The Effects Of Fluctuation Real Exchange Rates On The Bilateral Trade Balance Between Indonesia – China: Observation condition of Marshall - Lerner And The J-Curve Phenomenon Approach

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Abstract - **This study aims to come to a conclusion as to whether there were effects of the real exchange rates on the bilateral trade balance especially in export-import sector and to prove that the Marshall-Lerner condition (for medium to long term time frame) was met, as well as whether the J-Curve phenomenon in the short term also took place during the 23-year trade period of Indonsia and China (1990 to 2013). The results derived from using the Error Correction Method within the period to exhibit a research gap: the exchange rate fluctuations did not affect the balancewhich in turn pointed to the conclusion of the absence of performance increase in the sectors. Several factors such as politics, social, and cultural issues contributed to the economic factors which sustained the condition.**

Keywords - **Real Exchange Rates, Trade balance, Error Correction Method (ECM), Marshall-Lerner Condition dan J-Curve**

I. INTRODUCTION

A country builds relationship with other countries based on mutuialism and interdependency, be it bilateral or multilateral. A form of such relationship is in international commerce, and the most important factor is the exhange rates. An exchange rate refers to the value of the domestic currency against a foreign currency after a conversion. The conversion value is considered a key component in such relationship (especially in the export-import industry) since it can affect the economy of the countries involved because it represents the value or a product or service that can be exchanged for another service or product of their counterparts. An exchange rate is also a reflection of a country's competitiveness in the international market. Currently, Indonesia uses the *free floating exchange rate* which can have a significant effect towards its open economy, especially on the trade balanceand its GDP.

A change in the real exchange rate will have an impact on the trade balance in two ways, namely *value effect*and *volume effect*.A value effect which is caused by rate depreciation will lead to an increase in export due cheaper commodities and an increase in the volume of the trade which in turn will have a positive impact on the balance. Therefore, an exchange rate is an instrument to increase competitiveness which will encourage a rise in export and finally increases the GDP of the country.

On the contrary, an increase in export and a decrease in import will not automatically be followed with an increase in the balance. Theoretically, it can only occur if the *Marshall-Lerner*condition is met; i.e. the elasticity volume of export and import is greater than one. In other words, the MLC exhibits how a real depreciation leads to a balance surplus when such volume surpasses the value of one:

$$\varepsilon_X + \varepsilon_M > 1$$

A *Marshall-Lerner*condition states that a change in volume dominates the change in the

value. Although the import value increases and an export value decreases, the opposite directions for both will dominate and the total value of the balance will improve (Husman, Jardine A. 2005). Simultaneously, the balance n short term will decline at its initial stage and causes a decrease in export value and an increase in import causing the balance to be stagnant.This is due to the constant export volume and value, but more importantly the prices of the commodities. Changes in the commoodity prices occur more rapidly compared to the changes in trade volume due to fluctuation in the exchange rate. Also, it is common practice to bind an international trade with a contract to avoid, in an occurence of a depreciation, any change in the volume of the export-import based on the exchange rate. Instead, the adaptation will most likely take place in the price of the commodities. Such condition, however, will improve for a short periode of time (in terms of months) since buyers will most likely switch to lower-priced commodity and the trade volume increase, and such phenomenon is known ans the J-Curve Effect.

This study aims at revealing and analyzing the effects of a real exhange rate of a domestic currency against a foreign currency on the performance of export and the trade balance which in turn would advocate the aforementioned theory. Within the last few years, Indonesia has experienced deficitscompared to China as its counterpart. Also, the the Rupiah-Yuan exchange has experienced depreciation within the same time span, which should have translated into an increase in Indonesia's export volume and value. The opposite condition, therefore, demonstrated a research gapwhere there was an inconsistency between reality and theory.Various research data on the development of Indonesia-China export-import industry demonstrated the following:

Table 1 : Indonesia-ChinaExport-Import in 2006-2010

Year	Export Growth (%) (Indonesia to China)	Export Growth (%) (China toIndonesia
2006	27.7037	15.96172
2007	15.9145	27.68893
2008	19.0784	54.88879
2009	-3.1049	-10.1571
2010	34.585	49.96438
2011	49.8171	26.80184
2012	-7.759	12.55217

Source :Statistik Ekonomi dan Keuangan (SEKI) Bank Indonesia (inwww.bi.go.id)

The export-import industry can be summarized in the following graph:

Source: Statistik Ekonomi dan Keuangan (SEKI) Bank Indonesia (in www.bi.go.id)

Figure 1 : Indonesia-China Export-Import Growth

The graph shows a sharp deficit trend in the Indonesia–Chinatrade balanceespecially in 2007, 2008, 2010 and 2012 (with 2012 being the lowest deficit to date). In contrast, the figures exhibited a sharp increase in import from China.

In addition to the growth of export-import industry, some observations were also made on another international trade indicator, namely the exchange rate. The following graph displays the IDR/CNY real exchange rates:

Source : Pacific Exchange Rate Service (processed)

Figure 2 : IDR/CNY Exchange Rates 1990- 2014

Moreover, the data can be further compared with the value of the export-import activities during the same period (values are in thousand US Dollars):

Figure 3 :Trade balance for the Export-Import relationship of Indonesia-China

The graph above confirms the deficits and the down trend Indonesia experienced while conducting trades with China during the period aformentioned.

Based on the introductory explanation based on the data compiled, there was a strong indication that the theory was inconsistent with the reality (*research gap*) of the Indonesia and

China trade relationship. The phenomenon leads to the question of whether real depreciation will have effects on export performance which in turn will impact the trade balance. Thus, the study is based on the extent of influence the real exhcange rate or Chinese Yuan on the export-import tradeing balance

Objectives

This study aims at gaining insight on and analyzing the following:

1) the effects of real exchange rates on the export volume from Indonesia to China.
2) the effects of real exchange rates towards the volume of import from China to Indonesia.
3) to prove whether the Marshall–Lerner condition was met to instigate the J–curve phenomenon in the Indonesia – China trade relations.

The framework of this research is based on the idea that orients to the a reserach concept in order to arrive to the model and methodology of the study. In essence, the framework is represented thus:

Figure 4: Framework of Research

II. METHODOLOGY

The data compiled for this study are secondary (quantitative) which is analyzed using the time series type. The model employed served to analyze the effects of real exchange rates on the trade balance by observing the MLR condition and the J-curve phenomenon.The model was then made into three models.The following three functions represented the equation model made to achieve the objectives of the research :

1. **Trade Balance(TB) = F(Dummy,RER, GDP_{JPN}, GDP_{IND})→ Model 1**
2. **Volume Export(Q_{EX}) = F(Dummy,IDX_{EX}, GDP_{JPN})→ Model 2**
3. **Volume Import(Q_{IM}) = F(Dummy,IDX_{IM}, GDP_{IND})→ Model 3**

Model 1 : Thetrade balance integral equation (net export, NX)used in the study derived from the 4 sector economy which is as follows:

$$\mathbf{TB = NX(Y,Y^*,) =)- IM (Y,)}$$

The above equations were used to form a trade balance model as a function from GDP and real exchange rates represented thus:

Key:

TB : Trade Balance.
RER : Real ExchangeRate)
GDP : Real GDP (Indonesia)
GDP* : Foreign GDP (China)
β_{1-3} :Regressive co-efficient (*slope parameters*), which also determines the orientation (increase (+) ordecrease (-))
β_0 : *intercept*
Ut : White-noise process (*disturbances*atau *error term*)
ln : Natural algorythm

The model above was used to examine whether the real exchange rates affected the trade balance of Indonesia-China and vice versa.

Model 2 & 3 : The models were used to see whether the Marshall-Lerner (MLR) condition was met in the trade relations during the 1990-2013 period by testing the export-import value index co-efficient through Model 2 and 3 to be greater than 1 (+ > 1) or whetherthe elasticity of the amount of export and import is greater than 1. If so, MLR is met which entailed the notion that real depreciation can significantly improve the trade balance and encourages trade balance surplus.

2.

3.

Key :

: export volume

: import volume
$IDX_{t,EX}$: export value index
$IDX_{t,IM}$: import value index
, : intercept
- , - :regression-co-efficient

The analysis method to be employed in the study is a time series type commonly used in similar preceding researches, namely the co-integration and error correction. The former will be used to explain the long-run relationship balancebetween the dependent and independent economic variablesin terms of similar trends from non-stationary variablesof the model, so thatspurious regessioncan be prevented. In essence, most economic models explain the relationship between the long term behaviour in accordance with the theories that perform estimation in the models.The method uses the Johansen test to check whether co-integration exists among the variables in the models.

The Johansen test can be represented thus:

$$\Delta Y_t = \beta_0 + \pi Y_{t-1} + \sum_{i=1}^{p} \Gamma_i \Delta Y_{t-1} + \varepsilon_t$$

The components of the $Y_t$vectoris considered co-integrated if there are β = (β1 , β2 ,., βn) vectors found to in order the combination of both vectors be that of stationary. β vector is considered as the cointegration vector.The cointegration rank of $Y_t$vectoris the number of independent conintegration vectors and can be obtained by conducting the Johansen test.

Meanwhile, the error correction method (ECM) is used to analyze the non-stationary time series multi-variate with the occurence of cointegration between variables used in the model of the research. The method is employed to observe the extent of real exchange rate effects on the trade balance studied.

Should there be cointegration among the variables, it is an indication that balance will occur in the long term rather than in the short term. Deviation in the short term will experience corrections to return to the balance in the long term. The correction process is observed through an econometric called the Error Correction Method (ECM). Therefore, a test for conintegration among the variables mustbe conducted before ECM can be performed.

Besides the two methods mentioned, the study also uses several tests comprising of data stationary tests.It is designed to maintain the stationary characteristic of the the data when tested with the time series type within a certain long time span. Another consideration is placed on the criteria for selecting the appropriate model in order for the results to maintain the BLUE standards (Best, Linear, Unbiasedand Estimator). The study applies the *Ordinary Least Square* (OLS) method along with other classic assumptions to build the foundation of the regression model (heteroscedasticity, muticollinearity, autocorrelation). In addition to *goodness of fit* tests (correlation, AIC, and F-tests), a normality test is applied to all data and the stationary test to ensure that the data otained from the time series type confirm the stationary characteristics at the level of which the fluctuation is stable. That is, there is no difference of fluctuation ranges and that spurious regression is successfully hindered. It is viewed necessary in order to identify the short-and long-term relationships among the variables.

III.RESULTS

A. Data Stationarity Test

After undergoing several preliminary screenings through fundamental statistic tests normality and classic assumption) it was determined through E-views that the data complied with the selected parameters. The next procedure was the main statistic test to serve the objectives of the research. A stationary test was conducted to identify the short- and long-term relationships among the variables employed in the model. The results of the test can be seen below:

TABLE 2 : ADF-Based Unit Root Test Results

Description	Differentiation			Integration Order
	Level	First	Second diference	

	p-value	p-value	p-value	
RER	0.1247	0.0000	----	I(1)
TB	0.2322	0.0001	----	I(1)
GDP_CHN	1.0000	0.9242	0.0001	I(2)
GDP_IND	0.9993	0.0719	0.0000	I(2)
IDX_HRG_EX	0.9974	0.0015	----	I(1)
IDX_HRG_IMP	0.9940	0.0006	----	I(1)
CPI_CHN	0.5305	0.1887	0.0050	I(2)
CPI_IND	0.9997	0.0266	----	I(1)
VOLUME_EX	0.3027	0.0042	----	I(1)
VOLUME_IMP	0.9768	0.0003	----	I(1)
Prob. In ADF - Fisher Chi-square	0.9071	0.0000	0.000	

From the table it can be concluded that all the data were not stationarity at its first level as seen in the p-value column. All p-value variables were higher than the alpha; thus the value of 0.05 was determined as the pivot value of the research. It was considered necessary to transform the data into its stationary mode by ordinallly using the differences (1st difference, 2nd difference, etc) through a unit root testusing the Augmented Dickey Fuller (ADF-test). At its first difference level, there werestill non-stationary variables, requiring further implementation in the second difference) until all data became stationary.

B. Research Model Estimation and Cointegration Test

Following the tests were estimationsby the three models. Model 1 aimed at providing explanation on the effects of real exchange rates on the trade balance perdagangan dengan model through a regression equation below:

The output results via E-Views were as follows:

LOG(TB) = 21.88 + 27.67*LOG(RER) – 146.06*LOG(GDP_IND) + 54.56*LOG(GDP_CHN)

	C	RER	GDP_IND	GDP_CHN
t-statistic	(4.701781)	(3.65044)	(-4.731192)	(3.997517)
Prob.	(0.0002)	(0.0017)	(0.0001)	(0.0008)
Adjusted R-squared	=0.628477			
F-statistic	= 13.40525	**Prob.**	= 0.000062	
Durbin-Watson stat.	1.449531			

The output from Model 1 showed that all co-efficient values of the independent variables (real exchange rates and the GDPs of Indonesia and China) were significant as the Probability displayed. In the output column, all values were lower than the values of alpha, thus laying a baseline of 0.05 used in the processing. Such a result indicated that there were effects on the trade balance. It was also evident that the F-test yielded significant numbers and they were advocated by F-statistic results which showed lower values than that of alpha (0.05). The correlation value of independent variables and dependent variables was 62,85% which meant that there was a strong impact made by the independent variables on the dependent variables.

Once all the fundamental tests had been implemented, cointegration tests were conducted to give light on the long-run relationshipbetween economic variables of the research, namely the independent and dependent variables. They were analyzed to provide indications of trends of non-stationary variables and to avoidspurious regession.

Residuals were implemented in the models to test the cointegration of the data. Next, the results were tested using the unit root method to yield the following results:

Null Hypothesis: D(RESIDUAL) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic based on SIC, MAXLAG=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.754953	0.0002	
Test critical values:	1% level	-3.831511	
	5% level	-3.029970	
	10% level	-2.655194	

*MacKinnon (1996) one-sided p-values.

The ouput above gained through E-Views showed that the residual variablesimplemented in various levels indicated cointegration among

the following: trade balance (tb), GDP China (gdp_chn_2005),GDP Indonesia (gdp_ind_2005), Inflation China (cpi_chn_2005), Inflation Indonesia (cpi_ind_2005), Expor Value Index (idx_hrg_ex_2005),and Import Value Index (idx_hrg_imp_2005).

Output of e-views

C. J-Curve Test (Short Term)

After the cointegration test, short-term estimations were conducted to know whether real exchange rates had short term effects towards the trade balance and incurred the J-Curve phenomenon. By combining Model 1 estimation with residual calculations, results from E-Views appeared as follows:

S Sample (adjusted): 1994 2013
In cluded observations: 20 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.957716	2.633095	0.743504	0.4687
D(D(LOG(RER)))	**-4.264536**	11.35145	-0.375682	0.7124
D(D(LOG(GDP_IND_2005)))	-35.01402	80.78611	-0.433416	0.6709
D(D(LOG(GDP_CHN_2005)))	294.3384	205.8375	1.429955	0.1732
RES(-1)	-0.394714	0.190015	-2.077278	0.0554

R- squared	0.302833	Mean dependent var	1.224711
Adjusted R-squared	0.116922	S.D. dependent var	12.23937
S.E. of regression	11.50161	Akaike info criterion	7.935169
Sum squared resid	1984.305	Schwarz criterion	8.184102
Log likelihood	-74.35169	Hannan-Quinn criter.	7.983763
F-statistic	1.628915	Durbin-Watson stat	1.932834
Prob(F-statistic)	0.218644		

The results above showed 0,2186 for the co-officient for Pro(F-statistic), higher than the alpha(0.05): the three independent variables (exchange rates, Indonesia's GDP and China's GDP China) simultaneously demonstrated no short-term effects on the trade balance. Nxt was the probability from the residual (-1) which amounted to 0.0556 and was also higher than alpha (0.05). The conclusion was that the real exchange rates in the short term did not have any effect on the trade balance, thus the non-existence of the J-Curve phenomenon in the Indonesia-China bilateral trade.

D. MLR Condition Test (Long Term)

After the tests for short-term effects, A MLR test followed suit to determine the long-term effect of real exchange rates on the trade balance. Model 2 and Model 3 were employed, with the former estimating the export value index against the export volume. The latter measured the import value index agains the import volume. The results were obtained with the use of E-Views, showing the following:

Model 2 :

The output of Model 2 is as follows:

LOG(VOLUME_EX_2005) = 0.842+ 0.384*LOG(RER) + 0.209*LOG(IDX_HRG_EX)

t-stat. (2.945765) (6.268725) (6.268725)
Prob. 0.0077 0.000 0.000
Adjusted R-squared = 0.903938
F-statistic = 109,2149 ; Prob. 0.000
Durbin-Watson stat = 2,311077

Model 2 gave a value of Pro (F-statistic) lower than alpha (0.05): both independent variables (real exchange rates and export value index) mutually affect the export volume. Furthermore, the probability of the co-efficients from individual variables lower than the alpha (0.05), sugesting that both variables partially affect the dependent variables. The contribution of independent variables to dependent variables was indicated as high as 90% from the adjusted R-squared analysis. It entailed that there was a strong connection between both dependent variables (real exchange rates and export value index) and export volume simultaneously.
The output of Model 2 showed the co-efficient of export value index at **0.209,** indicating the level of export elasticity (ε_{ex}) employed to test the MLR condition.

Model 3 :

Estimation with E-Views using Model 3 yielded the following results:

*LOG(VOLUME_IMP_2005)=1.485+ 0.068*LOG(RER)+0.564*LOG(IDX_HRG_IM)*

t-stat. (7.708382) (2.476648) (33.76661)
Prob. 0.0000 0..0219 0.00000
Adjusted R-squared = 0.982142
F-statistic = 633.4650 ; Prob. 0.0000
Durbin-Watson stat = 1.361752

It should be noticed that the value of Pro (F-statistic) is 0, lower than alpha value at 0.05. It suggested that both independent variables (real exchange rates and import value index) simultaneously affected the import volume. Additionally, the probability of the co-efficients from individual variables were also lower than alpha (0.05): each variable had some effects on dependent variables.The contribution made by the dependent variable was 98% according to the Adjusted R-squared estimation98%. It suggested a strong relationship between independent variables of real exhange rates and export value index simultaneously and export volume.

The Model 3 output showed a co-efficient of export value index as high as **0.564**, which reflected the level of import elasticity (ε_{IM}) also used to test for MLR condition fulfillment.

It is clear that both output gave the co-efficients of export value index and import value indexfrom both models (model 2 & model 3), and when added together ($\varepsilon_{EX} + \varepsilon_{IM}$=0.22 + 0.564), the value is 0.784 (exceeding 1).

The results above showed how the MLR condition in the long term was not met: in the long term, real exchange rates had no effects on the increase of export and the decrease of import thus bearing the same result with the trade balance. MLR could only take place when the requirements for the Marshall Lerner Robinson condition are met, namely the export and import elasticity indices are higher than 1 ($\varepsilon_X + \varepsilon_M > 1$)

IV. CONCLUSION

According to the result of the research which has been done, J-curve (short-run) did not occur and MLR condition (Long-run) between Indonesia - China trade relationship is experiencing deterioration from Indonesia against China. It is due to high increase import which is done by Indonesia and flooding goods from China which is cheap (competitive cost). Raw material which is needed by some big industry in Indonesia is imported from other countries, China included. Therefore, the occurance of J-curve phenomenon and MLR condition still cannot boost export increase which is caused by currency depreciation value effect. J Curve and MLR condition, which is happening in Indonesia, have not shown depreciation power as an instrument to increase export competitiveness Indonesia to China. The effort which should have been done by Indonesia for export commodity to compete in international market are maintaining product quality and increasing customer service and satisfaction. Moreover, in order to increase competitiveness product of Indonesia in international market or export destinations, best strategy which should have been done is maximalizing the efficiency using potency of nature resources of Indonesia without importing from other countries, or can also be done in different ways as long as it fits with the concept of competitive advance by David Ricardo which is harnessing nature resources of other countries efficiently, for example, efficiency can be done by minimalizing production cost with opening a factory in other countries (industry globalization) which have more efficient nature resources, or efficient on distributing goods (distribution channel). In summary, this can give cheap yet competitive price (low price) while maintaining the quality of the product.

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