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The Impact of the Global Stock Market and the Foreign Exchange Market on Domestic Financial Market

Wahyu Murti[1]

Abstract:

The JCI (Jakarta Composite Index) movement contributed 13.5 percent to the variation of movement in the balance of the rupiah exchange rate. EG test, cointegration test and VECM test with the period 2006-2016, explained that the IDR movement is not independent, influenced by the movement of IHSG (The Composite Stock Index) and currency from The United States, Singapore, Japan, Australia and Germany.

The flow of foreign capital into the stock market becomes the source of the IDR (Indonesia Rupiah) movement from within the country, the increase of JCI will attract the entry of foreign capital into Indonesia, thus boosting demand for domestic currency.

Keywords*: Global stock market, foreign exchange market, domestic financial market.*

JEL Classification: *F3, G15*

[1]*Faculty of Economic University Borobudur Jakarta, Indonesia, E-mail: murti_why@yahoo.com*

1. Introduction

In the short term the balance of the rupiah (IDR) exchange rate in particular against the US dollar (USD) can be said to be influenced by the movement of the composite stock price index (IHSG) in the stock market (Fama and French,1988) The research of Hsing (2011) is the stronger which occurred in the last two years with a negative correlation value of 0.78. The negative correlation gives the meaning that when JCI shows an upward trend, IDR is strengthened (appreciation). Kimani and Mutuku (2013) indicated a severe causality relationship between the stock market and the foreign exchange market. The movement of the index in Indonesia Stock Exchange (BEI) shows an increase, in line with the rupiah exchange rate which strengthened (Lana Sulistiyaningsing, 2010). The research of Tahir and Ghani's (2004) on the Bahrain money market shows empirical evidence of validation of Dornbusch's approach. The increase in JCI triggers the entry of foreign capital, so IDR is strengthened in the balance portfolio approach (Frankel, 1993). Meanwhile, in the approach of good / assets market (Dornbusch and Fischer, 1980) explains the reverse relationship is that the change of the exchange rate into the attractiveness of the flow of capital into the stock market.

The dynamic relationship using the Tobin model between the stock market and the forex market in an open economy shows that the stock market reduces the impact of monetary policy through real exchange rates. If the relationship between the stock market and aggregate demand is strong enough, then the impact of monetary policy on the real exchange rate is the opposite (Gavin, 1989). The Nath and Samanta (2003) study of the Indian case shows that there is no mutually influence relationship between the rupee exchange rate (INR) and the index on the Indian stock exchange, but there is a significant correlation between the returns of the stock market on returns on the forex market. Meanwhile, a study in Thailand showed the flow of demand (order flow) in the forex market associated with the flow of demand in the stock market (Gyntelberg, 2009).

The relationship between financial markets of developed and developing countries such as the case for India and Japan (Rahman and Mishra, 2007) suggests there is a cointegrated relationship between the two markets. Rahman and Uddin (2009) show that there is no cointegration between stock prices and exchange rates in three countries in South Asia or in other words there is no relationship between stock price index and exchange rate. Mougoue (1996) shows the relationship between exchange rate and stock index through coin-integration and ECM tests which show the dynamic short-term and long-term relationships in eight developed countries in the world. The study proves that the approach of Frankel's price of the portfolio is more dominant as the rise in the index makes the domestic currency have appreciation.

The results are supported by Ooi, Wafa, Lajuni and Gazali (2009) in the case of Thailand and Malaysia, that the movement of stock prices more influence the movement of exchange rates than vice versa. Jorion's research (1991) in cases in

developed countries such as the United States, found that investors in the stock market were not affected by the risk of exchange rate movements. These findings are also consistent with the previous studies conducted by Fama and French (1988) USA, that bond and share yields respond differently with the exchange rate changes.

The research of Sulistiyaningsih (2010) contagion effect occurs between the regional stock market and the global financial system, on the other hand there is no spilover effect from IHSG volatility to exchange rate voting, from Dow Jones index to exchange rate and from Dow Jones Index to IHSG. Novelty in his research is expected to respond to a cointegration relationship between the foreign exchange market and the stock market in Indonesia as well as answer the hypothesis that the entry of foreign capital into the stock market makes the exchange rate appreciate as it should be.

2. Theory and Hypothesis

Globalization of the financial sector, cannot be denied that the movement of the market in Indonesia both the forex market and the stock market is also influenced by the movement of forex markets and stocks from other countries (Thalassinos and Pociovalisteanu, 2007; Thalassinos and Politis, 2012; Thalassinos *et al.*, 2012a; 2012b; 2013; 2015a; 2015b). Most Asian markets such as the main markets of Japan, Hong Kong, Singapore, and the US New York market have a very close movement in the direction of the IDR and IHSG movements-as well as some European countries.

Frankel's theory can be modeled by assuming a relationship between three assets held by private agents with the authority of base money (M), bonds in domestic currency (B), and foreign currency denominated bonds (F). Investors are assumed to hold bonds of B = Bp + Ba where the amount of domestic bond supply held by private agents by Bp, and held by the authority of Ba. While stock of foreign bonds held by private agents and authority moves affect the current account balance that is surplus or deficit. The amount of foreign asset is formulated as F = Fp + R with Fp as foreign bonds held by private agents and R is the foreign exchange reserves held by the authorities. At the same time the authority has an obligation to supply the base money into domestic economy of M = Ba + SR with S is the exchange rate of the domestic currency against the foreign currency (exchange rate). Thus the total wealth held by private agents is W = M + Bp + SFp is the total of the base money held plus the domestic asset and the value of the foreign asset in the domestic currency (multipliedwith S, exchange rate). In every increase in wealth possessed by an increase of one of its forming variables, the first derivative of the increase in wealth is expressed as mw + bw + fw = 1 (Pilbeam, 2007), that the demand for held money can be formed as a function of: M = m (r, Es, Y, W) where mr <0, ms <0, my> 0 and mw,> 0, r is the domestic interest rate, Es is the expectation of the depreciation of the domestic currency, Y is the domestic national income, and W as

the property owned. While demand for domestic assets is formed by the equation B = b (r, Es, Y, W) but br> 0, bs <0, by <0 and bw> 0.

An increase in interest rates in the country will make the demand for domestic assets increased. Domestic assets demand is inversely proportional to the expected rate of return of foreign assets, and inversely proportional to national income and is positively influenced by wealth. Demand for foreign assets can be formed in the system of SFp = f (r, Es, Y, W) with f, <0, fs <0, fy <0, and fw> 0. As domestic interest rates rise, demand for overseas assets falls, and demand for overseas assets rises as its expected rate of return rises, and declines as national income rises, and increases as wealth rises. In the balance sheet system and assuming mutually substituting assets, it implies that mr + br + fr = 0 and ms + bs + fs = 0.

From the first identity equation it is known that demand from domestic assets is more responsive to domestic interest, compared to foreign asset demand and domestic asset demand is less responsive to yields from foreign assets. And from the second identity system it is known that domestic asset demand is less responsive to the expected rate of return of foreign assets than the demand for foreign assets.

3. Hypothesis Development

The framework of this research is to examine the causality relationship between the foreign exchange market and the Indonesian stock market using the cointegration method and the Vector Error Correction Model with the monthly period between January 2012 to December 2016. The hypothesis leads to short and long term relationship between IDR and IHSG (composite stock price index) -for that period. The study will also include measures of market integrity and the magnitude of the influence of currencies and indices of 6 countries against IDR and JCI to be tested by VAR decomposition (Variance Decomposition).

Some theories related to long-term exchange rate determination include law of one price and purchasing power parity (PPP). Both theories assume no transport and goods costs are generated by either identical or homogeneous countries (Pilbeam, 2007). Meanwhile in the short term, the exchange rate may fluctuate according to the conditions of the foreign exchange market determined by demand and supply. So the exchange rate regime becomes very important in determining the level of exchange rate balance. The flexible exchange rate system provides the consequences of exchange rate movements which continues to move when there is a change in demand and supply side, consequently the exchange rate tends to be unstable. When this regime is offset by a foreign exchange system that tends to be free, foreign capital inflows in portoflio form can move in when returns on rupiah denominated assets are considered attractive and high. According to Mishkin (2010) the factors that influence the demand for an asset are liquidity, risk, return and wealth. Changes to these factors will affect the movement of asset markets. The phenomenon of

inclusion of investment in stocks that affects the balance of exchange rates underlies Frankel's (1993) in the theory of portfolio balance determination.

Dornbusch and Fischer (1980) describe the relationship between exchange rate equity and stock assets through good market approach. Dornbusch and Fischer emphasize exchange rate movements affecting international competitiveness and trade balance, further affecting national income and output. Surplus balance Trade will provide excess of foreign exchange that can increase supply from the forex market, making the forex market appreciated. Expectations of appreciation of the domestic currency will be the main attraction of investment in the form of stock or bond assets.

Trihadmini and Pudjiastuti (2010) state that contagion effect occurs among regional stock markets in the global financial system. On the other hand there is no spillover effect from IHSG volatility to exchange rate volatility, from Dow Jones Index to exchange rate, and from Dow Jones Index to IHSG (JCI).

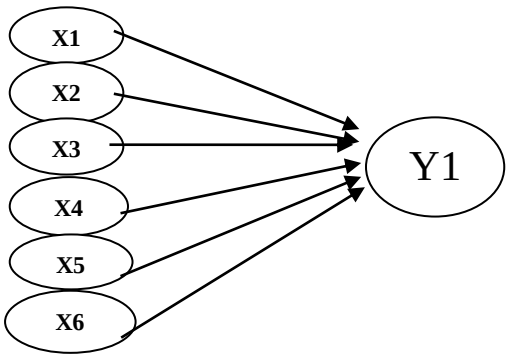
Tahir and Ghani's research (2004) in the case of Bahrain supports Dornbusch and Fischer's theories above. This theory is different from the relations described earlier by Frankel, who argue in contrast that expectations of profit in the stock market affect the balance of exchange rates.

The rising foreign exchange position is an acceleration of increased trade in the Asian region and foreign capital inflow, but investment flows in the form of portfolios cause volatility that tends to increase between the period 2000-2007. Increased volatility makes the financial market tendency in Asia becomes unstable.This instability makes the relationship between IDR and IHSG (JCI) can affect each other not solely because of the portfolio balance.

3.1 Theoretical Framework

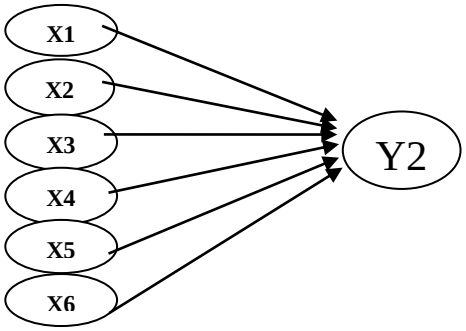
The theoritical framework which examines the effect of the German index, Hongkong, Singapore, USA, England, France and Japan indices against JCI index is presented in Figure 1.

Figure 1. *Theoretical Framework Research I*



The theoritical framework which examines the effect of currency of German, Hongkong, Singapore, USA, England, France and Japan indices against IHSG is presented in Figure 2.

Figure 2. *Theoretical Framework Research II*



4. Research Methodology

4.1 Hypothesis Testing

The empirical test using Vector Autoregressive (VAR) is done in several stages as follows: (i) test of stationarity of data, (ii) cointegration test, (iii) Engle-Granger causality test, (iv) ECM test, (v) Variance Decomposition test (VD). In the first stage, the variables used in this study should be stationary. This stationar test uses Augmented Dicky-Fuller (ADF). The ADF test will be stationary if the ADF value of the statistic must be greater than its critical value (Nachrowi and Usman, 2006).

4.2 Research results

Object of foreign exchange research and index of Germany, Hongkong, Singapore, United States, Australia and Japan against IHSG.

The first stage in modeling can be formed as follows: Wt = pWt-1 + μt, if p = 1 then the variant of Wt is not stationary. If the equation above is subtracted by Wt-1 on the right and left side, the equation becomes Wt-Wt-1 = pWt-1 - Wt-i + μt. Or can be written as ΔWt = bWt-1 + μr.If the hypothesis H_0 : δ = 0, and H_1 : $\delta \neq$ 0. If p = 1, then δ = 0, so Ho is accepted, it means the model has the root unit, and the time series data is not stationary. If the data is not stationary then, the ADF test can be continued by testing the data in the form of first difference.

The modeling can be done as Wt = β1 + β2t + β3Wt-1 + μt. If β1 = 0, β2 = 0, and β3 = 1 or means there is no intercept and trend, then Wt = W_{t-1+} μt is obtained. We know from the previous test the Wt data is not stationary, but when the model is written as Wt - Wt-i + = μt or ΔWt = μt, so E (ΔWt) = 0 and Var (ΔWt) = σ2, then ΔWt becomes stationary. The ADF test in Eviews allows testing of data in non-stationary levels to proceed to the testing process in the form of first difference

automatically.

The second stage is to test the causality between IHSG and IDR variables by using the Engle-Granger (EG) test. This EG test result to determine the causal relationship between IHSG an IDR. This EG test helps determine the direction between the two variables Whether it meets the market approach of goods or opposite the portfolio approach. Continued to the third and fourth stages of the Johansen co-integration test to find out the long-term relationship and VECMZ to know the short-term relationship. Two variables will have a long-term relationship if the error (μt) of the second linear regression of the variable is said to be stationary via the ADF test.

The next process continues to know whether there is a short-term relationship between the two. The formation of the ECM model can be expressed as follows: $\Delta W = \alpha 0 + \alpha 1 \Delta X + \alpha 2 \mu t\text{-}1 + et$. In the above equation, OX represents the short term interference of X, and cointegration error is an adjustment to long-term equilibrium. The model is said to have a short-term balance if $\alpha 2 \mu t\text{-}1 < 0$.

The last part of the research is measuring Variance Decomposition (VD). VD as one of the VAR (Vector Autoregressive) measurements intended to measure the contribution of one variable to another. This study uses monthly data for the period 2011 to 2016, data downloaded from Bloomberg, and processed using EViews 8. After performing stationary test by using Augmented Dicky Fuller (ADF) test, the result shows all stationary data in first diffenrence I(1). The next stage in the EG test shows the JCI is an endogenous variable compared to IDR.

Ansen's cointegration test results on the relationship between IHSG and IDR indicate that there is at least one cointegrated equation with $\alpha = 5$ percent of two cointegrated equations in the analysis of exchange rate relationship with $\alpha = 1$ percent. As for index relations there is at least one equation which shows cointegrated with $\alpha = 1$. That means the three relationships indicate there is a unidirectional movement toward long-term balance.

Meanwhile, VECM result for IHSG-IDR relationship indicates statistically there is a short term relationship with co-integration coefficient is negative 0,38182 and significant with t-test value equal to 5,1month. It shows that the change of JCI movement will be responded by IDR movement to make long-term equilibrium adjustment between IHSG and IDR within 5.8 months. As for the relationship between exchange rates obtained statistical results showing short-term relationship, with co-integration coefficient of negative 0.085667 significant with t-test value of 1.88433. When there is a deviation between IDR against long-term equilibrium and exchange rate of six partner countries, IDR will move to adjust for 10 months.

The next stage is the measurement of VD. In the analysis of JCI-IDR relationship indicates that JCI movement contributed about 13.5 percent to IDR movement,

otherwise IDR only contributed very little (about 1 percent) to JCI movement. In addition to the contribution of domestic factors, namely the JCI, the movement of IDR gets quite stronger than other currency movements, especially baht, USD spot index, $ Singapore with total contribution of nearly 42 percent, and about 58 percent contributed by the movement of IDR in the previous period.

This composition indicates that the movement of IDR is relatively less independent, and has a high dependence on the currency of other countries, especially currency movements from the United States, Singapore. Furthermore, VD testing is done to measure variations of IHSG with index from partner countries. Down Jhones are seen dominating JCI movement, even stronger than JCI movement before. After the Dow Jhones, JCI's movement was also contributed quite strongly by Nikkei index and SIT index. While the contribution of dummy that reaches almost 10 percent indicates JCI is very vulnerable issue.

5. Analysis

The EG test, cointegration test, and VECM test for the period 2012-2016 answer the hypothesis that the IDR movement is not independent, influenced by the movement of JCI and currency of partner countries especially from USA, Singapore, Hongkong. It also replied the hypothesis that the flow of foreign capital into the stock market became the source of the IDR movement from within the country, proving Frankel's approach of portfolio balance explain more the relationship between IHSG and IDR compared with Dornbusch model. The rise in JCI will attract foreign capital inflows into Indonesia, boosting demand for domestic currencies.

5.1 Descriptive Analysis

JCI movement contributed up to 13.5 percent against the movement variation in IDR country, proving Frankel's approach of portfolio balance explain more the relationship between IHSG and IDR compared with Dornbusch model. The rise in JCI will attract foreign capital inflows into Indonesia, boosting demand for domestic currencies as shown in Table 1.

Table 1. *Contribution of IHSG to IDR*

Variance Decomposition of LIDR:			
Period	**S.E**	**LIDR**	**LIHSG**
1	0,077.258	10.992.580	1.774.189
2	0,113.314	10.293.912	1.706.088
3	0,129.422	10.093.518	1.747.056
4	0,136.585	10.106.655	1.893.344
5	0,140.172	10.147.155	1.852.844
6	0,146.852	10.175.522	1.824.477.
7	0,142.486	10.193.076	1.806.848
8	0,142.882	10.203.068	1.796.931

9	0,143.952	10.207.140	1.792.860
10	0,143.272	10.206.645	1.793.954
Variance Decomposition of LIHSG:			
period	**S.E**	**LIDR**	**LIHSG**
1	0,104.724	0,000.000	11.200.000
2	0,170.632	0,918.982	11.908.101
3	0,212.124	1.271.800	11.872.820
4	0,242.112	1.285.776	11.158.622
5	0,270.752	1.268.917	11.873.108
6	0,295.804	1.287.932.	11.871.206
7	0,318.152	1.326.507	11.867.349
8	0,339.876	1.366.594	11.863.340
9	0,360.072	1.403.402	11.859.660
10	0,379.548	1.436.912	11.856.308

Source: *Processed Results of Eviews 8.*

But the movement of JCI is also not independent, but strongly influenced by Seng Index Zang. The Hong Kong stock exchange is the entrance of hedge funds to the Asian exchange so that the Hang Seng Index's movements are contributing heavily to the JCI, as well as to the Singapore stock exchange (STI) and the Japanese stock exchange (NIKKEI). The flow of foreign capital into Asia is distributed with certain weights as the allocation of the portfolio of hedge funds.This is an indication of the existence of band-wagon effect.As the implications of the entry of foreign capital is to bring movement in the exchange rate, including IDR.

Unlike in the forex market, The Central Bank has the authority to minimize the deviation of the movement to be more stable, in the stock market the market mechanism works more perfectly so that investors' decisions can not be controlled and strongly influenced by expectations that require more slow adjustment time and adjusted in the forex market.

Empirical results for the period 2012-2016 in the Indonesian case supports some of the earlier studies conducted by Mougoue (1996) and Ooi, Wafa, Lajuni and Gazali (2009) in the Singapore-Indonesia case as other emerging market countries have enormous economic openness. Integration of forex and stock market financial markets between Indonesia and in particular partner countries in the Asian region indicate a global interdependence of market interconnections.

Moving the market in a direction indicates the movement of capital flows that is also in the same direction. The entry of foreign capital into the Asian region has caused the Asian market to move in the same direction, otherwise foreign capital outflow from the Asian market will create a simultaneous market movement which goes down altogether as shown in Tables 2 and 3.

Table 2. *Contribution of Six Countries Currencies to IDR.*

Variance Decomposition of LIDR: Period	**S.E**	**LIDR**	**LHKD**	**LYEN**
1	0,078.855	0.782.359	0,036.273	0,110.052
2	0,123.482	0,709.099	1.591.147	0,399.505
3	0,151.366	0,075.104	2.741.742	0,268.113
4	0,170.595	0,903.175	2.876.230	0,348108
5	0,186.477	0,825.050	2.761.574	0,661.569
6	0,200.616	0,787.147	2.705.660	0,900.688
7	0,213.796	0,767.635	2.687.935	1,159.447
8	0,225.898	0,739.269	2.675.935	1.151.836
9	0,237.126	0,718.825	2.669.564	1.600.552
10	0,247.665	0,695.365	2.661.430	1.797.424
Variance Decomposition of LIDR: period	**LAUD**	**LSGD**	**LDMK**	**LDXY**
1	1.424.702	11.178.985	8.088.714	7.904.494
2	1.552.573	11.495.131	8.698.107	9.743.213
3	1.610.890	11.245.490	5.969.582	9.730.569
4	1.690.432	11.644.610	5.010.752	9.818.454
5	1.709.157	11.639.158	4.708.741	8.715.687
6	1.727.121	11.163.834	4.551.304	8.753.647
7	1.741.534	11.018.860	4.463.179	9.957.886
8	1.754.630	10.888.290	4.458.902	9.963.166
9	1.763.341	10.781.186	4.452.502	9.967.453
10	1.736.403	10.692.936	4.476.434	9.963.289,

Source: *Processed Result of Eviews 8*

Table 3. *Contribution of Index of 6 Countries to JCI.*

Variance Decomposition of LIDR: Period	**S.E**	**LIHSG**	**LSTI**	**LAUKP**
1	0,109.114	0,713.215	0.585.743	0,717.913
2	0,157.589	0,504.028	0,253.217	0,493.108
3	0,203.372	0,369.658	0,470.670	0,346.231
4	0,239.008	0,307.010	0,225.216	0,419.009
5	0,272.479	0,269.220	0,180.537	0,619.888
6	0,302.904	0,242.880	0,984.108	0,689.123
7	0,329.854	0,224.274	0,841.270	0,706.914
8	0,354.431	0,909.066	0,730.406	0,750.658
9	0,377.440	0,200.291	0,644.120	0,770.941
10	0,398.996	0,191.431	0,577.824	0,776.551
Variance Decomposition of LIDR: period	**LDAX**	**LNIKKEI**	**LHANGSENG**	**LDJ**
1	0,810.006	7.262.953	6.261.061	9.905.604
2	0,489.340	7.486.638	6.453.939	10.276.703

3	0,632.411	6.378.354	7.769.625	10.348.618
4	0,872.647	5.281.083	6.292.647	10.520.655
5	0,991.789	4.522.358	6.657.025	11.267.051
6	0,953.167	4.060.674	6.876.616	11.680.228
7	0,911.188	6.678.722	7.015.470	11.828.280
8	0,917.229	5.357.478	7.117.704	12.181.454
9	0,921.183	4.089.907	7.198.698	12.360.498
10	0,924.366	4.866.246	7.260.920	12.586.838

Source: *Processed Result of Eviews 8.*

6. Conclusion

Regional indices that are geographically close together also have a major impact on their immediate volatility. The Dow Jones index from the regional financial center closest to Indonesia has the greatest impact on JCI volatility, followed by the Hangseng Index and STI (Singapore). This conclusion reinforces the first conclusion. The volatility of regional and domestic stock indexes has a relatively small contribution to the volatility of the rupiah. The volatility of the rupiah is more due to variables other than stock volatility, which are not reflected in the model.

The Increased volatility makes the financial market tendency in Asia become unstable.This instability makes the relationship between IDR and JCI can affect each other not solely because of portfolio balance. This study invites the need for further research related to the decision of investors in investing as anticipation to the occurrence of contagin effect. The implication of the band cntagion effect needs to be reviewed further by the policy makers in the Asian region. The flow of funds from hedge funds in large quantities can lead to market instability that makes the index and exchange rates become two variables.which are most easily infected.

The IDR's reliance on capital inflows into Indonesia and the movements of other regional currencies are often the source of other fundamental economic problems such as inflation, exports, imports and real sectors which further implies interest rate policy and national output. For that reason, coordination between policy makers in the Asian region, especially emerging markets such as Indonesia, Singapore, is necessary to minimize the negative impact of capital flows that can create vulnerability to market indicators.

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