

# The Impact of *Treasury Bills* on the Financial Conditions in Indonesia and Philippines

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## ABSTRACT

This study aims to identify the impact of the United States monetary policy on financial conditions in Indonesia and the Philippines before and after the 2008 global financial crisis. The research type used is associative and descriptive. The data type used is secondary data using time series data in Indonesia and the Philippines from 2004 M1 to 2019 M4. This study uses a *Vector Error Correction Model* (VECM) analysis tool. The variables in this study are treasury bills, exchange rate, and stock price index. The results of this study focused on *impulse response function* (IRF) and *forecast error variance decomposition* (FEVD) tests. The results of this research show that: (1) Shock by T-Bills will be responded positively by Stock Price in Indonesia and the Philippines, (2) The shocks by T-Bills will be responded positively by the Exchange Rate in Indonesia and the Philippines, (3) The shocks by T-Bills will be responded negatively by the Stock Price in Indonesia, while the Stock Price in the Philippines responded positively before the Global Financial Crisis in 2008, (4) The shocks by T-Bills will be responded positively by Exchange Rate in Indonesia and the Philippines prior to the 2008 Global Financial Crisis, (5) The shocks by T-Bills will be responded positively by Stock Price in Indonesia and the Philippines after the Global Financial Crisis in 2008, (6) The shock by T-Bills will be responded positively by Exchange Rate in Indonesia and the Philippines after the Global Financial Crisis in 2008, (7) The shock caused by the Exchange Rate due to T-Bills is responded positively by the Stock Price in Indonesia and the Philippines, (8) Shocks caused by Stock Prices due to T-Bills were responded positively by the Exchange Rate in Indonesia and the Philippines, (9) Shocks caused by Exchange Rates due to T-Bills responded positively by Stock Prices prior to the 2008 Global Financial Crisis in Indonesia and the Philippines, (10) The shock caused by the Stock Price due to T-Bills was responded negatively by the Exchange Rate before the 2008 Global Financial Crisis in Indonesia and the Philippines, (11) Shock caused by the Exchange Rate as a result of T-Bills responded positively by the Stock Price after the Global Financial Crisis in 2008 in Indonesia and the Philippines, and (12) Shocks caused by Stock Prices due to T-Bills were responded positively by Exchange Rates after the 2008 Global Financial Crisis in Indonesia and the Philippines.

**Keywords:** *Treasury Bills, Stock Price Index, Exchange Rate, Global Financial Crisis 2008*

## 1. INTRODUCTION

A prominent phenomenon in the world economy was when the global crisis occurred in 2008. The global crisis in 2008 originating from the United States affected the economy of the entire world, which in turn had an impact on the financial conditions of all countries in the world. This crisis was caused by the existence of bad loans which led to the bankruptcy of financial institutions in the United States, thus affecting the liquidity of the capital market and banking system. So, this phenomenon caused a global crisis in 2008 which had an impact on other countries, especially developing countries

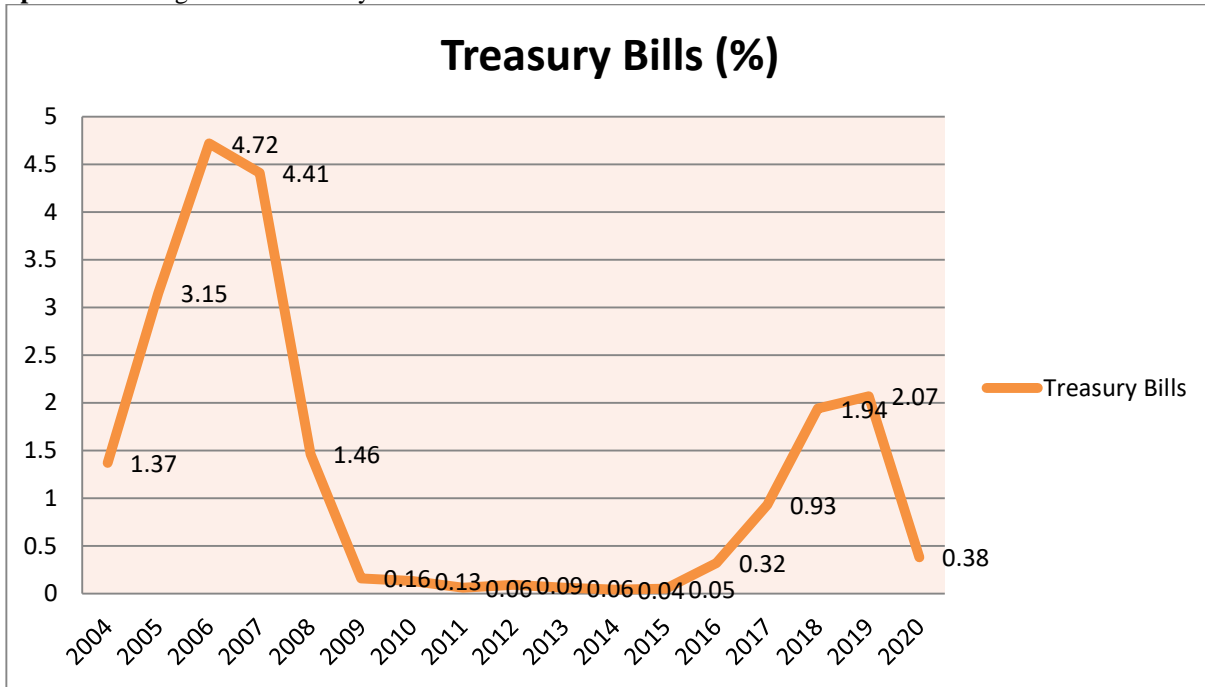
Developing countries or commonly referred to as Emerging Market Countries are countries that have medium-sized economies that are very easily influenced by other countries, especially developed countries. This is due to the unstable economic conditions of developing

countries because economic activity in developing countries is not only caused by internal factors of the country, but can also be caused by external factors originating from other countries, especially from developed countries. So that the United States policy to restore its economy through the monetary route policy will affect the financial conditions in Indonesia and the Philippines

One of the monetary policies issued by the Central Bank is by issuing treasury notes on government or central bank bills. T-Bill is a Government Securities that is used in the short term. The T-Bill is not only issued by the government through the central bank to settle a temporarily insufficient budget. However, T-Bill is also used as a form of open market operation (OPT) for monetary policy. Therefore, by issuing treasury notes, the

central bank can raise short-term funds for the government and absorb surplus liquidity from the financial market at the same time [1]. So that by setting the T-bill interest rate is one of the United States monetary policies to be able to maintain the country's financial stability.

**Graph 1.** Percentage of US Treasury Bills 2004-2020



Source: IMF Data

Graph 1 shows the percentage of US Treasury Bills from 2004 to 2020 fluctuating every year. The graph shows that the percentage rate of Treasury Bills from 2004 to 2006 always increased from 1.37 percent to 4.72 percent. Where the Central Bank of the United States considers that an increase in asset growth will lead to economic growth, so that the US Central Bank attracts investors by increasing the interest rate on T-Bills, so that it will increase bank funds. However, from 2006 to 2016 T-Bills continued to decline to 0.05 percent. This decrease was due to the subprime mortgage loan crisis, so to increase in liquidity, banks will lower the T-Bills interest rate. From 2017 to 2019, the T-Bills interest rate increased from 0.32 percent to 2.07 percent. This is due to the stability of the United States economy. Meanwhile, in 2020 the T-Bills Interest Rate again decreased to 0.38 percent.

The occurrence of fluctuations in T-Bills interest rates from 2004 to 2020 affects the financial conditions of countries in the world, especially Emerging Market Countries. Emerging Market countries are peer countries that have similarities in the financial level of these countries, one of which is Indonesia and the

Philippines. Indonesia and the Philippines have similarities in geographical, governmental and economic conditions. The economic similarity between the two countries can be seen from the per capita income of each country, according to the Ministry of Finance, Indonesia's per capita income in 2020 was US\$ 3,870 while the Philippines' per capita income was US\$ 3,323 that year. This is the financial condition of a country can be seen through the exchange rate, where the exchange rate is the value or price of a country's currency as measured by the currency of another country. Where the value of a country's currency has strengthened compared to other currencies, the value of that country's currency is said to appreciate. Meanwhile, if the value of a country's currency decreases against other currencies, it is called depreciation.

Emerging Market exchange rates tend to be more volatile when compared to the United States. This is because the currency of the United States has a very strong value. The United States is seen as a developed country with the US Dollar being the reference currency for many countries, especially developing countries in terms of international trade and other

activities. So the United States is known to have dominant power over other countries including Indonesia and the Philippines.

Changes in the United States monetary variables that the global economy before and after the 2008 global financial crisis had an influence of exchange rates and stock prices in Indonesia and the Philippines. Either directly or indirectly as outlined in the form of research entitled "THE IMPACT OF UNITED STATES MONETARY POLICY ON FINANCIAL CONDITIONS IN INDONESIA AND THE PHILIPPINES".

## 2. METHOD

### *Purchasing Power Parity Theory*

In the short term, the exchange rate determined by the market is very sensitive to monetary policy, political events and changes in expectations. But in the longer run, exchange rates are primarily determined by the relative prices of goods in different countries. An important implication is the theory of purchasing power parity (PPP) of the exchange rate [2]. Purchasing power parity relates the foreign exchange rate to commodity prices in local currencies in the international market, namely that the foreign exchange rate will tend to decrease in the same proportion as the rate of price increase [3].

Purchasing power parity is a comparison of the ability of a country's currency to buy goods and services. The ratio of the PPP conversion factor to the market exchange rate is the result obtained by dividing the PPP conversion factor by the market exchange rate. This ratio is also known as the national price level. This currency value based on purchasing power parity tells how many dollars it takes to buy a dollar of goods in a country compared to a dollar in the United States. IFE theory states that when the domestic interest rate is higher than the foreign interest rate, the exchange rate will appreciate. On the other hand, when the domestic interest rate is lower than the foreign interest rate, the exchange rate will depreciate [3]. This is influenced by the decrease in investment that enters the country when foreign interest rates increase, so that the supply of currency in dollars will decrease which will make the exchange rate depreciate.

When the relative price of foreign goods increases, consumers will shift from consuming foreign goods to consuming domestic goods because the prices of foreign goods or imported goods become expensive. The relative rate of change between the exchange rates of two countries is equal to the difference in the rate of change in prices of each country:

$$dS/S = dP/P - dP^*/P^*$$

The above equation shows that when the domestic price (P) increases faster than the foreign price level (P\*), there is a depreciation of the exchange rate. when the foreign price (P\*) increases faster than the domestic price level (P) then there is an appreciation of the exchange rate.

### **Stock Market Theories and Concepts**

the stock market encourages investors with surplus funds to invest these funds in additional financial instruments that better suit their liquidity preferences and risk appetite. Better savings mobilization essential for the growth and liquidity efficiency of the stock market economy can help reduce risk and reduce investment costs in projects that do not pay off in the long term. so that investors will not lose access to savings during the investment project because they can quickly and easily sell their shares in a company [4].

According to [5] stock market returns are influenced by exchange rates, interest rates, inflation and oil prices. Stock prices will react very quickly to macroeconomic information. A country's financial system, especially the stock market, is affected by exchange rate volatility, so that global economic conditions affect the stock market [6]. The stock market acts as a monetary policy transmission mechanism so that the relationship between macroeconomic and stock market returns helps policy makers to improve and monitor monetary policy. It also serves as a transmission mechanism by which savings are adequately mobilized and distributed across all sectors of the economy with the aim of realizing inclusive growth. In addition to the performance of the stock market, it has the function of increasing investor confidence in financial institutions and even the entire economy. This will demonstrate the strength and viability of the productive sector and facilitate the allocation of capital, investment and provide companies with an easy way to have access to sufficient and needed capital.

### **Effect of T-Bills on Stock Prices**

Treasury Bills have an influence on Stock Prices in other countries. T-Bills affect Stock Prices in Emerging Market Countries negatively, where when T-Bills interest rates increase, share prices in Emerging Market Countries will decrease. This is because with the increase in T-Bills, foreign investors will prefer to buy T-Bills rather than investing shares in Emerging Market countries. Because T-Bills are one of the debt instruments guaranteed by the government, investors will feel safer by buying T-Bills. When there is uncertainty that causes the volatility of T-Bills, investors who have information about T-Bills will get

greater profits at the expense of small investors who do not have information about T-Bills (Hughes, 2008). In addition, Treasury Bills have several advantages, among others (Hughes, 2008): (1) a high level of security, which is free from default risk (2) an interest rate risk equal to or less than the maturity or duration securities have a comparable value. (3) high liquidity, and (4) most markets are free of private information, so better-informed traders cannot profit at the expense of less-informed traders (i.e. small investors).

(Lee, 2021) states that treasury bonds are the safest place to flee for stocks during the turmoil in financial conditions, namely the US subprime crisis in 2008, because investors prefer to replace safer assets than riskier conditions. Investors will transfer their money from risky stocks to safer and more profitable bonds (Skintzi, 2017). So the relationship between bonds and stocks is negative.

**Effect of T-Bills on Exchange Rates**

According to Hughes (2008) T-Bills serve as one of the main benchmarks for interest rates, inflation expectations, economic forecasts, exchange rates and other financial variables. T-Bills have a negative effect on the exchange rate, where when T-Bills increase, the exchange rate will depreciate because with the increase in T-Bills investors will tend to buy T-Bills which will then decrease or reduce investment in other countries which will ultimately lead to the depreciation of the other country's exchange rate.

According to (Préget & Waelbroeck, 2005) states that Treasury sales or auctions are always carried out repeatedly every week with the same bidder and issue different bills at maturity in independent auctions, so that after the crisis investors saw the US economy falling causing prices to fall. T-Bills auctions have slumped, causing investors to choose to invest in shares rather than buying T-Bills.

So that by decreasing investment in a country, it will cause the exchange rate to depreciate in that country. This is because with a decrease in investment in a country, the economic activities of a country are not going well, which in turn will lead to the depreciation of a country's exchange rate.

**3. RESULTS AND DISCUSSION**

**Unit Root Test**

This study was conducted to find out at what level of differentiation all variables were stationary. In this study, the degree of integration test also used the Augmented Dickey-Fuller (ADF) test. Variable data that is not stationary at the level will be tested to what level of differentiation will all variables be stationary. The following are the results of the integration degree

test using the Augmented Dickey-Fuller (ADF) method on the level and first differences:

**Table 1. Table Of Unit Root Test with The Augmented Dickey-Fuller (ADF) Test Method at The Level and First Different Levels**

Variables	Level	Prob
TB	<i>1st difference</i>	0,0004
TB before crisis	<i>1st difference</i>	0,0032
TB after crisis	<i>1st difference</i>	0,0000
ER INA	<i>1st difference</i>	0,0000
ER INA before crisis	<i>1st difference</i>	0,0000
ER INA after crisis	<i>Level</i>	0,0465
ER PHI	<i>1st difference</i>	0,0000
ER PHI before crisis	<i>1st difference</i>	0,0001
ER PHI after crisis	<i>1st difference</i>	0,0000
IHS INA	<i>1st difference</i>	0,0000
IHS INA before crisis	<i>1st difference</i>	0,0000
IHS INA after crisis	<i>1st difference</i>	0,0000
IHS PHI	<i>1st difference</i>	0,0000
IHS PHI before crisis	<i>1st difference</i>	0,0000
IHS INA after crisis	<i>1st difference</i>	0,0000

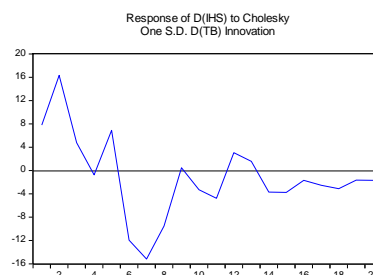
Based on the table above, the variables of Treasury Bills (TB), stock price index (IHS) and exchange rate (ER) have probability values. < 5%, which means that all research data used are stationary at the first difference.

**Impulse Response Function (IRF) Test**

IRF is used to track the effect of changing one standard deviation of one innovation of a variable on the present and future values of another variable in the VECM system of equations. This method can be used to determine the response of an endogenous variable to certain variables.

**Indonesia**

**Graph 2.** Response of Stock Prices and Exchange Rates to Shock caused by changes in T-Bills



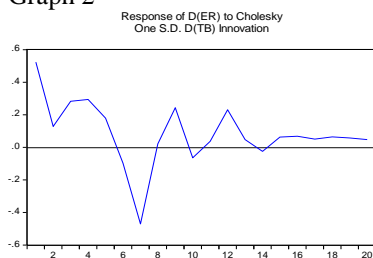
The graph above shows that the response of stock prices to the shock caused by T-Bills (response of D(IHS) to shock D(TB)) in periods 1 to 3 shows a

positive response, while in period 4 the response of stock prices to shocks caused by T -Bills is close to the balance point. Then in period 5 the Stock Price again responded positively to the shock caused by T-Bills, but in period 6 to 9 there was a negative response from the Stock Price to the shock caused by T-Bills where the overshoot of the balance line.

The graph also shows that in periods 9 to 11 there was a negative response and in periods 12 to 13 there was a positive response again, then in periods 14 to 16 there was a negative response from Stock Prices to the shock caused by T-Bills. Then in period 17 to period 20 it moves towards balance. Cumulatively the Stock Price Response (IHS) to the shock caused by T-Bills (TB) as shown in the picture above describes a pattern in the form of a negative response tendency in the middle of the observation period to the end of the period.

The results of the Stock Price IRF on the increase in the Treasury Bill interest rate show that the increase in the Treasury Bill interest rate will have a positive impact on the Stock Price in Indonesia at the beginning of the period, meaning that an increase in the Treasury Bill interest rate will increase the Stock Price in Indonesia. This is not in accordance with the theory which states that when the Treasury Bill interest rate is increased, investors will prefer to buy T-Bills because of the high dollar value which will ultimately benefit investors when selling T-Bills later than investing in Indonesia. Research conducted by [7] states that returns on international stocks are more profitable than returns on Treasury Bills. So investors prefer to invest in shares compared to buying T-Bills. This statement is also supported by research conducted by [8] which states that investors will prefer stock returns that further increase wealth.

**Graph 2**



The graph above shows the Exchange Rate response to shock caused by T-Bills (response of D(ER) to Cholesky D(TB)) at the beginning of period 1 to period 5 showing a positive response but tends to decrease in the period up to period 7 showing a negative response with overshoot from the equilibrium point to periods 8 to 10 again showing a positive

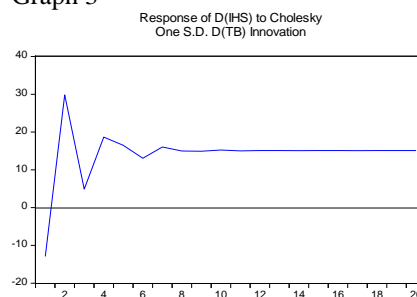
response until period 14 which then increased again and was getting closer to the equilibrium point.

The results of the IRF Exchange Rate against the shock caused by T-Bills showed a positive impact at the beginning of the period, where cumulatively the response of the Exchange Rate to the shock caused by T-Bills is shown in the picture above at the beginning of the shock, responding positively to the shock caused by T. -Bills although tend to decline. So it can be concluded that an increase in T-Bills will lead to an appreciation of the Exchange Rate in Indonesia.

Research conducted by [9] states that countries that have more credit flows will be more sensitive to financial conditions. With the increase in T-Bills will cause investors to increase the purchase of T-Bills which ultimately increases the funds which are then channeled to the public for housing loans. The high amount of housing loan funds provided causes high public demand or causes people to become more consumptive of raw materials, thus causing a demand surplus which in turn increases production which leads to a decrease in raw materials which causes the US to import to meet its demand. High imports led to high funds out of the US, which in turn caused the dollar to depreciate and the rupiah to appreciate. So it can be concluded that the increase in T-Bills causes an increase in the Exchange Rate in Indonesia or the appreciation of the Rupiah.

**Response of Stock Prices and Exchange Rates to Shock caused by changes in T-Bills Before the Global Crisis of 2008**

**Graph 3**



Graph 3 shows that the Cholesky Impulse Response Function of the T-Bills variable on the Stock Price. Seen in the graph above, the response of stock prices to the shock caused by T-Bills (response of D(IHS) to Cholesky D(TB)) tends to fluctuate at the beginning of the period. Where in period 1 showed a negative response but tended to increase until period 2, but in period 3 there was a decrease from the previous period but still responded positively which in the end in period 4 it increased again and finally in period 7 to period 20 it was no longer felt shock from T-Bills. So it can be

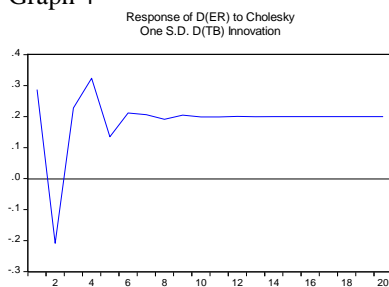


concluded that the stock price stabilized at the end of the period.

The IRF results show that there was a negative response from the Indonesian state stock price before the 2008 global crisis at the beginning of the period, but in the next period the response was positive to the shock caused by T-Bills. So it can be concluded that T-Bills gave a negative shock to Stock Prices in Indonesia before the Global Financial Crisis in 2008. This is because when there is an increase in T-Bills investors will be interested in buying these bonds and attracting investments in Indonesia. Where the investor wants to get a bigger profit, because the higher the interest rate on T-Bills, the higher the interest earned by the investor. This causes a decrease in investment in Indonesia.

The decline in investment in Indonesia is due to investors choosing to invest in the United States because it is more profitable and besides that T-Bills are safer and guaranteed by the government. This is in accordance with the theory which states that when T-Bills increase, stock prices in developing countries will decrease. Research conducted by [10] states that treasury bonds are the safest place to flee for stocks during turmoil in financial conditions, namely the US subprime crisis in 2008, because investors prefer to replace safer assets than riskier conditions. Investors will transfer their money from risky stocks to safer and more profitable bonds [11]. So the relationship between bonds and stocks is negative.

Graph 4



Graph 4 shows that with the Cholesky Impulse Response Function of the Exchange Rate variable the shock caused by T-Bills (response of D(ER) to Cholesky D(TB)). At the beginning of the period the Indonesian Exchange Rate responded positively due to the shock caused by T-Bills, but in the second period there was a negative response to overshoot the equilibrium point 0 (0). In periods 3 to 4 there was an increase and then a decrease in period 5 and then increased again in period 6. But in period 6 the shock caused began to move slowly and finally in periods 9 to 20 it was no longer felt. So it can be concluded that the movement of the Exchange Rate is stable again at the

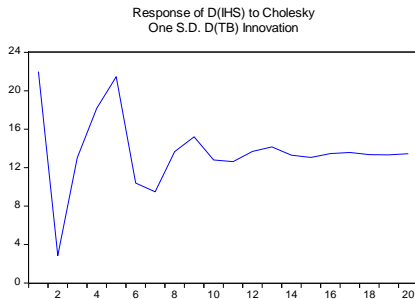
end of the period but is stable above zero (0) which means that the equilibrium point has moved. The new equilibrium point is at the point (0.2).

The results of the IRF showed a positive response from the Exchange Rate at the beginning of the shock caused by T-Bills in the period before the 2008 global crisis. However, in the middle of the period there was a negative response which finally at the end of the period the shock caused began to stabilize with a positive response. So from the test results it can be concluded that the Exchange Rate gives a positive response to the shock caused by T-Bills. When T-Bills increase, the Indonesian Exchange Rate will also increase. The phenomenon of increasing Exchange Rates due to an increase in T-Bills before the global financial crisis in 2008 has the same conditions as Indonesia's results if it is processed as a whole for the period 2004M1 to 2019M12. This shows that the condition of the Indonesian Exchange Rate before the crisis tends to be the same as the condition of Indonesia as a whole.

Research conducted by [9] that countries that have more credit flows will be more sensitive to financial conditions. With the increase in T-Bills will cause investors to increase the purchase of T-Bills which ultimately increases the funds which are then channeled to the public for housing loans. The high amount of housing loan funds provided causes high public demand or causes people to become more consumptive of raw materials and assume that large-scale development, especially in the property sector, will improve the country's economy, causing a demand surplus which in turn increases production which leads to a decline. raw materials that cause a US to import to meet its demand. High imports led to high funds out of the US, which in turn caused the dollar to depreciate and the rupiah to appreciate. So it can be concluded that the increase in T-Bills causes an increase in the Exchange Rate in Indonesia or the appreciation of the Rupiah Value.

**Response of Stock Prices and Exchange Rates to Shock caused by T-Bills Changes after the Global Crisis of 2008**

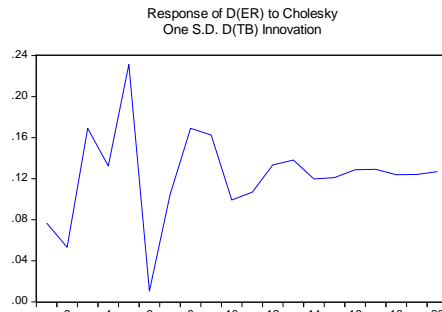
Graph 5



Graph 5 shows the response of stock price movements to the shock caused by T-Bills (response of D(IHS) to Cholesky D(TB)). At the beginning of the period the shock caused a positive shock. Where in period 1 shows a positive response but tends to decrease which moves towards the equilibrium point but only reaches the point (2:3) in period 2. In periods 3 to 5 the stock price again gives a positive response with continuous increases. In the period 6 to 13, stock price response movements were always fluctuating but remained on the positive side. Until the period 14 to 20 there is no longer any response from the Stock Price to the shock caused by T-Bills. The graph shows that at the end period the Stock Price response to the shock by T-Bills was stable above 0 (zero) which means that a new equilibrium point occurred which caused a shift in the equilibrium point. The results of the Stock Price IRF on the increase in T-Bills in other words show a positive impact on the movement of Stock Prices in Indonesia after the 2008 Global crisis.

This means that an increase in T-Bills will be followed by an increase in Stock Prices in Indonesia. The increase in stock prices in Indonesia was due to the global financial crisis in 2008 caused by bad loans, so investors prefer to keep investing in Indonesia rather than buying T-Bills. This is because at the time of the crisis the T-Bills interest rate continued to decline every year where in 2008 the T-Bills interest rate was 1.46% and continued to decline to 0.16% in 2009, until 2010 still decreased to 0.13%. The decline in T-Bills interest rates every year causes investors not to be interested in buying T-Bills and prefer to invest in Indonesia.

Graph 6



Graph 6 shows the movement of the Exchange Rate against the shock caused by T-Bills (response of D(ER) to Cholesky D(TB)). At the beginning of the period the Exchange Rate against the shock caused by T-Bills responded positively and tended to fluctuate until the end of the period. However, in period 3 there was a very significant increase in the response of the Exchange Rate to the shock caused by T-Bills, in period 5 was the highest response until period 6 there was a very high decline almost to the equilibrium point but still responded positively.

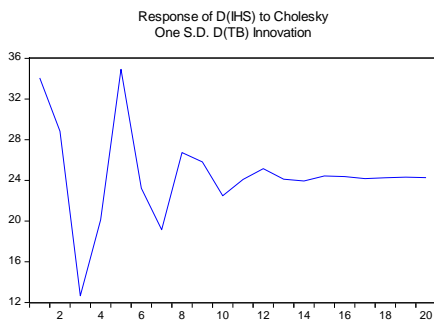
During the period 6 to 8 the Exchange Rate still responded positively to the shock caused by T-Bills with a significant increase, until the end of the period the Exchange Rate still responded to the shock caused by T-Bills. The movement of the Exchange Rate caused by the shock caused by the T-Bills gave a positive response, it can be seen in the graph at the end of the response period the Exchange Rate began to stabilize with a movement above the zero-balance point (0) which eventually formed a new balance point. The results of the IRF concluded that the shock caused by T-Bills had a positive impact on the Exchange Rate in Indonesia after the 2008 global financial crisis.

The appreciation of the Indonesian Exchange Rate was due to the aftermath of the US subprime crisis, the US economy fell which eventually weakened the dollar, so T-Bills were increased to attract investors to buy bonds. However, investors prefer to invest in Indonesia, which is more profitable than buying US bonds. This is due to the Appreciation of the Rupiah Exchange Rate during the shock caused by T-Bills after the 2008 global financial crisis due to investors preferring to invest in Indonesia rather than buying T-Bills, this was due to the downturn in the US economy at the time of the crisis. So that investors are less interested in investing their capital or shares in the US and choose to invest in Indonesia which ultimately causes the appreciation of the Rupiah.

**Philippines**

**Response of Stock Prices and Exchange Rates to Shock caused by changes in T-Bills**

Graph 7



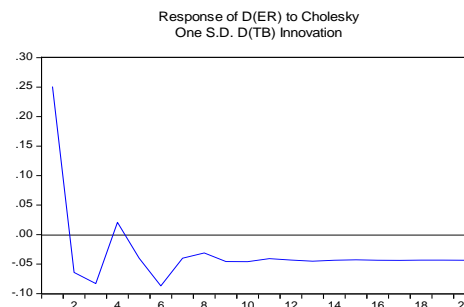
Graph 4.7 shows the stock price response to the shock caused by T-Bills (response of D(HIS) to Cholesky D(TB)). At the beginning of the period, the response from the Stock Price to the shock caused by T-Bills decreased from period 1 to 3 but was still on the positive axis. However, in periods 3 to 5, the shock caused by T-Bills is still very large, where there is an increasing trend. In the middle of the period, namely in periods 6 to 7, the shock caused by T-Bills still affected the movement of stock prices, but this movement was smaller than before. Until then it increased again in period 8 and decreased again in periods 9 to 11.

In period 12 the Stock Price still responded to the shock caused by T-Bills, but the response given was very small which can be seen in the graph there was only a slight movement until at the end of period 13 to 20 the shock caused by T-Bills was no longer felt by the Stock Price. Graph 4.7 shows that at the end of the period, Stock Prices no longer responded to the shock caused by T-Bills where the movement of the graph tends to be stable above the zero axis (0), thus creating a new equilibrium point.

The results of the IRF indicate that there was a positive response from the shock caused by T-Bills to the stock price in the Philippines. This shows that overall, investors prefer to invest in the Philippines compared to buying T-Bills in the United States. This is because developing countries are able to be stable in crisis conditions. So that investors are more interested in investing compared to buying T-Bills for profit. This is not in accordance with the theory which states that when T-Bills are increased, investment in Developing Countries will decrease. Research conducted by [7] states that returns on international stocks are more profitable than returns on Treasury Bills. So investors prefer to invest in stocks compared to buying T-Bills.

This statement is also supported by research conducted by [8] which states that investors will prefer stock returns that further increase wealth.

Graph 8



Graph 8 shows the Exchange Rate response to the shock caused by T-Bills in the Philippines before the global financial crisis in 2008. Where at the beginning of the Exchange Rate period responded positively to the shock caused by T-Bills, but tended to experience a decline or overshoot in period 2 and 3 from the zero balance point (0) so it is on the negative side. In period 4 the Exchange Rate responded positively to the shock caused by T-Bills, but this positive response was not as large as the response given at the beginning of the period. In periods 5 and 6 the Exchange Rate responded negatively to the shock caused by T-Bills. This can be seen where in that period there was a decline. Meanwhile, in periods 7 and 8, the Exchange Rate still responded to the shock from the T-Bills, which eventually stabilized the movement of the Exchange Rate on the negative side, which meant that a new equilibrium point occurred. The results of the IRF show that at the time of the shock caused by T-Bills the Exchange Rate gave a positive response at the beginning of the period, so it can be concluded that the Exchange Rate in the Philippines gave a positive response to the shock caused by T-Bills.

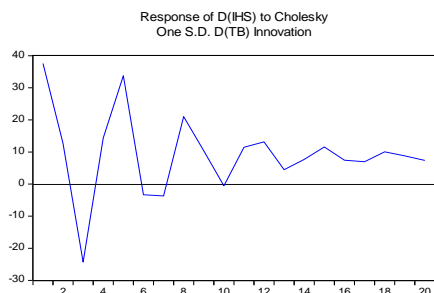
The response given by the Exchange Rate to the shock caused by T-Bills in the Philippines is the same as that of Indonesia. Research conducted by [9] countries that have more credit flows will be more sensitive to financial conditions. With the increase in T-Bills will cause investors to increase the purchase of T-Bills which ultimately increases the funds which are then channeled to the public for housing loans. The high level of housing loan funds provided causes high public demand or causes people to become more consumptive of raw materials, thereby causing a demand surplus which in turn increases production which leads to a decrease in raw materials which causes the US to import to meet its demand. High imports led to high funds out of the US, which in turn



caused the dollar to depreciate and the peso to appreciate. So it can be concluded that the increase in T-Bills causes an increase in the Exchange Rate in the Philippines or the appreciation of the Peso Value.

**Response of Stock Prices and Exchange Rates to Shock caused by changes in T-Bills Before the Global Crisis of 2008**

Graph 9



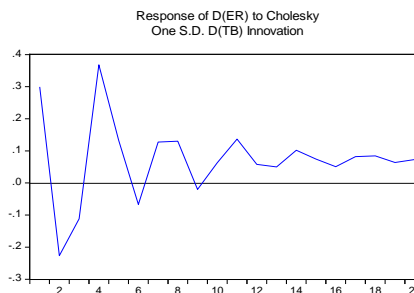
Graph 9 shows the response of stock prices to the shock caused by T-Bills in the Philippines in the period before the global financial crisis in 2008. The period used in this table is 20 periods. At the beginning of the period the Stock Price responded positively to the shock caused by T-Bills, but in periods 2 and 3 there was a negative response where there was a decrease in overshoot at the zero balance point (0). In periods 4 and 5, the Stock Price still responded strongly to the shock caused by the T-Bills, where there was a positive response that can be seen in the graph with an increase in the Stock Price. In period 6 there was a decline in which the Stock Price responded negatively to the shock caused by T-Bills. But this time it was only slightly below the zero-balance point (0) and finally in period 7 the movement remained stable.

In period 8 the Stock Price again responded to the shock caused by T-Bills with a positive response where there was an increase in the chart and again a decline in periods 9 and 10, but in period 10 it touched the equilibrium point until finally at the end of the period the Stock Price always responded to the shock. generated by T-Bills are fluctuating but tend to respond positively. So it can be concluded that the response of Stock Prices to T-Bills did not leave a permanent influence on stock prices in the Philippines in the period before the 2008 global crisis.

The results of the IRF show that at the beginning of the period the Stock Price responded positively to the shock caused by the T-Bills. This is not in accordance with the theory which states that when T-Bills increase, stock prices in developing countries will decrease. Based on Graph 9 the results of the IRF show that

when there is an increase in T-Bills, the stock price in the Philippines will also increase.

Graph 10



Graph 10 shows the Exchange Rate response to the shock caused by T-Bills in the Philippines prior to the 2008 global financial crisis. The graph shows the movement for 20 periods where at the beginning of the period there were fluctuations in the response given by the Exchange Rate due to the shock caused by T-Bills. In period 1 the Exchange Rate responded positively, but in period 2 there was a decrease in overshoot from the balance point, but in period and 4 there was an increase, and in periods 5 and 6 the Exchange Rate again responded to the shock caused by T-Bills with a negative response from the Value Swap.

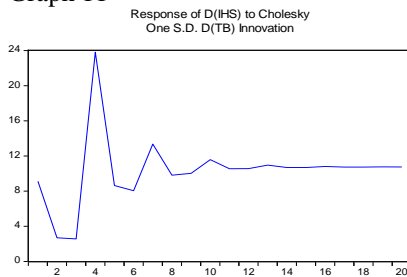
In period 9 the response of the Exchange Rate was slightly below the equilibrium point, but again there was an increase. At the end of the period, it can be seen that the shock caused by T-Bills is still being felt by the Exchange Rate. Where there is a fluctuating movement but tends to be positive. So it can be concluded that at the end of the 20th period the shock caused by T-Bills still had an impact on the Exchange Rate and responded positively. The IRF results show that there is a positive response from the Exchange Rate to the shock caused by T-Bills in the Philippines before the global financial crisis in 2008, this result is similar to the Exchange Rate response to the shock caused by T-Bills in the Philippines in the whole period. Research conducted by [9] states that countries that have more credit flows will be more sensitive to financial conditions. With the increase in T-Bills will cause investors to increase the purchase of T-Bills which ultimately increases the funds which are then channeled to the public for housing loans.

The high amount of housing loan funds provided causes high public demand or causes people to become more consumptive of raw materials and assume that large-scale development, especially in the property sector, will improve the country's economy, causing a demand surplus which in turn increases production which leads to a decline. raw materials that cause a US

to import to meet its demand. High imports led to high funds out of the US, which in turn caused the dollar to depreciate and the Peso to appreciate. So it can be concluded that the increase in T-Bills causes an increase in the Exchange Rate in the Philippines or the appreciation of the Peso Value.

**Response of Stock Prices and Exchange Rates to the shock caused by changes in T-Bills after the 2008 Global Crisis**

Graph 11



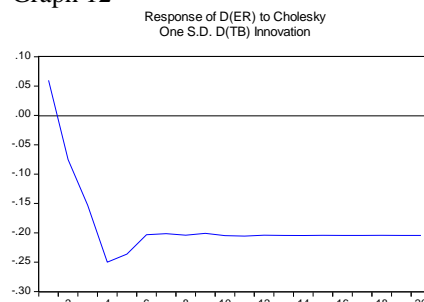
Graph 11 shows the response of stock prices due to the shock caused by T-Bills in the Philippines after the 2008 global financial crisis. The period shown in the graph is for 20 periods, where movements tend to fluctuate and the responses tend to be positive at the beginning of the period to the end of the period. In period 1 the response was positive, but in period 2 there was a decrease and then stabilized in period 3. The biggest shock caused by T-Bills occurred in period 4 where in this period the movement of stock prices increased very significantly due to the shock caused by T-Bills. In periods 5 and 6 there was a decline in stock prices, and so on, stock prices fluctuated but tended to start to weaken. In the period 11 to 20 the shock caused by T-Bills is no longer responded to by the Stock Price. This can be seen in Graph 4.11 the movement of the graph tends to be stable during this period and forms a new equilibrium point on the positive side. So it can be concluded that the shock caused by T-Bills did not have a permanent impact on stock prices in the Philippines in the period after the 2008 global financial crisis.

The results of the IRF Stock Price response to the shock caused by the T-Bills were positive, where when the T-Bills gave a shock to the Stock Price in the Philippines during the period after the crisis had a positive impact on the Stock Price in the Philippines. This is not in accordance with the theory which states that when T-Bills increase, stock prices in developing countries will actually decrease. This condition was due to the fact that after the 2008 global financial crisis caused by subprime mortgage non-performing loans originating from the US, investors were not interested in buying bonds in the US due to the country's

economic downturn. So investors prefer to sell T-Bills and channel funds to developing countries.

Research conducted by [7] states that returns on international stocks are more profitable than returns on Treasury Bills. So investors prefer to invest in stocks compared to buying T-Bills. This statement is also supported by research conducted by [8] which states that investors will prefer stock returns that further increase wealth.

Graph 12



Graph 12 shows the Exchange Rate response to the shock caused by T-Bills in the Philippines in the period after the 2008 global financial crisis. In period 1 the Exchange Rate responded positively to the shock caused by T-Bills, but in periods 2 to 4 there was a significant decline. until the equilibrium point overshoots zero (0) and then increases again in periods 5 and 6. This increase is still on the negative side, which means that the Exchange Rate is still responding negatively to the shock caused by T-Bills. In the period 6 to 20 the shock caused by the T-Bills is no longer being responded to by the Exchange Rate. this means that at the end of the period the exchange rate tends to move stable at a new equilibrium point below the zero point (0) or on the negative side. So it can be concluded that the shock caused by T-Bills did not have a permanent impact on the Exchange Rate in the Philippines in the period after the 2008 global financial crisis.

The IRF results show that during the shock caused by T-Bills after the 2008 global crisis, the Exchange Rate in the Philippines responded positively to the shock. This means that when T-Bills increase, the Exchange Rate in the Philippines will also increase, this is not in accordance with the theory which states that when T-Bills increase, the Exchange Rate will decrease. Research conducted by [12] states that Treasury sales or auctions are always carried out repeatedly every week with the same bidder and issue different bills at maturity in independent auctions, so that after the crisis investors see the US economy as weak. The fall caused the auction price of T-Bills to

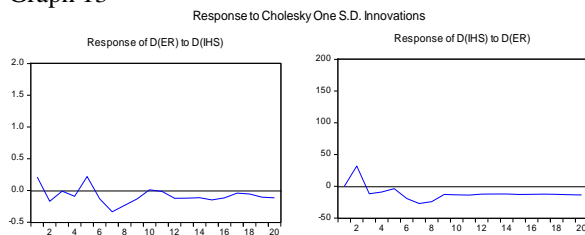
decline which caused investors to choose to invest in the Philippines.

The appreciation of the Peso Exchange Rate during the shock caused by T-Bills after the 2008 global financial crisis was due to investors preferring to invest in the Philippines rather than buying T-Bills, this was due to the downturn in the US economy at the time of the crisis. So that investors are less interested in investing their capital or shares in the US and choose to invest in the Philippines which ultimately causes the Philippine currency to appreciate.

**Causality between Exchange Rate and Stock Price due to Shock caused by T-Bills in Indonesia and the Philippines**

**Indonesia**

Graph 13



Graph 13 shows the reciprocal response between Exchange Rate and Stock Price due to the shock caused by T-Bills. It can be seen in the Response of d(er) to d(ihs) graph in the first period it can be seen that the Exchange Rate responded positively to changes in the movement of the stock price which was at point 1(0.21) but in period 2 it moved down to overshoot from the balance point. However, in period 3 it moves back up towards the equilibrium point. In periods 4 to 9 again fluctuated, which in the end in period 10 again touched the equilibrium point until period 11. In period 12 to the end of the period the Exchange Rate response to changes in stock price movements tended to be below the equilibrium point.

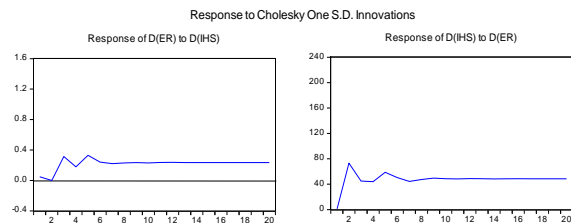
Graph 13 also shows the response of stock prices due to changes in the movement of the exchange rate in Indonesia. It can be seen on the graph that Response d(ihs) to d(er) in the first period of IHS tends to be stable and then the graph moves up in period 2 until it is at point 2(32) and then moves back down in period 3 which is overshoot from the equilibrium point is located at point -3(-12) until the end of period 20 the movement of the graph is below equilibrium so that there is a displacement of the equilibrium point which is below the equilibrium point 0(0).

So it can be concluded from the explanation above that the response of the Exchange Rate to the Stock Price and the response of the Stock Price to the Exchange Rate in Indonesia has a positive influence.

This is in line with research conducted by [13] which states that there is a positive causality relationship between exchange rates and stock prices. In addition, with an increase in stock prices, it will increase the wealth of domestic investors so that it will increase the demand for local investors and will increase interest rates. interest and consequently generate higher foreign demand for domestic currency by buying domestic assets which causes the exchange rate to appreciate [14] The existence of a causal or reciprocal relationship between exchange rates and stock prices is also explained by [15]

**Philippines**

Graph 14



Graph 14 shows the mutual response of Exchange Rates and Stock Prices to the shock caused by T-Bills from 2004 to 2019 in the Philippines. In the graph of the response of d(er) to d(ihs) it can be seen that in period 1 the Exchange Rate gave a positive response to changes in stock price movements caused by the shock caused by T-Bills which was at point 0(05). Then in period 2 it tends to move stable towards the equilibrium point, but in period 3 to period 7 it tends to fluctuate but still moves on the positive side. Until the period 8 to 20 the response of the Exchange Rate to the Stock Price is no longer felt, it can be seen that the movement of the graph is stable which forms a new equilibrium point, which means that the equilibrium point moves from 0(0) to 0.24.

Graph 14 also shows the response of Stock Prices to changes in Exchange Rates due to the shock caused by T-Bills. In the response graph d(ihs) of d(er) period 1 to 2 there is a positive response from the stock price to changes in the exchange rate. In period 3 there was a decline but still on the positive side until period 9 it fluctuated. In period 10 to period 20 the shock from changes in the Exchange Rate is no longer responded to by the Stock Price. It can be seen that the chart is moving steadily which forms a new equilibrium point at point 49(0).

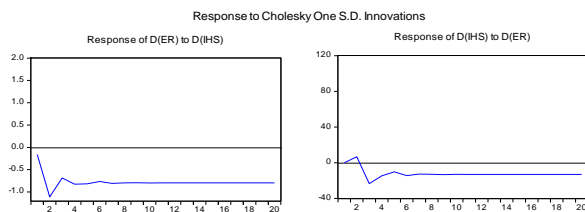
The causal relationship between Exchange Rate and Stock Price is also in accordance with research conducted by [15], [16]. The exchange rate is considered to respond to an increase in demand for assets such as stocks, with a bullish domestic stock market signaling a favorable economic prospect so that it will encourage the inflow of capital flows which will

eventually appreciate the exchange rate [17] a strong relationship between the exchange rate and stock prices also found in research conducted by [18].

**Causality of Exchange Rates and Stock Prices due to the shock caused by T-Bills in Indonesia and the Philippines before the 2008 Global Financial Crisis.**

**Indonesia**

Graph 15



Graph 15 shows the reciprocal response of Exchange Rates and Stock Prices in Indonesia and the Philippines in the period before the 2008 Global Financial Crisis. The Response of d(er) to d(ihs) graph shows a negative response to changes in Stock Prices by Exchange Rates at the beginning to the end of the period. Where the graph moves overshoot from the 0(0) equilibrium point, at the beginning of the period there was a significant decline until period 2 then moved up again in period 3 and again decreased in period 4, then in period 5 to period 20 the movement tends to be stable but still remains is on the negative side with the displacement of the equilibrium point from 0(0) to -79(0).

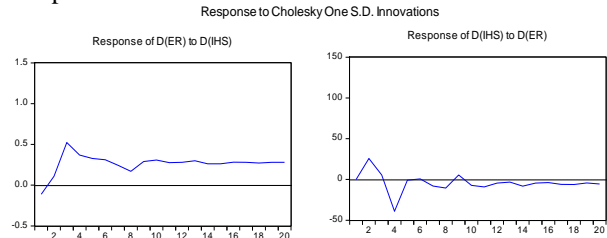
The Response of d(ihs) to d(er) graph shows the response of Stock Prices to changes in Exchange Rate movements caused by the shock caused by T-Bills. In the first period the stock price was still stable and at the equilibrium point, but in period 2 it responded positively with an increase to point 2(7). However, in period 3 there was a decrease with an overshoot from the equilibrium point to the negative side, meaning that in period 3 the stock price responded negatively to changes in the exchange rate. In periods 6 to 7 there was only a slight shock which finally in periods 8 to 20 the movement of the graph began to look stable and there was no response from the stock price to the exchange rate. However, at the end of the period, the equilibrium point moves to the negative side with a new equilibrium point at -13(0).

The existence of a causal relationship between exchange rates and stock prices is also explained by [18] which states that stock prices and exchange rates are proven to have a strong relationship. This is also supported by research conducted by [19] which states that there is a relationship between the exchange rate

and stock prices where when the domestic exchange rate depreciates, the stock price will also decrease.

**Philippines**

Graph 16



Graph 16 shows the reciprocal response between Exchange Rates and Stock Prices in the Philippines before the 2008 Global Crisis, on the Response of d(er) to d(ihs) graph at the beginning of the period, it can be seen that the negative response of the Exchange Rate to the Stock Price which was at the negative side that overshoots from the equilibrium point. In periods 2 to 3 there is a significant increase in the overshoot from the equilibrium point moving towards the positive side at point 3(0.52). In periods 4 to 8 the graph moves down but is still on the positive side, until in periods 9 to 16 there is only a slight response to the shocks caused by the stock price. In the period 17 to 20 the movement stops at point 0(0.28) which means the graph starts to move stable and there is no longer any response from the Exchange Rate to the shock caused by the Stock Price with the movement of the equilibrium point.

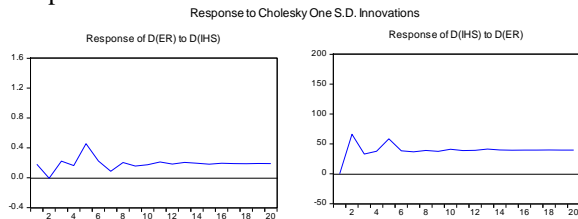
Graph 16 also shows the response of Stock Prices to changes in Exchange Rate movements due to the shock caused by T-Bills. It can be seen in the Response of d(ihs) to d(er) graph at the beginning of the period that the graph moves stable with being at the 0(0) equilibrium point, in period 2 there is an increase, which means there is a positive response from the stock price to changes in the exchange rate. However, in period 2 to period 5 there was a significant decrease in overshoot from the equilibrium point. In periods 6 and 7 the graph moved along the balance point, which in the end in period 8 there was a decline on the negative side and increased again in period 9 it moved on the positive side and always fluctuated until in periods 19 to 20 the movement of the graph began to stabilize. Where there is no longer a response to changes in the Exchange Rate.

The existence of a causal relationship between exchange rates and stock prices is also explained by [18] which states that stock prices and exchange rates are proven to have a strong relationship. This is also supported by research conducted by [19] which states that there is a relationship between the exchange rate and stock prices where when the domestic exchange rate depreciates, the stock price will also decrease.

**Causality of Exchange Rates and Stock Prices due to the shock caused by T-Bills in Indonesia and the Philippines after the 2008 Global Financial Crisis**

**Indonesia**

Graph 17



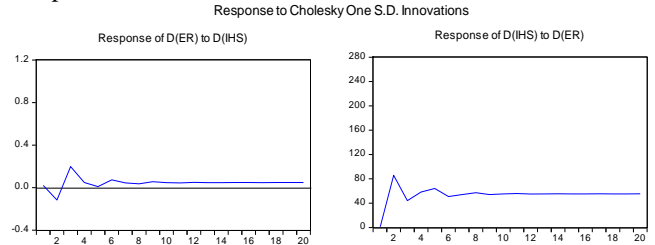
Graph 17 shows the reciprocal response between Exchange Rates and Stock Prices in Indonesia after the 2008 Global Financial Crisis. It can be seen in the Response of d(er) to d(ihs) graph that there was a fluctuating movement up to period 16. At the beginning of the price change Stocks, the exchange rate responded positively at point 1(0.18), but in period 2 there was a decline so that it touched the equilibrium point of 0(0). In periods 3 to 5 there tends to be an increase although in period 4 there was a slight decrease and in period 7 there was a very significant decrease along the movement. In periods 8 to 15 it can be seen that the response given begins to decrease until in periods 16 to 20 there is no movement. This means that there is no longer a response from the Exchange Rate to changes in the Stock Price, with the displacement of the equilibrium point at point 0(0,19).

In the Response of d(ihs) to d(er) graph, it can be seen that in period 1 there was no response from stock prices due to changes in exchange rates, but in period 2 there was a significant increase at point 2(66). In period 3 there was a decline which then increased again to period 5, but this increase did not exceed the previous increase, until in period 6 there was another decline before moving steadily in period 14 to period 20 at point 0(40).

According to [14] states that a country is considered stable based on the condition of its exchange rate. The existence of a causal relationship between exchange rates and stock prices is also explained by [18] which states that stock prices and exchange rates are proven to have a strong relationship. This is also supported by research conducted by [19] which states that there is a relationship between the exchange rate and stock prices where when the domestic exchange rate depreciates, the stock price will also decrease.

**Philippines**

Graph 18



Graph 18 shows the reciprocal response between Exchange Rates and Stock Prices to the shock caused by T-Bills after the 2008 Global Financial Crisis in the Philippines. In the chart Response of d(er) to d(ihs) it can be seen that at the beginning of the exchange rate period gave a positive response to changes in stock prices, where there was an increase at point 1(0.02). In period 2 there was a significant decrease in overshoot from the balance point at point 2(-0,12), but in period 2 there was a significant increase in overshoot from the balance point towards the positive side at point 3(0,20) and then it fell back in period 2 4 but this decline still remains on the positive side. In periods 5 to 9 the movement of the graph begins to decrease or is not very volatile and then stabilizes in periods 10 to period 20. This stable movement is not at the 0(0) equilibrium point, but is at 0(0.05) which means that it occurs displacement of the equilibrium point.

The Response of d(ihs) to d(er) graph also shows a positive response at the beginning of the period from stock prices to exchange rates after the 2008 Global Financial Crisis in the Philippines. In period 2 there was a significant movement, where the graph moved up to reach point 2(86) in period 2. Then it decreased again in period 3 and continued to fluctuate but tended to weaken in periods 5 to 9. In periods 10 to 20 the stock price did not respond to changes in the exchange rate, meaning that during this period the stock price moved steadily at point 55 and the equilibrium point moved to 0(55).

The causal relationship between Exchange Rate and Stock Price is also in accordance with research conducted by [15], [20]. The exchange rate is considered to respond to an increase in demand for assets such as stocks, with a bullish domestic stock market signaling a favorable economic prospect so that it will encourage capital inflows which will eventually appreciate the exchange rate [21]. research conducted by [18], [22].



#### 4. CONCLUSION

Based on the analysis and discussion that has been described previously, it can be concluded that:

1. The shocks caused by T-Bills will be responded positively by the Stock Price Variables in Indonesia and the Philippines. This can be seen in the Impulse Response Function (IRF) Test which illustrates that at the beginning of the shock period the T-Bills responded positively to the Stock Price Variable.
2. The shocks caused by T-Bills will be responded positively by the Exchange Rate Variables in Indonesia and the Philippines. This can be seen in the Impulse Response Function (IRF) Test which illustrates that at the beginning of the shock period the T-Bills responded positively by the Exchange Rate Variable.
3. Shock caused by T-Bills will be responded negatively by the Stock Price variable in Indonesia, while the Stock Price Variable in the Philippines responded positively before the Global Financial Crisis in 2008. This can be seen in the Impulse Response Function (IRF) test which illustrates that at the beginning of the shock period the T-Bills responded negatively by the Stock Price Variable in Indonesia and the Stock Price Variable in the Philippines responded positively.
4. Shock caused by T-Bills will be responded positively by Exchange Rate Variables in Indonesia and the Philippines before the Global Financial Crisis in 2008. This can be seen in the Impulse Response Function (IRF) Test which illustrates that at the beginning of the period the shock caused by T-Bills immediately responded positively by the Exchange Rate variable in Indonesia and the Philippines.
5. The shocks caused by T-Bills will be responded positively by Stock Price Variables in Indonesia and the Philippines after the Global Financial Crisis in 2008. This can be seen in the Impulse Response Function (IRF) Test which illustrates at the beginning of the period the shock caused by T-Bills directly responded positively by Stock Price Variables in Indonesia and the Philippines.
6. The shock or shock caused by T-Bills will be responded positively by Exchange Rate Variables in Indonesia and the Philippines after the Global Financial Crisis in 2008. This can be seen in the Impulse Response Function (IRF) Test which describes the early period of the shock caused by T-Bills immediately responded positively by Exchange Rate Variables in Indonesia and the Philippines.
7. The shock caused by the Exchange Rate due to T-Bills was responded positively by the Stock Price.

This can be seen in the Impulse Response Function (IRF) Test which illustrates that at the beginning of the period the shock caused by the Exchange Rate was responded positively by the Stock Price variable in Indonesia and the Philippines.

8. The shock caused by the Share Price due to T-Bills is responded positively by the Exchange Rate. This can be seen in the Impulse Response Function (IRF) Test which illustrates that at the beginning of the period the shock caused by the Stock Price was responded positively by the Exchange Rate variable in Indonesia and the Philippines.
9. The shock caused by the Exchange Rate due to T-Bills was responded positively by the Stock Price prior to the Global Financial Crisis in 2008. This can be seen in the Impulse Response Function (IRF) Test which illustrates at the beginning of the period the shock caused by the Exchange Rate responded positively by Stock Price Variables in Indonesia and the Philippines prior to the 2008 Global Financial Crisis.
10. The shock caused by the Stock Price due to T-Bills was responded negatively by the Exchange Rate prior to the Global Financial Crisis in 2008. This can be seen in the Impulse Response Function (IRF) Test which illustrates at the beginning of the period the shock caused by the Price Stocks responded negatively by Exchange Rate Variables in Indonesia and the Philippines prior to the 2008 Global Financial Crisis.
11. The shock caused by the Exchange Rate due to T-Bills was responded positively by the Stock Price after the Global Financial Crisis in 2008. This can be seen in the Impulse Response Function (IRF) Test which illustrates at the beginning of the period the shock caused by the Exchange Rate responded positively by Stock Price Variables in Indonesia and the Philippines after the 2008 Global Financial Crisis.
12. The shock caused by the Stock Price due to T-Bills was responded positively by the Exchange Rate after the Global Financial Crisis in 2008. This can be seen in the Impulse Response Function (IRF) Test which illustrates that at the beginning of the period the shock caused by the Stock Price was responded to positive by Exchange Rate Variables in Indonesia and the Philippines after the 2008 Global Financial Crisis.

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