor in determining the international trade. Many previous studies concluded that a depreciation of the exchange rate would have decreased the export volume of other countries (Baak 2006; Chowdhury 1993; Hassan & Tufte 1998). But, one important thing is that result could be bias because of the volatility risk on exchange rate to the point of view of people's behavior. This type of risk will increase the possibility of export volume's decreasing, in terms of international trade (Insukindro & Rahutami 2007).

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Arize, Osang & Slottje (2000) concluded that risk-averse behavior will cause a decreasing of import demand when other exchange rate is appreciated. Other studies (Wolf 1995; Arize 1995) also supported the hypothesis of the higher volatility on the exchange rate, the lower import demand of a related country. This result is derived from the assumption of risk-averse behavior that drives people, including business sector, to reduce the demand of a commodity since uncertainty level gets increased. Moreover, the equilibrium of the international trade will be moving to the new equilibrium because of that volatility risk.^{vi}

Hawkesby, Smith & Tether (2000) asserted that volatility on the international trade can be affected by determination of other exchange rate system. It is applied by a country to reduce transaction cost in order to increase its share on the global market. Thus, a country can make cooperation with related countries to reduce the risk of decreased export value as an impact of the exchange rate determination. Kalyoncu et al. (2008) concluded that policy on the exchange rate devaluation of the 23 OECD countries is found to reduce output on six countries. But, on the other side, that policy is found to increase the national output of other three countries. This result is also supported by Baak (2006) of which each country will have a different impact of the other exchange rate determination. The result showed that depreciation of Yuan *Renminbi* had had a positive effect on Japan's export, yet a negative effect on South Korea's export was taking reversely for the period of 1986:Q1 – 2005:Q2.

In these days, the international trade among countries, in fact, is not only affected by endogenous factor, the exchange rate (Eriksson, Smeets & Warzynski 2009; Melitz 2003). According to the David Ricardo's theory of comparative advantage proves that efficiency on production will cause a country to be exporter. Moreover, if there is more than one country have efficiency on production for a same commodity, so that the export value of other exporter will be affecting each other. Other literatures also support this argument that the advantage of a country on international trade, especially domestic productivity level, will cause a decreasing export's value of other countries (Gomez-Gonzalez & Rees 2013; Ibsen, Warzynski & Westergard-Nielsen 2009; Eaton et al. 2007). It is no wonder that the related countries had preferred to have a cheaper commodities in accordance with import's strategy. Thus, a country needs to examine both export's value and all advantages of other countries to keep the export's value stable.

However, study on the effect of another country affected to international trade between two countries is still limited. This study is going on the topic of which international trade between less developed country and big country has also been influenced by the existing of another big country. Baak (2011) examines the impact of real exchange rate of Chinese *Renminbi* against the US Dollar on Japanese and Korean exports to the United States. The results showed that Korean product could not take the competitive advantage on its exports to the United States. The model used on that paper will be employed on this study, regarding that export of a country is affected by the exchange rate and economic activity of the importing country.^{vii}

From the international economics standpoint, import will be needed if there is supply shortage in domestic. Since flying geese paradigm takes place on the Japan economy, input factors for industry are regarded as the dominant import of Japan. Previous study had shown that the higher economic activity, in term of production,

the higher input factors' demand of a country (Schneider 2012; Baum, Caglayan & Ozkan 2004). On the other way, production efficiency in domestic can determine the import's value of a country. Inefficiency in domestic production will decrease supply, assuming the demand is fixed, and the consumption will be fulfilled by import. In this paper, we accommodate the industrial production index as a proxy for the economy activity of Japan. This industrial production index measures the real production output, including manufacture, mining and utility. It is assumed that the increasing on the industrial production index reflects the increasing productivity level of business and be able to satisfy the domestic consumption.

3. Methodology

3.1 Model Specification

This paper will analyze the factors that affect Indonesia's export according to direct exchange rate, between Japan and Indonesia, as an endogenous variable. As we have mentioned before, this study takes into account on the international trade between developed country (Japan) and less developed country (Indonesia), regarding the existing of China. Krugman, Obstfeld & Melitz (2010, pp. 193-195) showed that international trade does matter if there is a shortage of a commodity and an excess of other commodity among countries. The import demand relationship in accordance with relative price of a commodity can be written as follow:

$$P_X Q_X + P_Y Q_Y = P_X D_X + P_Y D_Y \quad (1)$$

$$(Q_X - D_X)P_X = (D_Y - Q_Y)P_Y \quad (2)$$

$$\frac{P_X}{P_Y} = \frac{D_Y - Q_Y}{Q_X - D_X} \quad (3)$$

Where P_X and P_Y are the price of X and Y ; D_X and D_Y are demand of X and Y ; and Q_X and Q_Y are production of X and Y . On the modern economy, relative price for each commodity is a base of an exchange rate because all commodities cannot be exchanged directly. Model specification on this research will add the exogenous variables to accommodate the volatility of Yuan *Renminbi* and production efficiency of Japan.^{viii} As mentioned above, the use of Yuan *Renminbi* is aimed to capture the effect of China on the international trade between Indonesia and Japan. While Yuan *Renminbi* rate to Yen is decreasing, export value of Indonesia to Japan tends to decrease assuming the transportation cost is fixed. On the other hand, production efficiency of Japan reflects the import demand according to its production capacity. Inefficiency will cause an increasing of Japan's import, assuming its consumption is fixed, yet efficiency will cause a reversely. According to those arguments, econometric model to estimate the export of Indonesia to Japan is following as:

$$\ln EX_INA_t = \alpha_t + \ln IPI_t + \ln RER_INA_t + \ln RER_CHI_t + \ln EX_CHI_t + u_t \quad (4)$$

Where EX_INA_t is real export of Indonesia to Japan; IPI_t is industrial production index of Japan; RER_INA_t is real exchange rate of Rupiah to Yen; RER_CHI_t is real exchange rate of *Renminbi* to Yen; EX_CHI_t is real export value of China to Japan; and u_t is a residual. It should be noted that variables used in this paper are stationer

on the first difference level, $I(1)$, yet it needs to be accommodated on the error correction model (ECM).^{ix}

The ECM is able to estimate the $I(1)$ series if and only if the series are co-integrated (Engle & Granger 1987). The determination of stationary process for each variable is the first step for running ECM. We are performing Augmented Dickey-Fuller (ADF) method for the formal test of stationary process of each variable. Secondly, we identify the long-run relationship of non-stationary variables, $I(0)$, by performing four co-integration test:^x a) Phillips-Ouliaris test (1990);^{xi} b) Johansen test (1991); c) Co-integrating Regression of Augmented Dickey-Fuller (CRADF) test; and d) Co-integrating Regression of Durbin-Watson (CRDW) test. It is known that null hypothesis of those tests is no co-integrating process on variables used.^{xii} Specification of ECM in this paper follows Engle and Granger (1987) which can be written as:

$$\Delta \ln EX_INA_t = \alpha_t + \Delta \ln IPI_t + \Delta \ln RER_INA_t + \Delta \ln RER_CHI_t + \Delta \ln EX_CHI_t + u_{t-1} + \varepsilon_t \quad (5)$$

u_{t-1} on the model above is a model residual generated from the equation (4) and regarding as a short-run adjustment component or error correction term (Greene 2012). The adjustment shows that the long-run equilibrium will be achieved if and only if the first-difference variables used are co-integrated. The classical assumption test of ordinary least squares, however, has to be performed to identify whether ECM follows the goodness-of-fit of the model specification or not.^{xiii}

Hypotheses of this research is export Indonesia to Japan is influenced by industrial production index of Japan, exchange rate of rupiah to yen, exchange rate of Yuan *Renminbi* to Yen, and export value of China to Japan. We assume that there is a joint probability on that relationship. Hence, we can write the hypothesis of this research is following:

$$H_0: \ln EX_INA_t = \alpha_t + \ln IPI_t + \ln RER_INA_t + \ln RER_CHI_t + \ln EX_CHI_t + u_t$$

$$H_1: \ln EX_INA_t \neq \alpha_t + \ln IPI_t + \ln RER_INA_t + \ln RER_CHI_t + \ln EX_CHI_t + u_t$$

3.2 Data

All data on this paper are collected from several sources. The real export data, for both China and Indonesia to Japan, are collected from DOTS (Direction of Trade Statistics) of IMF; industrial production index of Japan is collected from METI (Ministry of Economy, Trade and Industry) of Japan; nominal exchange rate data, for both *Renminbi* and Rupiah to Yen, are collected from OANDA; and CPI of Indonesia, Japan and China are collected from OECD (Organization for Economic Cooperation and Development). All data are transformed onto real values and natural logarithmic forms.

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Table 1: Descriptive Statistic of the Respective Variable

	Mean	Median	Max. Value	Min. Value	Std. Dev.
Ln China Export	9.104	9.093	9.551	8.589	0.213
Ln Indonesia Export	7.598	7.588	8.145	7.144	0.232
Ln IPI	4.569	4.581	4.765	4.203	0.11
Ln JPY/CNY Exchange Rate	4.563	4.585	4.847	4.292	0.158
Ln JPY/IDR Exchange Rate	-2.617	-2.602	-2.488	-2.777	0.084

Table 1 above shows the descriptive statistic of respective variable used on this study. All variables are transformed into natural logarithm form in order to create a smoothing data for estimation. The real exchange rate for both *Renminbi* and Rupiah to Yen are calculated by: $P_{ijt} = E_{ijt} \frac{CPI_{jt}}{CPI_{it}}$; where P_{ijt} is a real exchange rate of country i to country j for the period of t , E_{ijt} is nominal exchange rate of country i to country j for the period of t , CPI_{jt} is consumer price index of country j for the period of t , CPI_{it} is consumer price index of country i for the period of t . All variables on this are stationer on the first difference level, I(1). It is known from the ADF test for unit root test, with the null hypothesis of random walk process of the variable tested, which is shown on the Table 2 below:

Table 2: Result for Unit Root Test by ADF Test

	Level		1st Difference	
	ADF-Stat	ADF Model	ADF-Stat	ADF Model
Ln China Export	1.785		-2.638*	
Ln Indonesia Export	-1.969	Intercept	-12.746*	
Ln IPI	-0.54		-2.091**	
Ln JPY/CNY Exchange Rate	-2.632	Intercept & Trend	-5.713*	
Ln JPY/IDR Exchange Rate	-2.838	Intercept & Trend	-6.742*	

Note: (*, **) shows significant level of rejecting the null hypothesis of the ADF test for 1% and 5% respectively.

As shown on the Table 2, all variables are stationer on the first difference level, I(1), of which lag optimum determination of the ADF test uses Akaike Information Criterion (AIC). Insukindro (1999) concluded that ECM is more efficient in estimating dynamic model of non-stationary variables since it is able to analyze both short-run and long-run phenomena and also examine the consistency of a model in accordance with economic theory using time series data.

4. Analysis Results

4.1 Co-Integration Test

The main objective of this research is to identify the relationship of Indonesia's trade with Japan by performing relative price among both countries regarding the effect of relative price between Japan and China. As we have mentioned above, all variables

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used on the equation (4) are following random walk process so that needs a model adjustment as it is mentioned on the equation (5). Co-integration test is needed for the specification of ECM on the equation (5) by knowing that variables used are stationer on the first difference level. We are performing four co-integration tests which can be seen below for the respective test.

Table 3: Result for Phillips-Ouliaris Co-integration Test

Dependent Variable	tau-statistic	Prob.*	z-statistic	Prob.*
Ln Indonesia Export	-7.234001	0.0000	-69.84321	0.0000
Ln IPI	-7.276842	0.0000	-67.02203	0.0000
Ln JPY/CNY Exchange Rate	-1.994475	0.9429	-6.148845	0.9798
Ln JPY/IDR Exchange Rate	-5.356755	0.0061	-42.51915	0.0081
Ln China Export	-8.991640	0.0000	-83.07499	0.0000

Note: (*) uses probability values of MacKinnon (1996).

Table 3 above shows that eight out of ten Philips-Ouliaris co-integration test are rejecting the null hypothesis of no co-integration process for all variables used. Hence, it can be concluded that there is long-run relationship among variables used on this paper.

Table 4: Result for Johansen Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.287524	78.52301	69.81889	0.0086
At most 1*	0.193922	45.97807	47.85613	0.0743
At most 2	0.151926	25.28290	29.79707	0.1516

Note: Trace test indicates that there are two co-integrating equations for the 10% significant level of rejecting null hypothesis; (*) shows a rejecting the null hypothesis for significant level of 10%; (**) uses probability values of MacKinnon-Haug-Michels (1990).

The result for Johansen test on the Table 4 above shows that there are two possibilities of co-integrating equation. Both Phillips-Ouliaris test and Johansen test prove that all variables used on this paper can be formed into an equation. On the other way, CRADF test and CRDW test are used to determine whether equation (4) above is a proper combination for co-integrating equation or not. ^{xiv}

Table 5: Co-integrating Regression Durbin-Watson (CRDW) Test

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Ln Industrial Production Index	0.078363	0.217012	0.361098	0.7188
Ln JPY/CNY Exchange Rate	0.068237	0.259060	0.263402	0.7928
Ln JPY/IDR Exchange Rate	-0.203155	0.213481	-0.951627	0.3437
Ln China Export	0.920241	0.093443	9.848102	0.0000
Constant	-0.032409	1.881703	-0.017223	0.9863
R-squared	0.637718	Mean dependent variable		7.597604
Adjusted R-squared	0.622301	S.D. dependent variable		0.231889
S.E. of regression	0.142513	Akaike info criterion		-1.009589
Sum squared resid	1.909123	Schwarz criterion		-0.878522
Log likelihood	54.97465	Hannan-Quinn criterion		-0.956559
F-statistic	41.36652	Durbin-Watson stat.		1.401935
Prob. (F-statistic)	0.000000			

Note: This test is only based on the Durbin-Watson statistic value of non-stationary variables' regression. In addition, this regression report is known as long-run estimation regarding the existence of spurious regression.

Table 6: Co-integrating Regression Augmented Dickey-Fuller (CRADF) Test

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-7.459411	0.0000
Test critical values:		
1% level	-4.054393	
5% level	-3.456319	
10% level	-3.153989	

Note: (*) shows a rejecting of the null hypothesis of non-stationary process using MacKinnon statistic value for the significant level of 1%.

According to the Table 5 and Table 6, the Durbin Watson statistic value for CRDW test and t-statistic for CRADF test are 1.402 and -7.459 respectively.^{xv} In addition, t-statistic of the CRADF test is taken from unit root test by performing ADF test for the residual of equation (4). Engle & Granger (1987) showed that the CRDW test will be more powerful by performing also the CRADF test because CRDW test is only an early indication for a long-run relationship.^{xvi} According to both CRDW and CRADF tests, it can be concluded that the specified model on this paper is co-integrated for identifying the long-run relationship. Hence, the specification of ECM is needed to estimate the disequilibrium correction on the short run.

4.2 Error Correction Model

Specification of ECM on this paper is based on the model specification of non-stationary variables on equation (4). The equation (5) is specified to accommodate the spurious regression on the long-run estimation and assuming that there is disequilibrium on the short-run relationship. That disequilibrium is corrected continuously in every period with the speed of adjustment is known by the coefficient of ECT (error correction term). The estimation result of ECM, following equation (5), can be seen below:

Table 7: Result for Estimation of Error Correction Model^a

Variable	Coefficient ^b		
Constant	0.007 (0.009)	Adj. R-squared	0.216
Ln Δ Industrial Production Index	0.182 (0.126)	F-statistic	6.352
Ln Δ JPY/CNY Exchange Rate	0.624 (0.585)	SE of regression	0.092
Ln Δ JPY/IDR Exchange Rate	-0.751 (0.385)	SSR	0.776
Ln Δ China Export	0.175 (0.071)	AIC	-1.879
Error Correction Term ^c	-0.35 (0.079)	SIC	-1.721
		DW-statistic	2.215

Note: a) dependent variable: Ln Δ Indonesia's Export; b) number on the parentheses shows standard error of regressor; and c) Error correction term is statistically significant on the significant level of 1%.

The result on the Table 7 proves the disequilibrium on the short-run, yet to be corrected continuously in every period. It is known from the significant ECT on the estimation and the coefficient shows the speed of adjustment to create equilibrium on the long-run. According to the estimation, 35% short-run disequilibrium, from the period of $t-1$, is corrected in every period of t . *Renminbi* revaluation policy in 2005 is known as the intervention that create a market failure and the disequilibrium had existed on the short-run.

On the other side, the long-run estimation, which can also be seen on the Table 4, shows that volatility of *Renminbi* does not affect the import value of Japan from Indonesia. But, the export value of China to Japan is found to affect the export value of Indonesia to Japan. The positive coefficient of the export value of China to Japan indicates that import commodities from both Indonesia and China are regarded as complementary for Japan.^{xvii} An increasing import value from China will also bring an increasing import value of Japan from Indonesia. It is in line with the argument of flying geese paradigm that brings Japan to be an industrial country and demanding most for input from other countries. Lawrence & Weinstein (1999) also support this argument that Japan's import is likely for increasing export's productivity rather than domestic consumption. Nevertheless, the main factor, exchange rate of Yen to Rupiah, does not affect the export of Indonesia to Japan. It shows that the result of this study is contradictive to the standard theory of international trade. However, this case can be arguably understood in modern international relationship as Baak (2006) concluded that exchange rate may have different impact on international trade depending on the exchange rate system.

The estimation of ECM on this paper is known to satisfy the classical assumption of OLS. Estimation's residual on the Table 6 follows normal distribution according to Jarque-Bera test (JB-statistic: 0.206), no serial correlation according to Breusch-Godfrey test (F-statistic: 1.3347), and constant variance according to White Heteroscedasticity test (F-statistic: 0.5597). Also, that model satisfies the linear assumption according to Ramsey-RESET test (F-statistic: 2.7878) and proven as

stable model for the period taken according to CUSUM of square test. All these tests are indicators for goodness-of-fit of the ECM in the analysis and we can conclude that the ECM can be used as estimation for short-run analysis in this case.

5. Conclusion

The estimation's results on this paper show that import's demand of Japan from Indonesia is not affected by the exchange rate among both countries. But, the exogenous variable, Japan's import from China, does affect that import instead. It is in line with several previous studies that proved insignificant effect of exchange rate to the export volume of a country (Gagnon 1998; Aristotelous 2001; Schneider 2012). One of argument to explain this phenomenon is a country keeps away from uncertainty risk of the exchange rate and difference of export's commodity. Duasa (2008) also concluded that international trade policy for either developing countries or small open economy is aimed to avoid the bilateral exchange rate effect. It is because the volatility risk on the exchange rate can decrease the export's value or even trade balance.

Another finding of this research is the effect of China's trade to Japan on Indonesia's trade to Japan. Since early 2000s, China had been a huge economy and came up with surplus trade balance. In addition, China's revaluation in 2005 is considered to possibly decrease other Asia countries' export, especially to developed countries (Krugman, Obstfeld & Melitz 2010). China's advantage over Indonesia on export to Japan can be regarded as 'monopolistic competitiveness' according to product's variation, its location, exchange rate stability, economic growth and domestic productivity (Eriksson, Smeets & Warzynski 2009; Melitz 2003; Gomez-Gonzalez & Rees 2013; Ibsen, Warzynski & Westergard-Nielsen 2009).^{xviii}

According to the estimation of ECM, short-run disequilibrium is found to be existed on the analysis of Japan's import from Indonesia for the period of October 2004 – December 2012. Yet, the long-run equilibrium is still achieved based on the co-integration test among variables used on the estimation of ECM. Cooperation between Indonesia and Japan (IJEPA) in which it was started in 2006 and revaluation's policy of China in 2005 are considered as an intervention for export's policy of Indonesia that trigger a market failure. To the point of view of Indonesia, those interventions prove that cooperation between Indonesia and Japan would cause short-run disequilibrium as an anticipation of *Renminbi's* revaluation effect.

However, this paper still needs improvements as study with a similar case is limited. It could potentially lead the paper to be ambiguous because we employ variable used on Baak (2011) which focus on the international trade between three developed countries. Also, we assume that there is no influence of global crisis in the late 2008 affecting the estimation results and determination of stationary level. The reason was because Indonesia did not experience the global crisis too much on either economy or political side. Another study would be best for improvement if it covers global crisis influence in the late 2008.

Endnotes

ⁱ Speller (2006) also concluded that the effect of that interaction on the exchange rate and international trade activities are begun since the Bretton-Woods system had been released.

ⁱⁱ Krugman, et al. (2010) showed that both distortions come from the regulation of international trade (tariff, quota and etc.) which increase the price on the global market. Those distortions are classified as inefficiency of the international trade, regardless the advantage of a commodity (absolute, comparative and competitive).

ⁱⁱⁱ A direct intervention on the exchange rate determination in Indonesia is executed by central bank (Bank Indonesia) through open market operation, whereas indirect intervention is implemented through coordination of institutions related to the international trade (Ministry of Trade, Ministry of Finance, private sectors and etc.).

^{iv} The cooperation between Indonesia and Japan is officially known as JICA (Japan-Indonesia Corporate Agreement).

^v The flying geese paradigm explains that Japan has been growing as a developed country by switching its industries from the labor-intensive industry to the capital-intensive industry. That paradigm also explains how technology and knowledge transfer does matter when the both developed countries (demand for input) and developing countries (supply of input) are connected by international trade.

^{vi} The foreign exchange market also takes a part on the volatility risk of exchange rate since it is potential to create a premium risk to the point of view of import demand and affect the international trade simultaneously (Scrimgeour, 2001; Hawkesby, et al., 2000). This mechanism is taken from the interest rate and monetary policy transmission which is responded by other countries. Although it is considered as indirect transmission, this mechanism will bring a decreasing of international trade volume because of exchange rate appreciation.

^{vii} Although this paper employs the model of Baak (2011), we are taking into account on the relationship between developed country and less developed country. We also use industrial production index of importing country instead of gross domestic product.

^{viii} This paper accommodates the industrial production index of Japan as a measurement of Japan production. Schneider (2012) showed that a decreasing of production efficiency will cause an import of other countries as an increasing of production cost in domestic, and vice versa.

^{ix} The ECM is considered to be more efficient for the case of dynamic model in which all variables are stationer at first difference level (Insukindro, 1999). This model assumes that there is an adjustment process in short-run which reflects a disequilibrium process in the short-run.

^x Although ECM performs the first difference variables, $I(1)$, it does not alleviate the long-run information of estimation (Thomas, 1997).

^{xi} Phillips and Ouliaris (1990) showed that unit root test for residual based test will not follow Dickey-Fuller's distribution. It is because the estimation for non-stationary variables will result a spurious regression, so that co-integration test distribution should depend on: a) deterministic terms in the regression used to estimate co-integrating vector; and b) number of variables $- 1$ or $(m - 1)$.

^{xii} Co-integration test of CRADF and CRDW are suggested by Engle and Granger (1987) in which it is all residual based test for co-integrating process from regression.

^{xiii} Goodness-of-fit of the ECM will follow classical assumption of OLS. It should take into account on multicollinearity problem, heteroscedasticity problem, serial correlation, normality of residual and linearity assumption of the model (Greene, 2012).

^{xiv} CRADF test is a residual based test in which the stationary process of residual model, $I(0)$, shows the existence of long-run relationship for the specified model. Similarly, CRDW test is determined by the Durbin-Watson statistic to prove the long-run relationship of the specified model. In addition, CRDW test can be known from the regression of non-stationary variables.

^{xv} The critical value for CRDW test are (0.511; 0.386; 0.322) for the respective significant level of (1%; 5%; 10%), whereas the critical value for CRADF test are (-4.054; -3.456; -3.154) for the respective significant level of (1%; 5%; 10%).

^{xvi} CRDW test tends to have a sensitive critical value for particular parameter so that cannot reject the null hypothesis.

^{xvii} This statement for complementary goods of China and Indonesia commodities for Japan is actually not generated from a price because we use quantity to determine this concept. Therefore, it can be said that the increasing quantity to be imported from China will also increase the quantity to be imported from Indonesia to Japan.

^{xviii} McConnel and Brue (2001) showed this market structure of monopolistic is considered to be more explaining the real condition for industrial advantage of developed countries. This advantage causes

the developed countries are able to reach a super-normal profit on the short-run (similar to perfect competition market) before more competitors enter the market on the long-run.

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