S. S., Vietha Devia

Article

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The Correlation of Exchange Rate and Inflation and Its Effect on Stock Markets. Case Study on Consumer Good Index Indonesia: 2004 – 2017

Vietha Devia S.S.

School of Economic, Huazhong University of Science and Technology, Wuhan, P.R. China, 430074/Faculty of Economics and Business, University of Brawijaya, Malang, Indonesia, 65144, E-mail: vietha.devia@ub.ac.id

Abstract

The purpose of this study is to see whether inflation and exchange rates have a two-way relationship and their influence on the stock market case study on the Consumer Good Index. In the first session the author wrote the introduction of the important of researching this topic, session two literature reviews about exchange rates, inflation and the stock market, the third session about the research methods and the fourth session described the overall discussion. The data used are monthly time series data from 2004 to 2017 and the estimation model used the VAR model. The exchange rate used Rupiah against U$D and inflation measure used Consumer Price Index. The results show that inflation do not affect the exchange rate, but the exchange rate significantly affect the inflation rate. As the stock market, there is a continuing decline or negative movement when inflation increased. Then when the Rupiah exchange rate continues to show a depreciating trend, the movement of the stock market seems to be decreasing.

Key words

Inflation, exchange rate, stock market, consumer good index

JEL Codes: C58, D53, E22, E31

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1. Introduction

Investment is one of the sectors supporting GDP. Investment generally contributes more than 20% of GDP in a country. In developed countries like China, investment contributes above 30% (OECD, 2015). Between 2004 - 2010 the investment rate in China reached 44.1% of GDP (Lardy and Solomon, 2012) and overall from 2000 to 2015 investment in China reached 47% of GDP (Anonymous, 2018). While for developing countries such as Indonesia, investment is the second strongest sector supporting economic growth (Nasution, 2012). In 2012 investment contributed 33% to GDP (Ginting and Aji, 2015). While overall from 2000 to 2015 investment plays a role towards GDP on average by 36% (Anonymous, 2018).

One of the tools to invest is stock through the stock market. Macroeconomic variables related to inflation and exchange rates in open economic countries are thought to affect performance on the stock market. A study by Kibria *et al.* (2014) shows that inflation, the exchange rate, the money supply, GDP per capita and GDP have a significant positive impact on the Stock Market in Pakistan (KSE 100 index). However, Talla (2013) shows that currency inflation and depreciation have a significant negative effect on stock prices. Another result by Khan *et al.* (2012) shows only the exchange rate variable significantly affects the capital market, while inflation does not have a significant effect.

In addition to allegedly affecting the stock market, inflation and exchange rates are also thought to correlate with each other (Edwards, 2006) shows that exchange rates affect inflation, especially for countries that adhere to inflation targeting policies. Achsani *et al.* (2010) reinforced that exchange rates affect inflation significantly in Asian countries. Conversely, the UK import price inflation and exchange-rate change have a significant relationship across subsamples (Allsopp *et al.*, 2006). However, Abdurehman and Hacilar (2016) shows the results that there is no relationship between exchange rates and inflation because there is no PPP in Turkey.

Purchasing Power Parity (PPP) theory can explain the correlation between inflation on exchange rates which described in the law of one price. The law of one price (LOP) states that for a given commodity a representative price adjusted by exchange rates and allowance for transportation costs will prevail across all countries (Yang *et al.*,, 2000). Baffes (1991) Reinforced that Law of One Price prevails at all market. Besides, there is strong evidence of convergence of the Law of One Price (Agustina *et al.*, 2008) and have not declined by as much as one might expect (Froot *et al.*, 2001). So if there are price differences between countries due to differences in inflation, the demand for goods changes and prices will adjust automatically until equality in prices occurs.

Conversely, exchange rates can also influence inflation through investment variables. If the currencies country experiences depreciation pressure, investors will have negative expectations. It makes the level of uncertainty increase both in business and economic activities (Maryatul, 2016). Patro *et al.* (2014) reinforced that if devaluation occurs, there will be a decrease in the returns on the stock market, causing investment and capital accounts to decline. The monetary authorities generally increased the interest rates to attract the investors. Higher interest rates which increase costs in the credit sector can triggering inflation. Assuming the same real rate of return, the difference in interest rates among the countries reflects differences in inflation expectations (Shalishali and Ho, 2002).

Another path that can explain the impact of exchange rate changes on inflation is through the pass-through effect. When there is exchange rate depreciation, the price of imported goods increases, causing prices in the domestic market to increase and trigger inflation. (Savoie-Chabot and Khan, 2015) Said the price of finished goods imported into Canada and prices of imported inputs used to produced domestic goods caused prices in Canada to become more expensive. Ito and Sato, (2006) shows real evidence that pass-through to import prices was quite high in the crisis-hit economies. Even Ca' Zorzi, Hahn and Sanchez (2007) find robust evidence for a positive relationship between the degree of the ERPT and inflation.

Indonesia as one of the developing countries has fluctuating macroeconomic variables including inflation and exchange rates. In the 1997 crisis, Indonesia's inflation reached above 60%. Post-crisis, the inflation rate is said to be stable after 2000, which is an average of 4-8% per year. For exchange rates, Indonesia has implemented a different exchange rate regime for a certain period. In the era of President Soeharto's administration, Indonesia adopted a fixed exchange rate regime. After the 1997 crisis, the central bank released the value of the rupiah based on the strength of market demand and supply. This regime is known as free-floating exchange rates.

One sector that is allegedly affected by changes in exchange rates and inflation is the stock market. In Indonesia, the stock market is generally assessed by the Indonesian Composite Stock Price Index (ICI). According to Thobarry (2009), since the establishment of the free-floating exchange rate system, the ICI movement seems to follow the movement of the rupiah exchange rate against the dollar or conversely the movement of the rupiah seems to follow the ICI movement. While inflation has a significant impact on Indonesia Stock Exchange (Zulfa and Tan, 2009), (Yogaswari *et al*., 2012). Rosalyn (2018) reinforced that inflation has negative influences to Composite Stock Price Index.

ICI has nine joint-stock sectors, one of them is Consumer Good Index. In the past few years, the Consumer Good Index recorded very rapid growth even surpassing the manufacturing industry. In 2016 the Consumer Good Index exist at 2,324.281, and on 13th January 2017, it exists at 2,338.454 (OJK, 2017). Behind its rapid growth, the consumer goods industry sector is very sensitive to changes related to inflation. According to Nur (2012), regarding inflation, the prices of goods and services will increase rapidly. Based on the background, the author tries to investigate further the relationship between inflation and exchange rates and their impact on the capital market, with a case study on the Consumer Good Index in Indonesia.

2. Literature review

2.1. Definition of Inflation and Exchange Rates

Generally, inflation is a price increase that occurs continuously. The price increase cannot be said as inflation if it only occurs at certain times. Case (2002) defined inflation as an increase in the overall price level, simultaneous and continuous. Inflation measurement generally uses the Consumer Price Index (CPI). CPI is composite good whose price is measured by a cost-of-goods index (Patel and Villar, n.d.). While according to Lebow and Rudd (2006) changes in individual prices of goods and services combined to measure generally price changes. Stanford (2008) defined CPI as the overall price level that consumers paid for goods and services which they purchase.

Economists distinguish exchange rates into two, namely the real exchange rate and the nominal exchange rate. Szulczyk (2014) simply define the ratio of one currency with another currency. In real terms, (Garín *et al.*, 2018) defined the exchange rate as a measures amount of domestic goods of one good foreign purchase while the nominal exchange rate measures the domestic currency of one currency of foreign currency purchase (Garín *et al.*, 2018) or the price of one unit of a currency regarding another currency (Laurence, 2011).

2.2. Indonesian Stock Market and Consumer Good Index

The stock market in Indonesia is traded on the Indonesia Stock Exchange (IDX). IDX is a combination of the Jakarta Stock Exchange and the Surabaya Stock Exchange. The Jakarta stock exchange first opened in 1912 during the Dutch East Indies government with the name Amsterdamse Effectenbeurs. On July 13, 1992, the Jakarta Stock Exchange was

privatized and became PT. Jakarta Stock Exchange. Then in 2007, the Surabaya Stock Exchange joined the Jakarta Stock Exchange and changed its name to PT. Indonesia stock exchange. The Consumer Goods Index showed the highest growth and was the ICI's highest support for three consecutive years. According to Alfred in Fuad (2013), the consumer goods sector contributes to more than 50 percent ICI growth. In 2016 the Consumer Good Index reached 2,324.28, ranking first as ICI support (OJK, 2017). In 2017 Consumer Good Industry was ranked first at 2,861.39 (DB & Hana, 2017).

3. Methodology of research

The data used is secondary data from the Central Bank. The inflation measure used is the Consumer Price Index, while the exchange rate used is the rupiah against the U$D. The author uses Vector Autoregression (VAR) to analyze the model. The VAR model can examine reciprocal relationships between variables and not complicated for the determination of exogenous or endogenous variables. VAR is a tool where a variable is influenced by its variables time-lagged itself values plus current and past values of the remaining n-1 variables (Chen *et al.*, 2011) and (Stock *et al.*, 2001). The VAR model of this study is as follows:

$$CGI_t = \propto + \beta_1 CGI_{t-1} + \beta_2 CGI_{t-2} + \cdots + \delta_1 ER_{t-1} + \delta_2 ER_{t-2} + \cdots + \gamma_1 CPI_{t-1} + \gamma_2 CPI_{t-2} + \cdots + \varepsilon_t$$

$$ER_t = \propto + \beta_1 CGI_{t-1} + \beta_2 CGI_{t-2} + \cdots + \delta_1 ER_{t-1} + \delta_2 ER_{t-2} + \cdots + \gamma_1 CPI_{t-1} + \gamma_2 CPI_{t-2} + \cdots + \varepsilon_t$$

$$CPI_t = \propto + \beta_1 CGI_{t-1} + \beta_2 CGI_{t-2} + \cdots + \delta_1 ER_{t-1} + \delta_2 ER_{t-2} + \cdots + \gamma_1 CPI_{t-1} + \gamma_2 CPI_{t-2} + \cdots + \varepsilon_t \quad (1)$$

The procedures for the VAR test series are as follows:

a. Test stationarity.

In the analysis of time series data, if the data is not stationary, it means that the data contains an autocorrelation element. Whereas in OLS regression, must fulfil the assumption of no-autocorrelation so that the results are not biased. According to Nachrowi and Usman (2007), a data set is declared stationary if the mean and variance of the time series data do not change systematically over time, or some experts state the mean and variance are constant. For stationarity tests, the author uses the Augmented Dickey-Fuller test or commonly known as the unit root test.

b. Optimum Lag Length

In testing VAR it is important to determine the lag length to explain the overall dynamics of the model. According to Gujarati (2003), the number of lags in the same variable, each estimated coefficient will not be statistically significant, which is possible because of multicollinearity. The selection of the lowest value in Akaike or Schwarz is one of the optimal lag selection methods.

c. Cointegration test.

In non-stationary data, the next step after making the first distinction is the cointegration test to see whether the data has a long-term balance or not. Cointegration is done to avoid spurious regression. In this study, cointegration tests were carried out using Johansen's Cointegration Test method.

If all steps after the VAR test are fulfilled, then the estimation of the VAR model can be done. An estimated set of VAR models are as follows:

a. Granger Causality: to see which variables occur first, or in other words to see which variables cause other variables to change in the VAR model.

b. Impulse Response Function: to see the impact of the shock on changes between variables and examine the dynamics between variables.

c. Decomposition Variance: to see the comparison of changes between variables.

4. Results and Discussions

4.1. Statistical Test Results

4.1.1.Stationarity Result

According table 1, the ADF test carried out with the real data shows that there is no significant variable at the 5% real level, which means that the data is not stationary. Next, the ADF test is carried out in the first derivative (first differencing). The

test results obtained in the first difference indicate that all variables have significantly rejected H_0 at the real level of 5%. These variables no longer have root units and are stationary in the first derivative.

Table 1. ADF Value Statistics for Exchange rate, CPI, Consumer Good Index

Variable	Real Data	First differencing
Exchange Rate	-1.478064	-11.83688
IHK	-2.596010	-12.772832
Consumer Good Indeks	-1.911516	-13.55590

Source: output VAR

4.1.2. Optimum Lag Length

Based on the results in Table 2, between lag 0 to 12, the 8th lag is the lag with the smallest AIC value so we can know that the optimal lag used for the Vector Autoregressive (VAR) model is in lag 8.

Table 2. Optimum Lag Length

Lag	AIC
0	40.97012
1	31.52774
2	31.58073
3	31.65235
4	31.72807
5	31.66708
6	31.50251
7	31.48849
8	31.46599*
9	31.52750
10	31.60895
11	31.71830
12	31.80852

Source: output VAR

4.1.3. Cointegration

Table 3 and Table 4 shown that the value of the trace statistic and Maximum Eigenvalue is smaller than the critical value with a significance level of 5%. It means that the null hypothesis which states that there is no cointegration cannot be rejected and the alternative hypothesis which states that there is cointegration is rejected. Thus, indicate that between the exchange rate, Inflation and Consumer Good Index does not have a long-run equilibrium.

Tabel 3. Optimum Lag Test

H0	Eigen value	Trace Statsitic	5% Critical Value	Prob.
r = 0	0.092579	18.60337	29.79707	0.5217
r ≤ 0	0.021589	3.739559	15.49471	0.9234
r ≥ 0	0.002613	0.400275	3.841466	0.5269

Source: output VAR

Tabel 4. Johansen's Contegration Test (Maximum Eigen Statistics)

H0	Eigen value	Max Eigen Statistic	5% Critical Value	Prob.
r = 0	0.092579	14.86381	21.13162	0.2985
r ≤ 0	0.021589	3.339284	14.26460	0.9216
r ≥ 0	0.002613	0.400275	3.841466	0.5269

Source: output VAR

4.1.4. VAR Analysis

a. Granger Causality Test

At this stage is the parameter estimation stage for the VAR model. In the second stage, the lag length is 8 which consist of 3 variables so that the model produced to be estimated is VAR (8). The following is the equation of the VAR model:

$$ER_t = 553.4309 + 1.050646\ ER_{t-1} - 0.218266\ ER_{t-2} + 0.366689\ ER_{t-3} - 0.014931\ ER_{t-4} - 0.283112\ ER_{t-5} - 0.045415\ ER_{t-6} - 0.278589\ ER_{t-7} + 0.401091\ ER_{t-8} + 0.500184\ CPI_{t-1} - 15.98267\ CPI_{t-2} + 5.246906\ CPI_{t-3} + 5.123103\ CPI_{t-4} + 3.029116\ CPI_{t-5} + 0.926567\ CPI_{t-6} - 5.625534\ CPI_{t-7} + 4.173535\ CPI_{t-8} + 0.123834\ CGI_{t-1} - 0.502720\ CGI_{t-2} + 0.617207\ CGI_{t-3} - 0.028010\ CGI_{t-4} + 0.418886\ CGI_{t-5} - 1.075992\ CGI_{t-6} + 0.100331\ CGI_{t-7} + 0.330115\ CGI_{t-8}$$

$$CPI_t = 11.318234 + 0.004691\ ER_{t-1} - 0.004892\ ER_{t-2} - 0.001988\ ER_{t-3} - 0.002923\ ER_{t-4} - 0.002299\ ER_{t-5} + 0.012533\ ER_{t-6} - 0.007528\ ER_{t-7} + 0.002770\ ER_{t-8} + 0.879391\ CPI_{t-1} + 0.105473\ CPI_{t-2} - 0.022067\ CPI_{t-3} + 0.004734\ CPI_{t-4} - 0.101088\ CPI_{t-5} + 0.002497\ CPI_{t-6} + 0.069408\ CPI_{t-7} - 0.044585\ CPI_{t-8} + 0.012573\ CGI_{t-1} - 0.016013\ CGI_{t-2} + 0.000667\ CGI_{t-3} + 0.000209\ CGI_{t-4} - 0.006420\ CGI_{t-5} + 0.006115\ CGI_{t-6} - 0.000181\ CGI_{t-7} + 0.001596\ CGI_{t-8}$$

$$CGI_t = -259.9329 - 0.024230\ ER_{t-1} + 0.023999\ ER_{t-2} - 0.020883\ ER_{t-3} + 0.050082\ ER_{t-4} - 0.037176\ ER_{t-5} + 0.068873\ ER_{t-6} - 0.037306\ ER_{t-7} - 0.008585\ ER_{t-8} + 0.698862\ CPI_{t-1} + 2.281460\ CPI_{t-2} - 1.604437\ CPI_{t-3} - 0.140904\ CPI_{t-4} + 0.331931\ CPI_{t-5} - 0.344218\ CPI_{t-6} + 0.928199\ CPI_{t-7} - 1.262352\ CPI_{t-8} + 0.883984\ CGI_{t-1} + 0.016514\ CGI_{t-2} - 0.060444\ CGI_{t-3} + 0.069253\ CGI_{t-4} - 0.188175\ CGI_{t-5} + 0.228798\ CGI_{t-6} - 0.044924\ CGI_{t-7} + 0.065050\ CGI_{t-8}$$

Table 5. F and Probability Values in the Granger Causality Test

H_0	Lag 8	
	F stat	Prob
CPI does not Granger cause Exchange Rate	1.19471	0.3070
Exchange Rate does not Granger cause CPI	8.03036	9.E-09
CGI does not Granger cause Exchange Rate	0.54132	0.8238
Exchange Rate does not Granger cause CGI	2.58382	0.0115
CGI does not Granger cause CPI	0.39101	0.9238
CPI does not Granger cause CGI	1.20579	0.3005

Source: output VAR

Using the F table comparison at a 5% significant level as shown in Table 5, the results of the Granger causality test that tested the relationship between 3 (three) pairs of variables showed the following results:

First, H_0 which states the CPI does not affect the ER accepted. However, it is different from the case with H_0 which states that ER does not affect the CPI which has a prob value <0.05 so the result rejected H_0. It can be concluded that the two variables do not have a two-way relationship.

Second, H_0 which states the CGI does not affect the ER accepted. However, the difference with H_0 ER does not affect the CGI which has a prob value <0.05 so the result rejected H_0, but at the real level of 1% (prob value> 0.01) the result accepted H_0. This means that the relationship between the two variables can still be said to have a two-way relationship.

Third, H_0 CGI does not affect CPI accepted. Similarly, H_0 CPI has no effect on CGI which has a value of prob> 0.05 so that H_0 is also accepted. This means that the relationship between the two variables can be said to have a two-way relationship.

b. Impulse Response Function

According to the IRF result, the ER responded very well to changes in its history variable (ER) in the first two months to reach 315,173 %. However, this increase did not last long because there was a decline in the third period to the end of the period. The ER response to changes in INF shows a positive value in the first two months to reach 1.73%. However, in the third month, ER responded negatively to INF changes to the end of the period. The response of the ER to changes that occur in the CGI. The ER response shows a positive value in the first two months to reach 6,511%. However, in the third, fourth and eighth month, ER responded negatively to CGI changes. Fluctuations saw until the 19th month. Furthermore, the response value appears to decline until the end of the period.

The CPI response to ER changes tends to fluctuate to a constant and tends to decrease and gives a negative response starting in the month of 47 to the end of the period. The CPI response to changes in its history variable tends to fluctuate. Response values tend to decline until the 58th month and increase again starting in the 59th month and tend to be constant until the final period. Furthermore, the CPI response to CGI changes tends to decrease and give a negative response and not be too volatile. The response from the CGI to the changes that occurred in the ER showed a fluctuating value of the impulse response up to the 46th month and subsequently decreased to the last period. Even the negative response is shown in the first month to the sixth month.

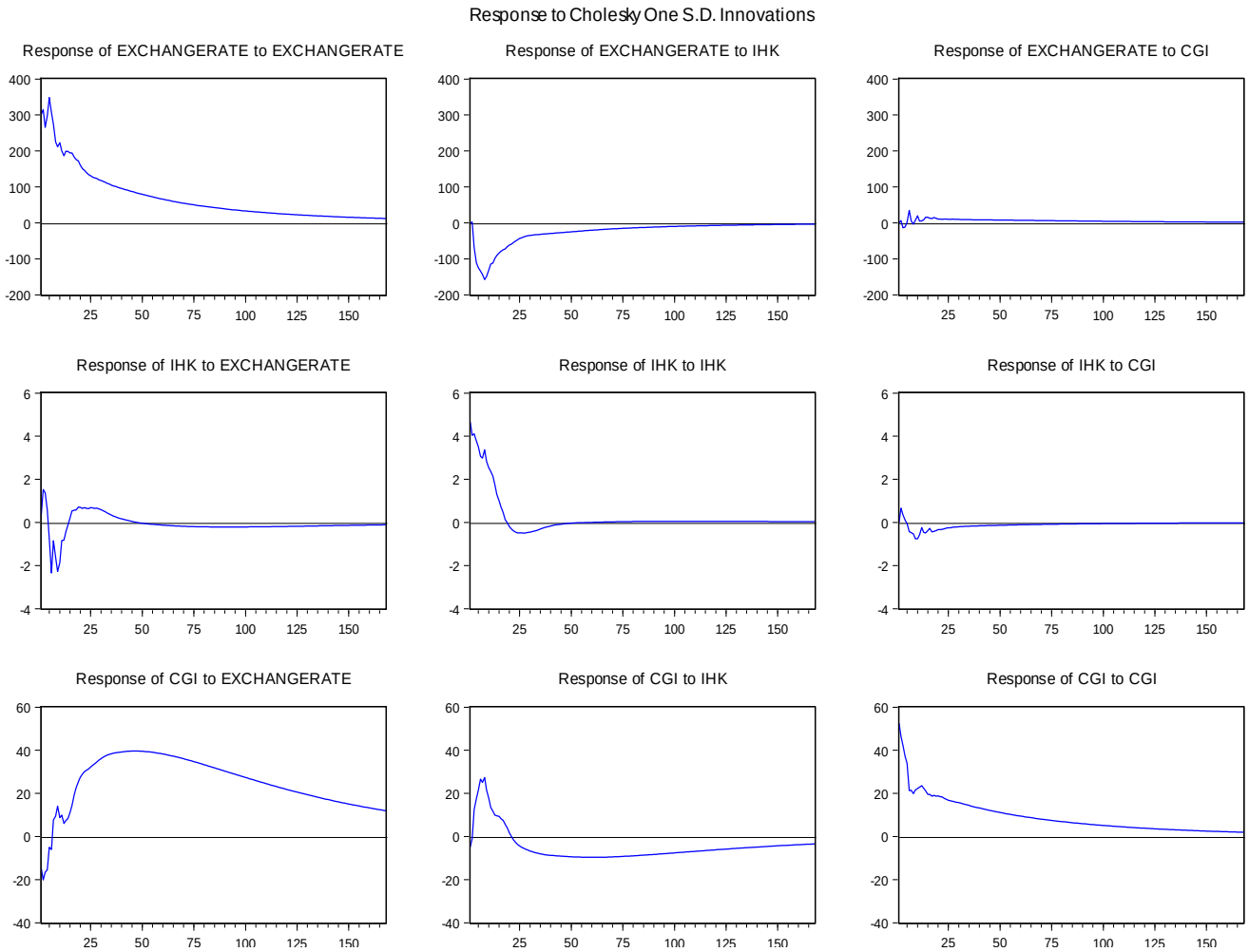


Figure 1. Output Impluse Response Function

CGI response to CPI changes showed the negative response seen in the first two months. The response has increased and fluctuated in the third to the ninth month. Furthermore, the response value has decreased periodically to give a negative response again until the last period. The highest value in the CGI response to changes in itself obtained in the first period which reached 52.58%. Then the value undergoes fluctuating changes and tends to decline until the end of the period.

c. Variance Decomposition

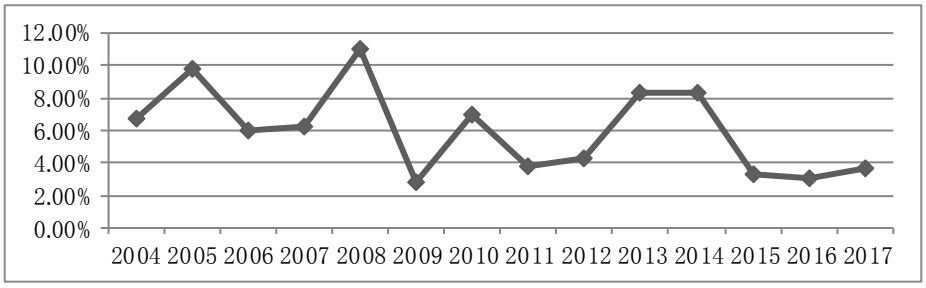
Based on the results of the variance decomposition test can be explained in the variable contribution rate the biggest contribution comes from the variable itself. In the first month, the variance exchange rate itself contributes 100%. In the second month to the end of the period, the variance exchange rate itself decreases until it reaches 85.88%. Similarly, the CPI is more likely to be influenced by the historical CPI variable itself. The historical CPI variable itself provides a variance of 99.46% and also decreases from the second month to the end of the period. At the CGI, the variance of historical CGI contributed the largest variance 91.90% in the first month and decreased from the second month to the end of the period to 15.40%. However, starting in the 34th month the contribution of the variance from the exchange rate is greater than the CGI variance itself. In the 34th month, the contribution of variance from the exchange rate is 45.88% and continues to increase until the end of the period to 77.25%. While the CPI variable contributed 43.02% in the 34th month and continued to decline until the end of the period to 15.04%.

4.2. Economically Discussion

4.2.1. The Effect of Inflation on Rupiah Exchange Rates

Based on the results of statistical tests, the inflation and exchange rates in Indonesia do not have a two-way relationship. The test results show that inflation does not affect the exchange rate, but the exchange rate affects inflation. The result is in

line with research in Indonesia, among others, conducted by (Zalogo, 2017), which states that inflation does not affect the Rupiah exchange rate.



Source: Central of Bureau Statistic, processed.

Figure 2. Annual Inflation Rate

Figure 2 shows the annual inflation movement in Indonesia. In 2008 inflation showed a high rate of 11.08%. The increase in world crude oil prices pushed up the CPI in Asia, including Indonesia, which further led to increases in food subsidy in the government budget (Shikha *et al*., 2008) and rising in domestic fuel prices (Djunedi, 2014). In 2008 world oil prices reached USD 140 per barrel. Besides, inflation also occurs due to crop failure in some commodities so that supply decreases. According to Suseno and Astiyah (2009), inflation can also be caused by a disruption in the supply side (a supply shock) for example in the event of a dry season which results in crop failure.

In 2009 inflation in Indonesia declined. However, in 2010 inflation again skyrocketed to 6.96%. It occurs because of the government's decision to raise the basic electricity tariff in April 2010 contributed to inflation (Komaidi and Rakhmanto, 2010). In 2011 inflation declined again to the level of 3.79% and slightly increased in 2012 to 4.30%. According to Bank Indonesia (2011), the low inflation was supported by the increase in export performance and the role of investment as a source of growth, a decrease in unemployment and poverty as well as equal distribution of regional economic growth.

In 2013 and 2014 inflation again skyrocketed to 8.36% and 8.38%. An increase in basic electricity tariffs and domestic fuel prices caused high inflation at that time {Formatting Citation}. Until November 2014 the price of gasoline reached Rp. 8,500 from the original price of Rp. 4500 (Burke *et al.*, 2017). In 2015 until 2017 inflation is relatively stable in the range of 3% - 3.6% per year. According to (Bank Indonesia, 2016) stable inflation occurred due to the decline in fuel oil prices, so that administered price inflation declined. High inflation has an impact on several variables including:

a. Economic growth rate

Economic growth is a process of increasing the sizes of national economies especially GDP per capita (Haller, 2012). According to research conducted by Thanh (2015), inflation affects GDP growth significantly and negatively. There is a downturn in GDP growth in the fourth quarter of 2008 due to the global crisis and rising inflation. In 2009 although inflation declined sharply, economic growth was still low at 4.5%. It was due to the contraction in exports due to the global crisis.

In 2010 economic growth recorded a growth of 6.1%, even though inflation was recorded higher than in 2009 which were 6.96%. It is in line with research that states that low inflation (below 10%) will be a simulator for the economy (Septiatin *et al.*, 2016). In 2011 and 2012 when inflation was lower, economic growth was recorded at 6.5% and 6.3%. In 2013 and 2014 when inflation began to rise, economic growth declined to 5.2% in 2013 and 5.01% in 2014. The decline in economic growth continued to occur until 2015 to 4.45%. In 2016 and 2017 the Indonesian economy showed a recovery. Economic growth increased to 5.1% and 5.2%. According to (Beck, 2017) Indonesia showed reliability as volatility returned to global financial markets. More investment and export is the key growth drivers for 2017 and 2018 (Kacaribu *et al.*, 2018).

b. Unemployment

The occurrence of inflation has an impact on unemployment. It is in line with Alisa (2015) who stated there is a relationship between inflation and unemployment. Even the two variables positively related in the long run (Haug and King, 2011). In Indonesia, inflation can affect unemployment in the following years. As shown by Dwi Indah and Nurcahyaningtas (2016) that inflation affects the unemployment rate for the next three years.

In 2005 unemployment increased from 9.6% in 2004 to 11.24% due to inflation. The inflation was due to an increased in world oil prices and caused a rise in fuel prices by 126% (Ariwibowo *et al.*, 2008). The increase in inflation which was not

followed by an increase in unemployment occurred in 2008 - 2009. In that time the President at that time poured large fuel subsidies so that domestic fuel prices were cut (Anonymous, 2018a). The impact is economic growth remains high at 6.0% in 2008 and 6.4% in 2009 (Anonymous, 2008).

The unemployment rate returned to increase in 2011 as a result of rising inflation in 2010. This figure has declined again in 2012 - 2014 and has risen again in 2015 as a result of the high inflation that caused an economic slowdown in late 2014. According to BPS Deputy Balance and Statistical Analysis, Suhariyanto in (Ariyanti, 2015) the unemployment rate rose 320 thousand people during the year from August 2014 to the same period 2015.

c. Poverty

In theory, an increase in inflation can increase poverty due to falling real income. In 2008 when inflation was at the level of 11.06%, the poverty rate was quite high at around 34.96 million people. In 2009 the poverty rate decreased to 32.53 million people in line with the decline in inflation to 2.78%. This decline continued until 2012 along with the comparatively stable inflation. According to (OECD, 2015b), in 2012, 14.3% of the rural population were below the rural poverty line, compared to only 8.4% of the urban population.

The poverty rate tends to stagnate in 2013 and tends to increase from the end of 2014 to 2015 along with the increase in inflation. Sugiartiningsih and Shaleh (2017) shows the results study that inflation affects poverty the same direction significantly. The Head of BPS stated that the number of poor people in September 2013 was 28.55 million people, an increase of 480 thousand compared to March 2013 (Gera, 2014). This increases in poverty continued until 2015. The poverty rate shows a declined in 2016 and 2017 as inflation declined.

4.2.2. The Effect of Exchange Rate on Inflation

Based on the results of statistical tests show that the exchange rate significantly affects inflation. It is in line with research in several countries which shows the results that exchange rates affect inflation and are positively related (Asad *et al.*, 2012) and (Berument and Pasaogullari, 2003). When the exchange rate depreciates (increases), inflation also increases. Further (Wang, 2013) emphasizing that exchange rate appreciation (the RMB in his research) prove to be able to control inflation.

Indonesia experienced several ups and downs on its exchange rate. Many factors caused the depreciation of the Rupiah exchange rate; most came from abroad. The worsening fiscal deficit triggered the depreciation of the exchange rate in 2005 due to rising world oil prices and a large amount of capital outflow due to the increase in the Fed rate from 2.25% to 4.25% (Edwards and Sahminan, 2008). In 2008 there was a global crisis and Indonesia was one of the countries affected (Ginting and Aji, 2013). The worsening of fiscal deficit (Tambunan, 2010), volatility in capital flows, and increased on investment risk due to the global crisis (Warjiyo, 2013) is possible as a cause of pressure on the Rupiah exchange rate.

The trend on depreciation of the Rupiah exchange rate has an impact on inflation volatility. The Exchange Rate Pass-Through (ERPT) can explain the effect of the changes in exchange rate on domestic inflation. ERPT can be defined as a change in import prices reflected in the domestic currency as a result of changes in exchange rates. (Hossain, 2005) stated that the price of tradable goods in domestic currency might change in response in changes on the exchange rate and price of tradable goods in foreign currency.

In theory, when the exchange rate depreciates, imported goods will become more expensive and increase prices in the domestic market. Rising prices of imported goods occur in both consumer goods and raw materials or capital goods (Hussein, 2013). Furthermore, the impact after causing inflation will reduce economic productivity and economic growth (Murtala *et al*., 2017). Suprihati (2017) also reinforced that an exchange rate significantly positive inflation. In 2008 the depreciation of the Rupiah was followed by an increase in inflation. Also, there was a decline in the value of exports in 2009 (Ginting, 2013). Pasrun *et al.* (2017) also stated that the depreciation of the Rupiah against the USD in the short and long term negatively affected the export value.

On the import side, there was an increase in 2008. Based on Central of Statistic Bureau, the increase in imports occurred significantly in 2008 to 129 197.3 million USD from the previous 74 473.4 million USD in 2007. It is in line with Isnowati and Mulyo (2017) that shows that exchange rate depreciation is positively related to import value. Even (Ito and Sato, 2006) stated that when the crisis occurred, Indonesia suffered a big hit regarding the degree of exchange rate pass-through to import prices.

In 2013 the Rupiah depreciated considerably and continued until 2015 to Rp. 13,787.50 from Rp. 9,367 in 2012. The slipping of the value of the Rupiah began in mid-2013. It had a direct impact mainly on high imported food prices (Anonymous, 2014). In 2013 inflation increased to 8.36% and 8.38% in 2014. One of the dominant factors in high inflation is exchange rate volatility through the pass-through effect (Syarifuddin *et al*., 2014). The biggest inflation contribution came

from the foodstuff subsector by 11.35% in 2013 and 10.57% in 2014. Safuan (2017) Stated the volatility of the exchange rate also had a negative impact on the value of exports. It is reflected in decline in export from USD 190 020.3 million in 2012 to USD 182 551.8 million in 2013.

4.2.3. The Effects of Inflation and Exchange Rates on the Consumer Good Index

First, based on the VAR result, the CGI response to inflation continues to show a negative response. Positive responses only shown in the third to the ninth month. In general, the stock index or stock prices is the leading indicator of assessing performance in the stock market. Inflation instability that affects stock market fluctuations can lead to market confusion and panic. The results of the author's research are in line with several previous studies. One of them also showed that the inflation has a negative effect on the stock market (Kumar and Puja, 2012). The same thing happened in United States since the second world war when inflation was at the level of 2%-5%, the inflation created a natural bias in the performance of the stock market (Geetha *et al*., 2011). In Thailand during the crisis, inflation which increased very sharply caused instability in the stock market (Limpanithiwat and Rungsombudpornkul, 2010).

The instability of the stock market due to inflation means that the risk faced by investors is also higher. Marshall in William et al. (2016) said that inflation could decline the growth of stock price because, in the long run, it can create negative expectations for investors. The high risk makes investors withdraw their funds and invest in countries with lower inflation rates. Furthermore, Feldstein (1980) in Antonakakis *et al.* (2016) inflation can reduce real stock prices and the tax code also creates distortionary effects between depreciation costs and capital gains.

Second, based on the VAR result, the CGI response to changes in exchange rates showed a negative response in the first month to the sixth month. The result is consistent with several previous studies. Research from Hussein and Mgammal (2012) shows the results that in the short term the exchange rate affects the stock market positively and in the long run negatively affects the stock market. Lim and Sek (2014) show significant relationship between exchange rate and stock market. Rahman Nidar and Diwangsa, (2017) reinforced that its relation is negative. During the research period, the Rupiah exchange rate depreciated from Rp. 8,458.50 / USD in January 2004 to Rp. 9,395/USD in June 2004. Furthermore, the CGI gave a fluctuating response but was still positive for changes in the exchange rate to the 55th month. During this period the Rupiah tended to fluctuate but still showed a tendency to appreciate. The fall in the value of the Rupiah began in the 56th month and continued until the end of the period up to Rp. 13,567.50/USD.

For export-based companies, they have higher competitiveness when the depreciation of currency occurs so that they can produce more returns. However, for companies that are import-import, this increases the cost of production and decreases returns, which negatively affects their shares. So it can be concluded that in theory, the exchange rate can affect the company's overall profit which ultimately can affect stock prices depending on the characteristics of the firm whether based on exports or imports (Agrawal *et al.*, 2010).

Indonesia has a large number of imports regarding imports of raw materials. Even 64% of the national industry depends on imported raw materials (Anonymous, 2016). For the import-oriented country, currency depreciation may have an adverse impact on the domestic stock market by harming import-oriented firms (Latha *et al.*, 2016).

According to Central of Statistic Bureau, from 2004 to 2016, Indonesia's imports of raw materials showed an increase from USD 36 204.20 million in 2004 to USD 100 945.80 million in 2016. Arianti Said that until 2006 the total imports of raw materials reached 77% of total Indonesian imports. Imports of raw materials were dominated by imports of industrial raw materials of USD 18.1 billion, imports of fuels and lubricants (unprocessed) of USD 7.9 billion and imports of fuels and lubricants (processed) of USD 7.1 billion.

Exchange rate movements that have an impact on the stock market in Indonesia have the same tendency as the stock market in several developing countries. As in South Africa, the JSE has been affected by exchange rate movements in recent years (Mlambo *et al*., 2013). Research by (Ouma, 2016) shown that exchange rate has a significant effect on stock Market in Nairobi. Even in developing country like the United States, the volatility of exchange rate has a significant effect on the stock market (Kennedy and Nourizad, 2016).

5. Conclusions

Based on the results of the VAR test, inflation and exchange rates do not have a two-way relationship. Inflation does not affect the exchange rate, but the exchange rate can significantly affect the inflation rate. As for the stock market, there is a continuing decline or negative movement towards changes and increases in inflation. Then the stock market responds to fluctuating changes in exchange rates. However, when the Rupiah exchange rate continues to show a depreciating trend, the movement of the stock market seems to be decreasing.

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