

Quantity easing

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The US quantitative easing and Indonesian financial market. Does it matter?

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Abstract

After financial crisis 2008, the central bank of the United States, known as Federal Reserve or the Fed, injected unprecedented amount of liquidity through large-scale asset purchases (LSAPs), which is also called as quantitative easing (QE). Lower long-term bond yields in the U.S. related to QE also made investors switched to other investment assets in the emerging market economies (EMEs) such as corporate bonds and privately issued securities. Indonesia, as one of the important EMEs in the world, also received higher capital inflows during the Fed's QE period. Therefore, this study attempts to analyze the impact of the Fed's quantitative easing policy towards volatility of financial sector in Indonesia by using Vector Autoregressive (VAR) model. Financial sector in this study focused on stock market, bond market and exchange rate market. The result shows that the Fed's quantitative easing plays greater role in explaining Rupiah exchange rate, compared to Indonesia composite index and long-term bond yields. This study found negative and significant relationship between US money supply and exchange rate. It could relate to the increasing of Indonesia composite index so that demand for Rupiah exchange rate increased.

Keywords: Quantitative Easing; Exchange Rate; Stock Market; Bond Market; Unconventional Monetary Policy.

1. Introduction

The United States (US) central bank issued a policy to restore the economy from the financial crisis after the crisis of 2008, due to the subprime mortgage. The financial condition of the US tends to become loose. It can be seen from monetary indicators, such as aggregate of monetary base and global broad money which growing rapidly. It can be attributed to unconventional monetary policy in the United States or it is called quantitative easing (QE). This policy is applied by the US central bank (the Fed). The Fed buys securities, bonds and debt securities when interest rates is about 0-0.25 percent. Through this program, the Fed buys US government bonds and mortgage-backed securities (MBS) issued or guaranteed by government-sponsored agencies (Figure 1). It is intended to lower long-term interest rates to improve the financial condition and support the growth of the domestic economy.

The Fed bought bond at 85 billion dollars every month in 2012. The Total of bonds that held until December 11, 2013 is 4 billion dollars, compared with the total assets of the Fed before the financial crisis that is only US \$800 billion. The figure 1 shows that in the period 2008 to 2013 in which the Fed implementing QE policy, total assets continued to increase. In January 2009, the Fed bought \$100 billion per month of MBS. Many funds that flowed into the market is not comparable with the economy's ability to absorb. Thus, many funds were not absorbed or commonly known as excess liquidity. The funds which have not been absorbed make investors drain their funds to emerging market economy. Thus, this study focuses on finding out its effects on developing countries.

The ability of financial institutions to keep the effects of risk in global markets determines the performance of the financial institution. If the financial institution in a country can control the global risk arising from the developed countries, the financial market conditions in developing countries will be better. The financial market risks consist of movements in interest rates, stock price index, three commodity price index, or the exchange rate. In this case, the US QE policy has created excess global liquidity, causing acceleration of US capital flows to developing countries. This is supported by a statement from Fratzscher et al (2013) that the global externality effects of monetary policy decisions in developed countries does affect the developing countries.

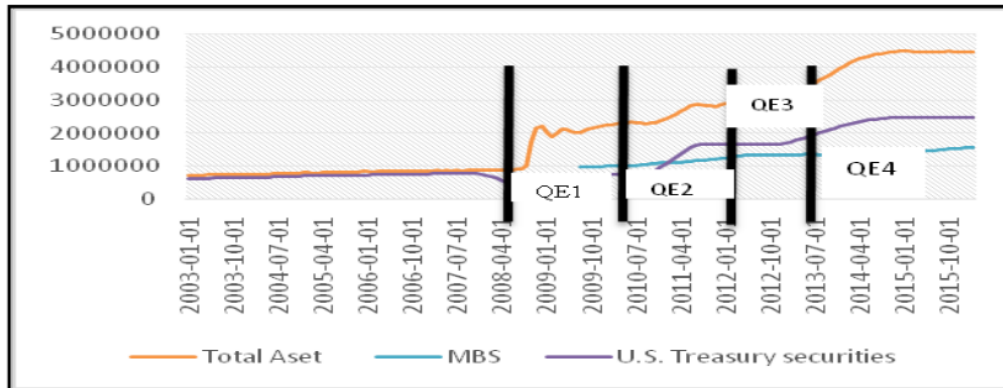


Figure 1. US Treasury, Mortgage-Backed Securities, Total Asset

Source: Federal Reserve Economic Data (FRED)

Indonesia is one of EMEs country in the world which makes trading with United States. Therefore, the supply of the dollar as the international medium of exchange will affect the Indonesian financial market volatility. During the period of The Fed QE, Indonesia also received partnership a substantial capital flows. The average amount of net capital inflow during 2009 until the third quarter of 2014 was 3.2% of GDP, a sharp increase from -0.2% of GDP during 2003-2008. From the total of net capital inflow, 56.4% of it is in the form of portfolio investment. In this case, the total value of the investment portfolio during 2009-2013 was higher 3.3 times than 2003-2008. Therefore, during the quantitative easing program, the growth of money in the United States has extremely growth.

There is a greatly increased on supply of USD since January 2009 from 1555.57 billion dollars to 1672.1 billion in January 2010. Two years after, January 2011, the money supply of USD increased to 1837.3 billion dollars. In other word, during QE policy, the supply of USD reached a level higher to 2488.8 billion dollars. This is supported by findings of Chen et al. (2012) and Cho and Rhee (2013) which shows QE boost the stock prices in Asia. However, after The Fed did the tapering off, JCI was decreasing. QE not only has an impact on the stock market but also on the exchange rate. In the short term, an increase in the money supply of a country leads to currency depreciation which relative to other currencies (Krugman, Obstfeld, & Melitz, 2012).

Nevertheless, empirical studies of the spillover effect by US QE policy to Indonesia's economy are still relatively limited. So far, most of the literatures just see the impact of QE on the developed countries and emerging Asia, as research conducted by Morgan (2011), Robert Jarrow (2014), and Volker Wieland (2009). In addition, the existing research analyzes the implications of QE on the rupiah. Some other studies examine the impact of this QE to ASEAN in a specific context, as research by Pastipatkul P. et al. (2016) showed a positive relationship between the QE program to financial market of ASEAN - 5 (Thailand, Indonesia, Singapore, Philippines, and Malaysia). The empirical study by Ahmed and Zlate (2014), Morgan (2011), Chen et al. (2012) and Cho and Rhee (2013) asserts that the United States of QE has increased the capital inflow in the form of portfolio investment to EME countries of Asia (including Indonesia) and Latin America.

Joyce (2011) examined the relationship of quantitative easing by the Bank of England to bond yield. He suggests that the monetary policy of developed countries has large spillover effects to the economies of developing countries. However, the previous studies only focused on the impact of QE in the economy of developed countries. This led the debate about the relevance of empirical findings on whether there is an impact of monetary policy of developed countries to developing countries or not¹. For an open economy country like Indonesia, no one has analyzed more

¹Another study conducted by Rayza (2014) indicated a negative correlation between the announcement of QE by the index of banking stocks, especially in Europe and the UK.

detailed about volatility in financial markets before, during, and after the QE policy. Upon this consideration, the author assess that the spillover effect of QE on Indonesian financial market volatility is an issue that is relevant and timely to learn. Therefore, this study tries to investigate the relationship between JCI volatility, exchange rate and yields on government bonds with the Fed QE. In this case, the VAR model is highly recommended to determine the relationship between variables in the study.

This study focused on how the US's quantitative easing effect on Indonesia's financial markets during the period May 2003 to February 2016 using the empirical data. The contribution of this study to the literature is twofold. First, this study examines the role of US quantitative easing program on Indonesia's financial market by using a vector autoregressive (VAR) model. It finds that US quantitative easing significantly effects the exchange rate market. Second, this study identifies how the Indonesian financial markets respond to the USD supply shock during the quantitative easing program.

The rest of this study is organized as follows. Section 2 describes theoretical framework and literature review. Section 3 introduces the methodological framework and data. Section 4 discusses empirical results. Finally, section 5 presents the conclusions and recommendations.

2. Review of Literature

In portfolio theory, it states that both of risk and return should be considered with the assumption that there is a formal framework for measuring them. The portfolio theory begins with the assumption that the rate of return on securities in the future can be estimated and risk is determined by the variation of return distribution. With certain assumptions, portfolio theory produces a linear relationship between risk and return. Portfolio theory assumes that rational investors refused an increase in the risk without an increase in the expected return. The relationship between acceptable risk and expected return is the basis for lending and investment modern decisions. The greater in risk of an investment or a loan, the greater the required return to cover such risks.

Based on the theory of Interest Rate Parity (IRP), if the US faced the excess supply of money, the interest rate will be decreased. Consequently, if the emerging countries have a higher interest rate than the US, the currency of the emerging country will be increased. Through applying the QE policy, the amount of money in the US will increase. Thus, the interest rates decline and the US dollar will depreciate. Furthermore, if Emerging countries have a higher rate of return during the QE, the foreign investors will have invested heavily into that country in real sector investment or portfolio. Several studies have also tried to examine the implications of the US QE policy towards other countries, such as Morgan (2011) that examines the impact of The Fed's LSAPs on the economy of the Asian financial markets. The results show that LSAPs does not have a significant impact on financial markets and inflation. However, based on the event study analysis about the effects of LSAPs Federal Reserve states that the Korean currency (Won) is strengthened and bond yields lower in Indonesia.

To select the investment, the investors need to identify which securities that have high return and low risk. In other word, the selection of these securities is influenced by the risk preferences, the patterns of cash requirements, and tax status². In fact, it is difficult to build a portfolio that consists of all the investment opportunity. The solution is the investors can use a representative (proxy), namely market index. Generally, QE not only has benefits for the US economy, but also has consequences, especially for developing countries (EME), through global liquidity and capital flows. There are differences in capital flows to the Asia-Pacific region at the time of the advent of QE and before the advent of QE. Pastpipatkul P. et al. (2016) show that the Asia-Pacific region has high growth rates and the stability of political-economy after the advent of QE. Recently, the global economic integration becomes the main driver of financial development in Asia, such as the presence of capital markets, decline in capital inflow, barriers and restrictions on foreign exchange, and the adoption of a flexible exchange rate, to increase opportunities for investment. There is a significant evidence that the QE program has an impact on emerging markets in Asia. Chen et al. (2012) and Cho and Rhee (2013) find a significant impact of the US QE, in terms of lowering bond yields economies of Asia, the increase in stock prices, and the country's currency appreciated against the dollar.

Driffill (2016) examined the effect of QE on the economy through the portfolio balance. The result found that the US quantitative easing down the bond yields, boosted the stock prices, appreciate the exchange rate in emerging Asia. For exchange rate, QE causes the depreciation of domestic exchange rate. Klaus-Jürgen Gern (2015) proved that QE causes the depreciation of exchange rate in the US and UK. However, QE in Japan had no significant effect to yen. Meanwhile, In Europe, QE is less effective in stimulating the growth and increasing the inflation. Prisecaru (2015) states that the QE policy in Europe is too short to measure influence. For developing countries, the impact of QE on economic growth, financial markets, inflation, and the deficit of balance of payments are difficult to identify on statistic base. Pastpipatkul P. et al (2016), Drewth Q (2015), Yutaka Kurihara (2012), Klaus-Jürgen Gern (2015), Bowman et al (2014) showed that QE is positively associated with bond yields in Asia.

²Husnan (2003) stated that the portfolios mean as a set of investment.

Miskhin (2009) in asset demand theory, if US interest rates is below the interest rates on EMES countries, the demand for stocks or bonds in EMES countries will increase. Another expert, Salvatore (2011) states that the capital would flow to countries that have a higher return than the other countries, then capital would flow out from US to Indonesia due to lower interest rates in the US. Thus, if the capital inflows to the emerging market countries, then the stock price will rise. Furthermore, Miskhin (2009) concluded that the exchange rate is determined by the interaction between supply and demand for currency in the foreign exchange market. Higher money supply will cause a drop in domestic currency. In other words, if the QE program causing the dollar amount increases, the value of the dollar will depreciate against other currencies. In this case, the factors that influence the exchange rate are a relative price level, barriers to trade, preferences for domestic goods to foreign goods, and productivity. There are several hypotheses in this research; (1) US Quantitative Easing has positive effect on stock prices; (2) Quantitative Easing has positive effect on bond yields; (3) US Quantitative Easing has negative effect on the exchange rate volatility.

3. Methodology

The data used are monthly time series data during period May 2003 to February 2016. The period is determined based on the quantitative easing policy in the United States. The monthly data are used because the data can capture the movement and give a more precise analysis. The data were obtained from Thomson Reuters DataStream, Indonesia Economic and Financial Statistics, and FederalReserve.org. The unit of measurement of the data used is quite varied. All variables are measured in logarithms except for the government bond yields which is expressed in percentages.

This study uses a Vector Autoregressive (VAR)³ model to estimate data. The estimation techniques preceded by several standard measures such as stationary test or stationary stochastic process (Ajija et.al, 2011) and determination of the optimal lag with lag order selection criteria. Sims (1980) states that if there is a simultaneous relationship between variables observed, the variables should be treated equally, no more endogenous and exogenous variables. The development in the VAR model is done through the establishment of restrictions among variables in the system equation. The restriction or limitation is intended to separate the movement of the endogenous variables into several components based on the underlying shock. The VAR is used to prove an economic theory or to find theoretical foundations from a shock (Bilmeier and Bonatot, 2002).

The VAR model that used in this study consists of five variables with five equations. They are money supply M2 as a proxy of the availability of shock from quantitative easing policy in the United States, Jakarta Composite Index (JCI) as a proxy of the condition of stock market in Indonesia, the exchange rate of rupiah against the USD, and the yield on the 10-year government bond yield as a proxy of the condition of bond market in Indonesia. The specification of the VAR model in reduced form is,

$$A_0 X_t = A(L) X_{t-1} + B \varepsilon_t \quad (1)$$

Where X_t is a vector with four variables (M2_AS, JCI, EXCRATE, and GYD); A_0 is a contemporaneous relation among variables; $A(L)$ is a finite-order matrix polynomial with the lag operator L ; ε_t is a vector of structural disturbance; and B is a non-zero diagonal matrix. Basically, there are several ways to place restrictions on the VAR model, such as long run restriction, impact, and sign restriction. This restriction helps to identify the models and to insert the basic theory into the model.

The US money supply variable is regarded as independent variable, so that the variables that can influence money supply shock is a shock in the money supply itself. The shock in Jakarta Composite Index, exchange rate, and yields on government bonds are considered unable to influence the money supply shock. Thus, the first equation in the VAR system is as follows:

$$e_{M2AS} = b_{11} \varepsilon_{M2AS} \quad (2)$$

Shock on Jakarta Composite Index is affected by US money supply shock. The Jakarta Composite Index is the first variable that responds to that shock, thereby shock of Jakarta Composite Index is affected by money supply shock and the shock of Jakarta Composite Index itself.

$$e_{IHSG} = b_{21} \varepsilon_{M2AS} + \varepsilon_{IHSG} \quad (3)$$

$$e_{extrate} = b_{31} \varepsilon_{M2AS} + b_{32} \varepsilon_{IHSG} + \varepsilon_{extrate} \quad (4)$$

³The VAR model is a development of the VAR model that was first introduced by Christopher Sims (1980).

$$e_{gy} = b_{41} \varepsilon_{M2AS} + b_{42} \varepsilon_{IHSG} + b_{43} \varepsilon_{exrate} + \varepsilon_{gy} \quad (5)$$

In addition, the author give an additional restriction which is diagonal elements $b_{11} = B_{22} = \dots = B_{55} = 1$, so that the equation system becomes over-identified. These additional restrictions are normalized models to facilitate the interpretation where reduced form disturbance (e) will be compatible with structural shock (ε). This normalization is merely scaling that does not change the essence and the interpretation of estimation result. Thus, the VAR system specifications used are as follows with a total of 10 restrictions:

$$\begin{bmatrix} e_{M2AS} \\ e_{IHSG} \\ e_{exrate} \\ e_{GY} \end{bmatrix} = \begin{bmatrix} e_{M2AS} \\ e_{IHSG} \\ e_{exrate} \\ e_{GY} \end{bmatrix} \begin{bmatrix} 1 & 0 & 0 & 0 \\ b_{21} & 1 & 0 & 0 \\ b_{31} & b_{32} & 1 & 0 \\ b_{41} & b_{42} & b_{43} & 1 \end{bmatrix} \quad (7)$$

To ensure the validity of the final model used, stability testing of model is needed with conditional the root lies inside the unit circle (absolute unit root less than one). If the condition is stable, it can be done with the next step which is Impulse Response Function (IRF) and Variance Decomposition (VD).

4. Result and Analysis

The testing procedure conducted to test the stationarity data is Augmented Dickey-Fuller test (ADF) and Phillips – Peron test. From stationary testing, the results obtained indicate that all variables are stationary at first difference. Furthermore, the estimated VAR model followed by determining optimal lag length in model. Determination of the optimal lag length is important in modeling the VAR. If the optimal lag entered is too short, it could not explain the dynamism of the whole model. The test results of lag length in the VAR by inserting a lag to include = 4, shows that optimal lag length⁴ is 2.

Further testing is the cointegration test by Johansen cointegration test (Johansen Test of Cointegration) to test whether there is a long-term relationship in the analysis that will use the VAR model. Testing is done by comparing the value of the Max-eigenvalue statistic with critical value at $\alpha = 5\%$. Based on the value of the Max-eigenvalue statistic on Johansen cointegration test, it can be concluded that there is no cointegration relationship among the variables in the long term. The VAR estimation results may not provide a comprehensive analysis because the evidences that examine a significant relationship among the variables are very limited. Analysis of the VAR model in this study can focus on relationship of financial market variable with money supply. The results show that the supply of USD can affect the rupiah against the dollar significantly and negatively. However, there is no evidence that the supply of the USD affect stock market and government bond yields. From the coefficient, the impact of M2 to JCI and GY (government yield) is positive, but not statistically significant.

Estimating the impulse response function is to examine the impact of shock of innovation variable to other variables. The estimation using the assumptions that each of innovation variables do not correlate with one another, so that a shock effect may be direct⁵. Besides, being able to determine the effect and duration of the shock, the IRF approach can also be used to determine how long the shock effect will end. The results for the 10 days of the IFR analysis are shown in Figure 2. In the figure, the response of change in each variable is a result of new information measured by 1-standard deviation. The vertical axis on the graph represents the value of response or growth of each variable, while the horizontal axis represents the time or the period after the shock, which in this case served for 10 periods ahead.

Figure of impulse response will show a response of a variable due to shock from other variables until some period after the shock. If figure of impulse response shows the movement that getting closer to the point of equilibrium (convergence) or return to the previous equilibrium, it means that the response of variable of a shock will disappear, so that the shock does not leave a permanent effect on these variables. In figure 4, it shows the effects of responses received by JCI, government bonds yield, and the exchange rate due to USD supply shock in 10 periods. The IRF graph (a) shows the response of JCI to USD supply shock. The supply of USD as a proxy quantitative easing negatively affect the stock index (JCI) over the next six months, but it had no impact in the long term. It is because the impact will be end after six months and stable for the next month. This means that increasing supply of money in United States did not cause the increasing in JCI. This is confirmed by the data which show that the sharp decline in stock index (JCI) preceded by the slump of global stock market. It appears at the same time with the risk on

⁴ Based on Schwartz Criterion (SC), Hannan-Quinn Information Criterion (AQ), Likelihood Ratio (LR), and Final Predictor Error (FPE).

⁵ Furthermore, to determine how the shock effect of a variable to other variables and how long the effect of the shock, it will be tested through the approach of Impulse Response Function (IRF).

sustainable global economic recovery and various US economic indicators which are giving mixed signal indication on the ongoing economic recovery.

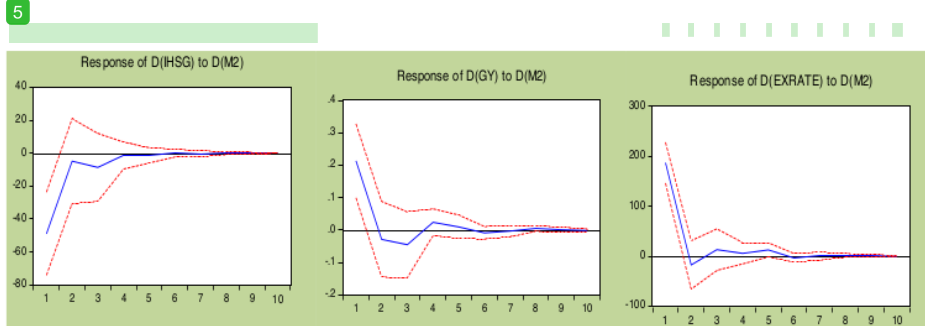


Figure 2. Impulse Response Function

The condition above responded by market participants to achieve the benefits which causing the fall of some global stock markets. In domestic stock markets, this condition become worse by fundamental condition of issuers that rated poor, so that triggering selling action by local and foreign investors. High selling pressure is felt in the middle of controlled inflation, the fall of interest rates, and the relatively stable exchange rate. At the same time, the foreign investors also adjust the position of their stock portfolio in developing countries stock markets. In addition, the condition of micro-structural issuers deemed not strong enough to encourage market participants to sell stock. The financial report of issuers also showed not good enough performance. It shows by the high financing needs of the company to finance its capital expenditures.

The figure (b) above shows the response of government bond yields to the supply of dollars. The relationship between government bond yields and dollar supply is positive in the short term. The bond yields in rupiah are still relatively high compared to other countries in the region of Asia. Bond yields spread are also relatively higher than other Asian countries. This is still the main attraction for foreign investors to invest in Indonesia. The increase in dollar supply will increase government bond yields for two months, then declined in the third month and rose back up to achieve the stability in seventh month⁶.

The figure (c) shows that when USD supply (M2) increase, the exchange rate of the rupiah appreciated until the seventh month, it continues until achieve the stability in the eighth month. In terms of the movement of the rupiah against the US dollar, the IRF reveals that when the supply of USD increase, then rupiah will strengthen against the USD. Increasing in supply of money in the United States led to The Fed interest rate decline. Assuming interest rates EME is unchanged (fixed), investors tend to prefer to invest abroad like in EME countries including Indonesia. The capital will outflow to Indonesia. Consequently, the value of the dollar will depreciate. The weakening of the USD directly make an appreciate of rupiah. During October 2009, the exchange rate of rupiah with subdued volatility (BI, 2009). The economic recovery which increasingly prevalent in many areas and quite solid of domestic economic fundamentals improve the risk appetite of investors in the Indonesian economy.

Then in September 2013, Morgan Stanley, a global investment bank, puts Indonesia into one of the countries that has the most vulnerable currency, including Brazil, India, Turkey and South Africa. Indonesia has a relatively high dependence on foreign funding for the current account deficit, mainly in the form of short-term portfolio inflows. Therefore, it is very vulnerable for domestic currency to fluctuate.

The normalized global economic encourages stance of investor's risk aversion. Optimism on global financial markets is reflected by improvement in risk perception that driven by intensity of the tightening liquidity in the money market. In the global banking sector, the perception of risk is also still in a downward trend. Positive developments in the financial markets of developed countries impact on financial markets in Asia. This condition triggered capital inflows into the regional financial markets, including Indonesia. The price index in the various regional stock exchanges increased. In addition, the exchange rate of the countries in the region recorded as strengthen as the impact of foreign capital inflows.

After analyzing the dynamic behavior through impulse response, the characteristic of model can be examined through variance decomposition. The variance decomposition is used to draw up forecast error variance of a variable, which is how big the difference between the variance before and after shock, either the shock which comes from the shock itself or shock coming from other variables. Then, the variance decomposition is used to see the

⁶The tendency of US investors is to hold the stock bonds with foreign currency (Burger and Warnock, 2007)

relative influence of each variables studied to other variables outside this model. The variance decomposition of forecast error equation system provides information on how big a role of each variable in explaining variation of the particularly variable in the VAR system.

The changes in the supply of USD have a bigger role in explaining the change of EXRATE (the exchange rate) compared to JCI and GY (government bond yield). The bankruptcy of financial firms like Lehman Brothers in 2008 caused panic, so investors pulled money out of the market and push the flight to quality. This caused the drop on stock index of DJI to the lowest point. The number of companies in the United States and Europe that facing a liquidity crisis and investor panic caused decrease in value of JCI.

The results of variance decomposition analysis indicate that the forecast error variance of changes in JCI in the first period, 99.44% of variability is determined by the change itself and in subsequent periods tend to decrease though still in a high level. Besides, as much as 9.55% in the first period of JCI variability are explained by the movement of the M2 and it will continue to increase until it reaches 9.74% to tenth period. This relates to the quantitative easing policy in the United States who play a role in influencing the JCI movement. Although in estimation of the VAR, changes in the supply of USD as a proxy of QE does not have a significant influence but the analysis above shows the impact of QE on the JCI movement in Indonesia. Until 10th period, the forecast error variance of JCI can be explained by the change itself of 89.78%, this suggests that the change in the stock price index in Indonesia is more influenced by investor behavior than any other factors. While forecast error variance of movement GY (government bond yields) in the first period, 65.46% of variability is determined by the change itself, while changes in exchange rate IDR / USD did not contribute at all in the first period, but in the next period variability bond yields could be explained by changes in exchange rate IDR / USD, and it is higher up while the contribution from itself decreasing.

When compared with the change of exchange rate IDR / USD, changes in USD supply (M2) has a higher contribution in explaining the variability of changes in Government bond yields. The forecast error variance of change in exchange rate IDR / USD is different from the forecast at JCI and GY. The results show that changes in exchange rate IDR / USD is more influenced by changes in the supply of the USD compared to its own moving. This is consistent with the results of the VAR estimation because the changes in exchange rate influenced only by the supply of USD. If there is an increase in the money supply in the United States, the investors are likely to flow the capital to Indonesia. Because US interest rates are relatively lower than the interest rate in the other country, the investors will be interested to invest in the stock market. It causes an increase in demand of Rupiah in Indonesia. This will make the Rupiah appreciated against the US dollar. Thus, the QE influences the foreign exchange market. This condition showed that the changes in exchange rates IDR / USD more explained by macro variables compared with JCI and GY.

5. Conclusion

The results of this study showed that there is no cointegration and dynamic relationship between quantitative easing program and financial market in Indonesia. The impact of QE policy significant and negative affect the movement of exchange rate market, but it has not significant effect on changes in stock market and bond market.

This conclusion is consistent with the fact that the Indonesian financial market is still strongly influenced by foreign financial markets, so if there is a shock in global financial market, that will easily cause panic among domestic investors. Bank Indonesia, as policy makers, send clear signals to stand ready to supply the foreign exchange and at the same time buy the bonds that foreign investors wish to unwind, and thus avoiding herding behavior and contagion of escalating capital reversals. Moreover, the intervention is a way to bring about the objective of monetary stability to be consistent with maintaining financial system stability. By stabilizing the foreign exchange market and government bond market, the intervention helps in stabilizing the overall financial markets.

Further research may extend our analysis by adding some other relevant variables, such as changes in interest rates and macroeconomic fundamental. To get more specific description associated with the problem, the analysis of the data can also be directed to the semi-quantitative method (a blend of quantitative and qualitative methods), so that the statistical facts can be synchronized with the behavioral aspects.

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