INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN BUSINESS & SOCIAL SCIENCES
HRMARS MANAGEMENT ACADEMIC RESEARCH SOCIETY EXPLORING INTELLECTUAL CAPITAL
www.hrmars.com
ISSN: 2222-6990

Rupiah Exchange Rate Stability towards US Dollars In Indonesia by VAR Approach

Murtala, Chalirafi, Teuku Roli Ilhamsyah Putra, Eddy Gunawan, Irham Iskandar

To Link this Article: http://dx.doi.org/10.6007/IJARBSS/v9-i4/5833 DOI: 10.6007/IJARBSS/v9-i4/5833

Received: *24 Feb 2019,* ***Revised:*** *12 March 2019,* ***Accepted:*** *1 April 2019*

Published Online: 24 April 2019

In-Text Citation: (Murtala, Putra, Gunawan, & Iskandar, 2019)

To Cite this Article: Murtala, C., Putra, T. R. I., Gunawan, E., & Iskandar, I. (2019). Rupiah Exchange Rate Stability Towards US Dollars In Indonesia by VAR Approacch. *International Journal of Academic Research Business and Social Sciences*, *9*(4), 174–191.

Vol. 9, No. 4, 2019, Pg. 174 - 191

http://hrmars.com/index.php/pages/detail/IJARBSS | **JOURNAL HOMEPAGE**

INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN BUSINESS & SOCIAL SCIENCES
HRMARS MANAGEMENT ACADEMIC RESEARCH SOCIETY EXPLORING INTELLECTUAL CAPITAL
www.hrmars.com
ISSN: 2222-6990

Rupiah Exchange Rate Stability Towards US Dollars In Indonesia by VAR Approach

Murtala[1], Chalirafi[1], Teuku Roli Ilhamsyah Putra[2], Eddy Gunawan[2],Irham Iskandar[3]

[1]Lecturer of Faculty of Economics and Binsis - Malikussaleh University, Lhokseumawe

[2]Lecturer of Faculty of Economics and Binsis - Syiah Kuala University, Banda Aceh

[3]Aceh Regional Planning Development Agency

Abstract

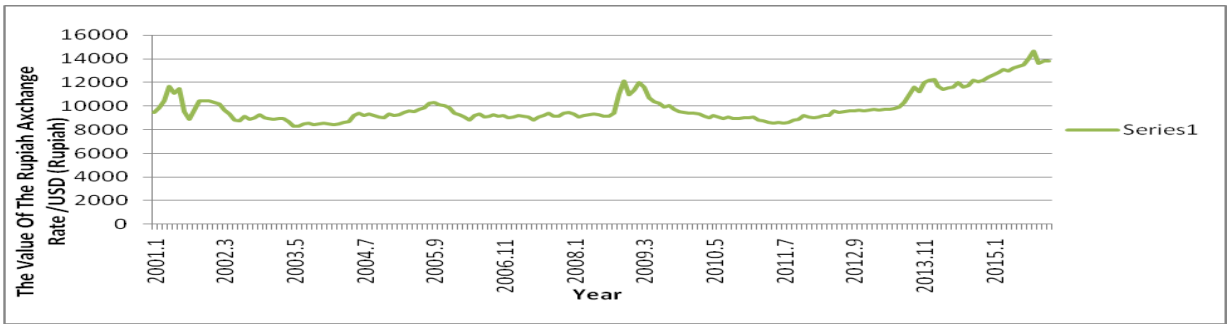
This research is carried out to analyze the causality and correlation of interest rate shock, net foreign asset and money supply towards rupiah exchange rate stability in Indonesia. Data used in this research is time series data, which consist of net foreign asset variable, interest rate variable, money supply variable and rupiah exchange rate towards US dollar within 2001 – 2015. Data analysis used is Vector Autoregressive approach. The research result shows that rupiah exchange rate process towards US dollar in Indonesia is based on Cholesky Ordering that is obtained from Granger Causality test result which is net foreign asset significantly effects money supply, then significantly effects the interest rate and finally significantly effects rupiah exchange rate. There is causality among interest rate, net foreign asset and money supply towards rupiah exchange rate stability in Indonesia. From VAR estimation, there is significant correlation on net foreign asset shock, money supply and interest rate simultaneously on rupiah exchange rate in Indonesia. In Impulse Reponse and variance decomposition analysis, the highest rupiah exchange rate response towards US dollar is from money supply, net foreign asset and interest rate respectively.

Keyword: VAR Model Rupiah Exchange Rate Stability

Introduction

The increase of US dollar exchange rate causes goods prices increase, and this problem is experienced by many people.People purchasing power decreased and this situation effects the low rate of market reserve power which slowing down the industry as there are no consumers. Production slowing down causes low tax income for government, whereas the government obliged to return its debt in US dollars, and at the end there will be national fund shortage which needs to be saved by having more foreign loans. Consequently, severence of labors happen everywhere. About

4,2 million people lost their jobs (Kompas April 3, 1999). Basic needs prices increase, economic recession and economic crisis happens.



Source : Indonesia Financial Statistic, (2016)

Figure 1. Rupiah Exchange Rate Fluctuation towards US Dollar in Indonesia 2001 - 2015

Rupiah exchange rate development towards US dollar in 2001-2015 can be seen in Figure 1. Figure 1 shows the fluctuation of rupiah exchange rate towards US dollar from 2001- 2015. In January 2001 rupiah exchange rate was Rp.9.450,00/$, in February 2001 it depreciated to Rp.9.835, 00/$. The reason of rupiah depreciation in 2001 was due to politic instability then the president replacement from Abdurrahman Wahid to Megawati and also because of national economic recovery which still couldnt eliminate the wound from long crisis. In December 2002 rupiah exchange rate appreciated to Rp.8.867,00/$. It was due to positive market sentiment regarding several Asian Regional currency appreciation. The appreciation factor was influenced by central bank policy in establishing monetary program through foreign currency sterelization, the raise of positive market sentiment towards rupiah. Treaty of Paris Club and London Club for rescheduling government debt payment and capital inflow addition through IMF loan agreement and nation assets sale. In 2003, 1 rupiah exchange rate was Rp.8.876,00/$ while in January 2004 rupiah exchange rate was appreciated to Rp.8.441,00/$. During 2004-2015 rupiah exchange rate kept on fluctuating but it was depreciated until December 2015 where rupiah exchange rate was Rp.13.795,00/$.

US dollar has replaced gold as world economic liquidity source and became world financial system base. Consequently, each country developed its net foreign assets in US dollar. US dollar reserve is needed so that a nation currency can be converted to US dollar. Net foreign asset in US dollar become essential for a nation economic stability and sustainability process, it was experienced by Indonesia during economic crisis. During crisis and low export activities, net foreign assets increase was commited by releasing new debt and withdrawing idle loan. At the end it was expected that increasing net foreign asset by having new debt can stabalize rupiah exchange rate, however the economic condition got worse.

Other indicator which highly influenced exchange rate is interest rate. Interest rate is one of the factors which influences currency exchange rate changing. If interest rate increases and foreign exchange rate doesn’t change, Indonesian investors will reduce US dollar request as Indonesia offers more interesting return and foreign investors will offer US dollar to be invested in rupiah.

Hsieh, (2009), interest rate increase will cause rupiah depreciation, moreover Indonesia reduces interest rate. Hsieh, (2009), becomes interesting to re-examine in Indonesia by using different model (Fadli at all, 2011), long term interest rate influences significantly and negatively towards exchange rate in Malaysia. Kayhan, Bayat, & Uğur, (2013), there are two ways causality between real exchange rate and real interest rate in Turkey. (Dorothy and Sabina, 2014), stated that monotery policy doesn't always have influence in stabilizing prices and exchange rate in Nigeria.

Frenkel, (1979), Sargent and Wallace (1981), Cumby and Obstfeld (1982), interest rate distinction among countries determines exchange rate. In other researches, Hooper, and Morton, (1980), Woo (1985), Feldstein, (1986) and Hakkio (1986), Campbell and Clarida, (1987), (Meese and Rogoff, 1988), there is no correlation between interest rate and exchange rate.

Literature of Related Review

Exchange Rate

Exchange rate is defined as foreign currency price in domestic currency price unit (Salvatore, 1999:49). According to Krugman, (2011), exchange rate is price of a nation currency which is measured in other currency. Price of a currency towards other currency is usually called as bilateral exchange rate or nominal exchange rate. We often only want to recognize a country currency exchange rate towards other country currency in a single number, than oversee other money separately.

Exchange rate index measures average nominal exchange rate effectively. However in order to recognize whether our goods relatively cheaper or more expensive than foreign goods, we must also consider what happen to domestic and foreign prices. Therfore real effective exchange rate or real exchange rate is used. This measurement is stated in foreign goods prices ration, stated in our currency, relatively towards domestic goods and services prices. This real exchange rate measures a nation competition in international trade (Dornbusch and Fishr, 2008:173).

Economic Fundamental Factors that Effect Exchange Rate

Interest Rate Distinction

Karahan, (2012) analyzed correlation between exchange rate and exchange rate uncertainty by using GARCH specification and Granger causality test and *Impulse-Response Function Analysis* Variables used in this model are :

ERUNC = f (INTER).

Which is:

ERUNC = *Exchange Rate*

INTER = *Interest rate*

Kayhan (2013) analyzed exchange rate and interest rate by using causality test and make model specification which is

ER = f (IR).

Which is:

ER= *Exchange Rate*

IR= *Interest rate*

Money Supply

Money supply is often distinguished between money supply broadly and tightly. Money supply broadly often referred as ecomonic liquidity or M_2. While money supply tightly is also referred as money supply, or M_1 (Widodo, 2009:47)

Monotery authority has major role as initial source from the establishment of money supply. Communities are last consumers from money that they use to ease production, consumption and exchange activities. If money offer in the communities is too high then it will create inflation, inflation is a money exchange rate depreciation process and is showed by goods and services price increase continuously. If the circulation of money in the communities is too low, then it will create deflation.

Net Foreign Asset

Net foreign asset is an important indicator among other monetary indicators. It is not only as indicator for a nation economic but also as an assurance for nation stability, so sufficient net foreign asset is a requirement for a nation. In free floating exchange rate system, where central bank doesn't have obligation to intervene, sufficient net foreign asset is not so important. In accordance to that situation Kemre, (2002) used a model by having fundamental factor which is:

ER = ƒ (CR,CF, IRD, CAB, RDF)
Which is:
ER = exchange rate
CR = Net foreign asset
CF = cash flow
IRD = interest rate distinction
CAB = current transaction balance
RDF = fiscal deficit ratio with industrial output

Logical Framework

The impact of interest rate to Exchange rate

Kayhan (2013) there is two ways causality between real exchange rate and real interest rate in Turkey. Alimi & Ofonyelu, (2013), there is long term correlation between nominal interest rate, inflation, exchange rate and foreign interest rate. The government must urge and support real sector by having subsidy, investment and infrastructure as the ways to limit the inflation by reducing interest rate and this will give impact to economic growth increase. (Zahid & Anwar, 2011), exchange rate change influences the interest rate and at the end will effect aggregate demand for goods and services through real interest rate change. On *supply-side*, exchange rate *depreciation* brings negative effect as domestic companies must adjust their prices to adapt with foreign companies effective prices changing

The Impact of Money Supply to Exchange Rate

Agustin (2009), money supply (M_2) has one-way relation to exchange rate, this means that the growth on money supply variable causes growth on rupiah exchange rate with the same direction (*depreciated* exchange rate) on the asumption that other variables are constant. This condition is in accordance to money offering theory as between money supply and exchange rate has positive correlation, the increase in domestic money offering cause *depreciation* on domestic currency. Money supply variable has dominant influence among other free variables.

The Impact of net foreign asset to exchange rate

Kemre (2002), the higher net foreign asset the stronger and stabil the exchange rate will be. Agustin (2009), the increase on number of net foreign asset will strengthen exchange rate (appreciated exchange rate). Net foreign asset and exchange rate have negative correlation. The higher number of net foreign asset, the higher foreign trust on our nation capability in overcoming *external shocks* so that it can pressure speculation on domestic currency and at the end the exchange rate will be appreciated. Other opinion which explain the correlation of net foreign asset with exchange rate is presented by (Alper & Saglam, 2007), every net foreign asset increase will cause appreciation on Turkey currency. Based on the above opinions, we can describe logical framework for this research as follows:

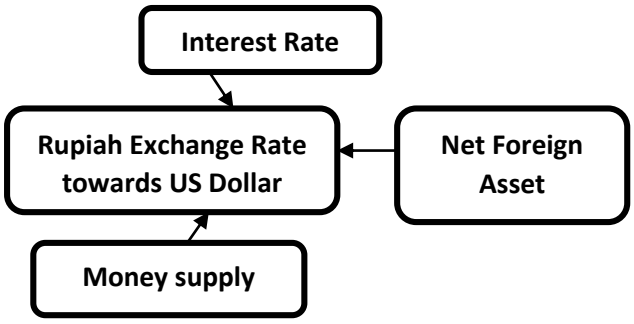


Figure 1. Logical Framework

Based on the above logical scheme concept it can be explained that exchange rate fluctuation is one of the causes having current economic problems in Indonesia which is unstable economic when exchange rate fluctuate ,therefore to manage rupiah exchange rate stability, a test on interest rate variable, money supply and number of net foreign asset need to be performed by using vector auto regression (VAR) analysis, then with this model causality correlation among interest rate variable, net foreign asset variable and money supply variable towards rupiah exchange rate also will be tested.

Research Methodoogy

This research was conducted in Indonesia and limteded only to rupiah exchang rate towards US dollar variable, money supply variable, interest rate variable and net foreign asset variable. Data used was monthly time series data during 2001 – 2015.

To analyze the shock interest rate, net foreign asset and money supply on rupiah exchange rate stability towards US dollar in Indonesia, *multivariate vector autogression (VAR)* was used. The

VAR analysis approach includes three major analysis tools which are *granger causality test*, *impulse response function* (IRF) and *forecast error decomposition of variance* (FEDV). Before we reach VAR analysis, there are several estimation steps that will be used in the analysis, which are:

1. Data stationarity and integrity degree test
2. Lag length determination
3. *Granger* causality test
4. VAR estimation
5. *Impulse Response Function*
6. *Variance Decomposition*

Discussion

Stationarity Test

The result of stationarity test can be viewed in Table 1.

Tabel 1. Unit Root Test using Augmented Dickey-Fuller (ADF)

Level		**1th Difference**	**2nd Difference**
Variabel	**Prob.**	**Prob.**	**Prob.**
CDV	0.9069	0.0000	0.0000
JUB	0.9998	0.6219	0.0000
KURS	0.8464	0.0000	0.0000
SB	0.2855	0.0007	0.0000

Source: Data Processing Result, 2017

From stationarity test result there are three variables that have become stationarize in I (1) which are D (CDV) variable, D (KURS) and D (SB) however there is one variable that haven't stationarized in I (1). Therefore it is no need to do cointegration test in I (1). As the consequency VAR model can be used in *second difference*.

Optimal *Lag* Determination

The chosen length of optimal *lag* showed in Table 2.

Table 2. The Length Of Optimal *Lag* Based On Several Criteria

Lag	LR	FPE	AIC
0	NA	3.37e+20	58.61932
1	250.2171	8.94e+19	57.29109
2	173.7884	3.67e+19	56.39990
3	63.55054	2.96e+19	56.18335
4	37.09094	2.80e+19	56.12916
5	44.35063	2.52e+19	56.01974
6	49.27178	2.17e+19	55.86817
7	40.39753	1.98e+19	55.76990
8	38.26085*	1.82e+19*	55.67886*

Source: Data Processing Result, 2017

Based on Table 2, LR, FPE and AIC criteria chose *lag order 8* while SC criteria chose *order 2* and HQ chose *order 3*. As the result, in this research the length of optimal *lag* that will be used is 8.

VAR Stability Test

The result of VAR stability can be seen in Table 3.

Tabel 3. VAR *Stability Condition Check*

Root	Modulus
-0.486613 - 0.855808i	0.984479
-0.486613 + 0.855808i	0.984479
0.016736 + 0.919873i	0.920025
0.016736 - 0.919873i	0.920025
-0.846724 - 0.356349i	0.918655
-0.846724 + 0.356349i	0.918655
0.509604 + 0.703343i	0.868555
0.509604 - 0.703343i	0.868555
0.628812 - 0.581443i	0.856435
0.628812 + 0.581443i	0.856435
0.234776 + 0.810579i	0.843895
0.234776 - 0.810579i	0.843895
0.692063 + 0.476356i	0.840159
0.692063 - 0.476356i	0.840159
-0.834320	0.834320
-0.523876 - 0.644744i	0.830748
-0.523876 + 0.644744i	0.830748
0.370558 - 0.742678i	0.829991
0.370558 + 0.742678i	0.829991
-0.304303 + 0.725140i	0.786402
-0.304303 - 0.725140i	0.786402
-0.553881 - 0.546470i	0.778084
-0.553881 + 0.546470i	0.778084
-0.659798 + 0.376794i	0.759807
-0.659798 - 0.376794i	0.759807
-0.718454 - 0.198500i	0.745371
-0.718454 + 0.198500i	0.745371
-0.111101 - 0.731144i	0.739537
-0.111101 + 0.731144i	0.739537
0.306006 - 0.479702i	0.568994
0.306006 + 0.479702i	0.568994
-0.170532	0.170532

Source: Data Processing Result, 2017

Based on VAR stability test result in Table 3, it showed that the VAR equation has modulus value less than 1 on *lag* 8, Therefore it can be concluded that VAR model has become stabile on its optimal lag which is *lag 8*.

Granger Causality Analysis

Causality analysis shows cause and effect relationship. In order to acknowledge the characteristic of causality relationship where the changing of one variable which give more impact to other variable, Granger Causality is needed. Causality test result can be seen in Table 4.

Tabel 4. ***Granger Causality Test Lag 8***

Variabel Pemprediksi	DDCDV	DDJUB	DDKURS	DDSB
DDCDV		0.0012**	0.6788	0.3904
DDJUB	0.0003**		0.1631	0.6913
DDKURS	0.0560*	0.0003**		0.0961*
DDSB	0.0387**	0.0606*	0.1319	

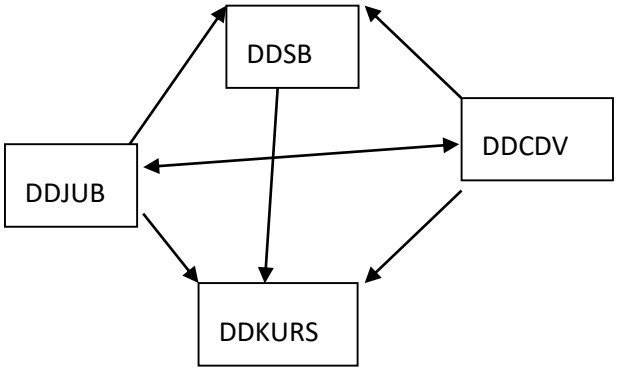
Source: Data Processing Result, 2017

Remark: ** significant on α = 5%

*significant on α = 10 %

From Granger Causality Test result in Table 4, it can be described that CDV has two-ways causality (Grager Cause) towards JUB and has one-way causality towards SB and KURS. Meanwhile JUB has two-ways causality (Granger Cause) towards CDV and has one-way causality towards SB and KURS. SB has one-way causality (Granger Cause) towards KURS and doesn't have any causality (not Granger Cause) towards CDV and JUB. While KURS doesn't have any causality (not Granger Cause) towards CDV, SB and JUB.

Based on Granger Causality test result, the correlation among variables can be figured as follows:



Source: Data Pocessing Result, 2017

Figure 2. Causality Correlation among variables tested by Granger Causality Test

Based on Figure 2, Cholesky Ordering that will be used in Impulse Response analysis has possibility as follows:

(1) DDCDV ↔ DDJUB → DDSB → **DDKURS**; or

(2) DDJUB ↔ DDCDV → DDSB → **DDKURS**.

Vector Autoregression Estimates Analysis

The estimation result of Vector Autoregression Estimated Difference (VARDD) towards endogen variables DDKURS and Cholesky Ordering DDCDV ↔ DDJUB → DDJUB →DDSB →DDKURS as follows (statistik t [.....]):

Equation 1

Lag	DDKURS	DDSB	DDJUB	DDCDV	C
(-1)	-0.849723	-101.5568	0.002148	-0.029405	2.054322
	[-9.92245]	[-0.59173]	[2.36033]	[-2.67188]	[0.08752]
(-2)	-0.951336	-127.1687	0.002936	-0.024344	
	[-9.03437]	[-0.46507]	[2.12194]	[-1.79794]	
(-3)	-0.616324	-198.1258	0.000337	-0.019927	
	[-5.03051]	[-0.60392]	[0.19195]	[-1.33480]	
(-4)	-0.555803	-264.6127	0.000356	-0.024454	
	[-4.52332]	[-0.78982]	[0.18880]	[-1.56402]	
(-5)	-0.48976	-554.0621	0.001516	-0.037359	
	[-4.04371]	[-1.71078]	[0.80066]	[-2.37091]	
(-6)	-0.349446	-816.3456	0.000886	-0.036492	
	[-3.09554]	[-2.81088]	[0.47891]	[-2.43280]	
(-7)	-0.212843	-775.2591	-0.002669	-0.010482	
	[-2.25568]	[-3.37225]	[-1.72030]	[-0.78600]	
(-8)	-0.114746	-389.773	-0.003097	-0.005004	
	[-1.61537]	[-3.01955]	[-3.05231]	[-0.44787]	

R-squared	0.593751	Schwarz SC	15.06348
Adj. R-squared	0.500226	Mean dependent	3.575581
Sum sq. resids	130655.1	S.D. dependent	433.6807
S.E. equation	306.5893		
F-statistic	6.348579		
Log likelihood	-1210.525		
Akaike AIC	14.45960		

Source: Data Processing Result, 2017

From the above VAR model estimation it is generated that F-statistic = 6,35 higer than F-table $_{\alpha=5\%;df1=32;\ df2=147}$ = 1,522. This means that simultenuously interest rate variable (DDSB), money supply

variable (DDJUB) and net foreign asset variable (DDCDV) in the above equation 1 significantly give impact towards rupiah exchange rate (DDKURS) stability on test level α = 5%.

On equation 1 partially, there is negative and significant impact on average rupiah exchange rate (DDKURS(-1)) towards US dollar in Indonesia in the previous month on test level α = 5%. Until 7th period (DDKURS(-7)) there is significant impact on average rupiah exchange rate towards US dollar in Indonesia and it also has negative correlation. It means that every increase on rupiah exchange rate in previous month, it will influence to the depreciation of rupiah exchange rate in one month period after it, and on the contrary every increase on rupiah exchage rate in the previous month, it will influence to appreciation of rupiah exchange rate in one month period after it

Interest rate (DDSB) in the previous month doesn't have any significant impact on average rupiah exchange rate towards US dollar in Indonesia. It is showed by the amount of statistic t value which is not significant to α = 5 % however it has negative correlation. Starting period 6th and 8th, there is significant impact towards average rupiah exchange rate in Indonesia on α = 5%. Interest rate shows negative impact on rupiah exchange rate, which means that the increase on interest rate in the previous month gives impact toward rupiah excahnge rate appreciation in Indonesia on one month after it. This analysis result is in line with (Szakmary and Mathur, 1997), (Fadli at all, 2011), Alimi & Ofonyelu, (2013), Kayhan (2013), (Scott, and Karlsson, 2014), (Murtala et al, 2017) which stated that there is negative impact on interest rate towards exchange rate, the higher interest rate the more appreciated exchange rate will be and on the contrary the lower interest rate, the more depreciated exchange rate will be. On the other hand, this research result is also in line with 1980s researches that were conducted by (Frenkel, 1979), Sargent (1981) and Cumby and Obstfeld (1982) which stated that interest rate really determines exchange rate.

Money supply (DDJUB) in one or two months prior has significant impact on rupiah exchange rate in Indonesia. It is showed by the amount of statistic t value which is significant to α = 5%, and it has positive correlation. Starting the 3rd and 7th month prior there is no significant impact on average rupiah exchange rate in Indonesia on α = 5 %. From the 1st until 6th month period money supply has positive impact towards interest rate in Indonesia which means that every increase on money supply it will make rupiah exchange rate depreciated and on the contrary every decrease on money supply then the rupiah exchange rate will be appreciated. This finding is in line with Szakmary and Mathur (1997), Agustin, (2009) and Vidyamukti, (2013), money supply has positive impact towards exchange rate, the higher money supply the more depreciated the exchange rate will be and on the contrary the lower money supply, the more appreciated exchange rate will be.

Net foreign asset (DDCDV) in the previous month has significant impact towards rupiah exchange rate in Indonesia. It is shown by the amount of statistic t value which is significant at α = 5% and has negative correlation. From 2nd through 4th month before it doesn't have significant impact towards rupiah exchange rate in Indonesia at α = 5 %. Starting 5th and 6th month it becomes significantly impact and has negative correlation towards rupiah exchange rate in Indonesia, until 7th and 8th month net foreign asset doesn't have significant impact towards exchange rate in Indonesia. However net foreign asset has negative impact towards rupiah exchange rate in Indonesia which means an increase of net foreign asset will give influence towards appreciation of rupiah exchange rate in Indonesia. This finding is in line with (Agustin, 2009), Emre and Ismail (2001), who concluded that every additional net foreign asset will cause appreciation to domestic currency.

Impulse Response Analysis

Impulse Response analysis is conducted in order to acknowledge the impact sensivity changing of one endogen variable towards other endogen variable. The result analysis will show the impact of current and future *shock* of a variable towards other endogen variable.

Rupiah Exchange Rate Response towards Interest rate Changing Shock

Impulse Response Function gives figure on how the response of future variable whenever there's an interference on another variable. To ease the interpretation, analysis result is presented on graphic figure.. How is the exchange rate response on shock from interest rate towards exchange rate can be seen in Figure 3 as follow:

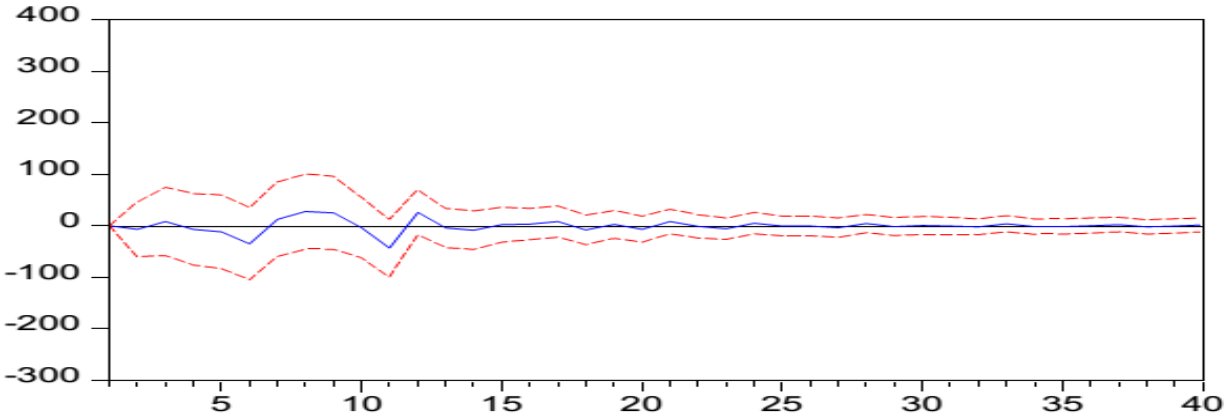


Figure 3. Impluse Response Function DDKURS towards DDSB

In Figure 4.6 it is shown that the impact of interest rate changing (DDSSB) amounting to one standard deviation towards rupiah exchange rate (DDKURS), by having 40 months horizontal time. At the beginning of the first month exchage rate (DDKURS) doesn't have impact on interest rate shock (DDSB) amounting to one standard deviation. In the second month average interest rate changing (DDSB) gives negative response towards exchange rate changing (DDKURS). In the third month average interest rate changing (DDSB) gives positive response towards exchange rate changing (DDKURS). Starting the 4th month and forth it has up and down movement and tend to reach the balance after the 15th month

Rupiah exchange rate response towards money supply shock

Exchange rate response on money supply shock towards rupiah exchange rate can be seen in Figure 4 as follows

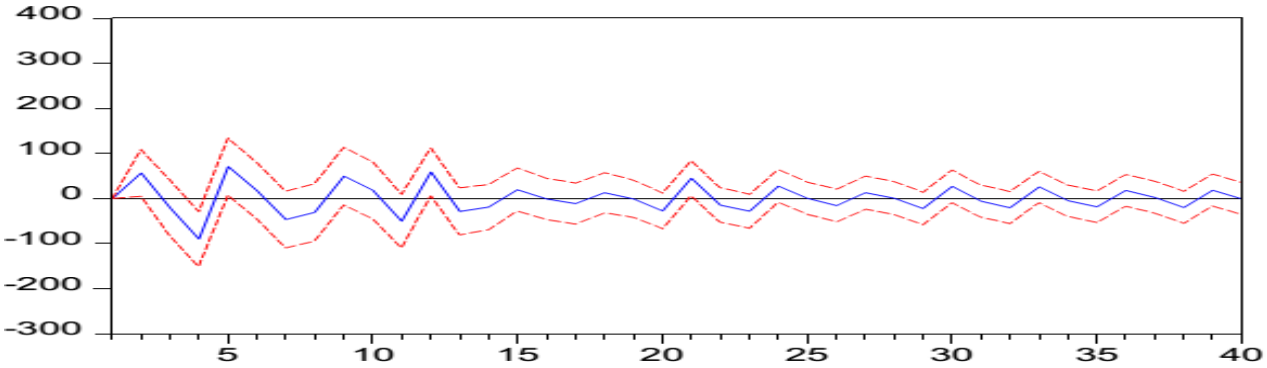


Figure 4. Impulse Response Function DDKURS Towards DDJUB

Figure 4 shows the impact on money supply changing (DDJUB) amounting to one standard deviation towards rupiah exchange rate changing (DDKURS), by having 40 months horizontal time. At the beginning of the first month exchange rate (DDKURS) doesn't have any impact on money supply shock (DDJUB) amounting to one standard deviation. In the 2nd month average shock money supply changing (DDJUB) give positive response towards exchange rate changing (DDKURS). In 3rd and 4th month the average shock money supply changing (DDJUB) give negative response towards exchange rate changing (DDKURS). Starting the 5th month and forth it has up and down movement and tend toreach the balance or close to balance.

Rupiah exchange rate response towards net foreign asset shock

Exchange rate response to shock or fluctuation from net foreign asset towards rupiah exchange rate can be seen on Figure 5.

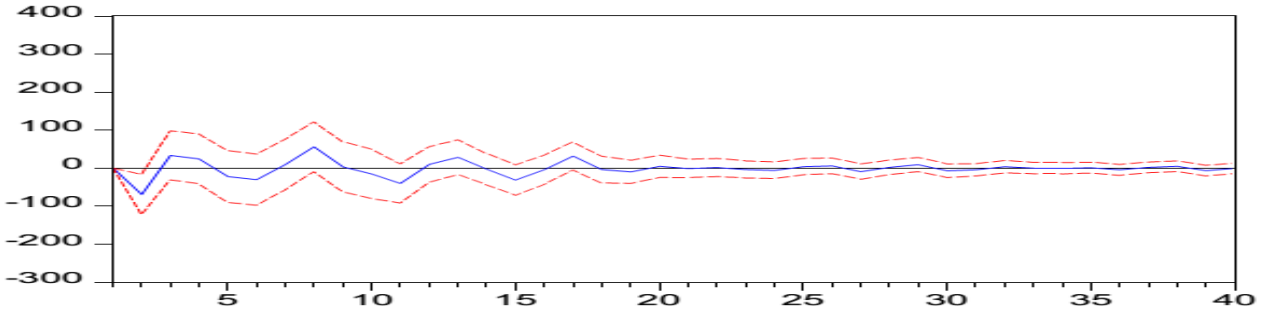


Figure 5. Impulse Response Function DDKURS Towards DDCDV

Figure 5 shows the impact of net foreign asset changing (DDCDV) amounting to one standard deviation towards exchange rate (DDKURS), by having 40 months horizontal time. At the beginning of the first month the exchange rate (DDKUR) doesn't have any impact on net foreign asset shock amounting one standard deviation. In the second month the average shock on net foreign asset changing gives negative response towards exchange rate changing (DDKURS). In the third and fourth month the average shock on net foreign asset changing (DDCDV) gives positive response towards exchange rate changing (DDKURS). Starting the 5th month and forth it has up and down movement and tend to reach the balance

Rupiah exchange rate response towards rupiah exchange rate shock

Exchange rate response to shock on rupiah exchange rate towards rupiah exchange can be seen in Figure 6.

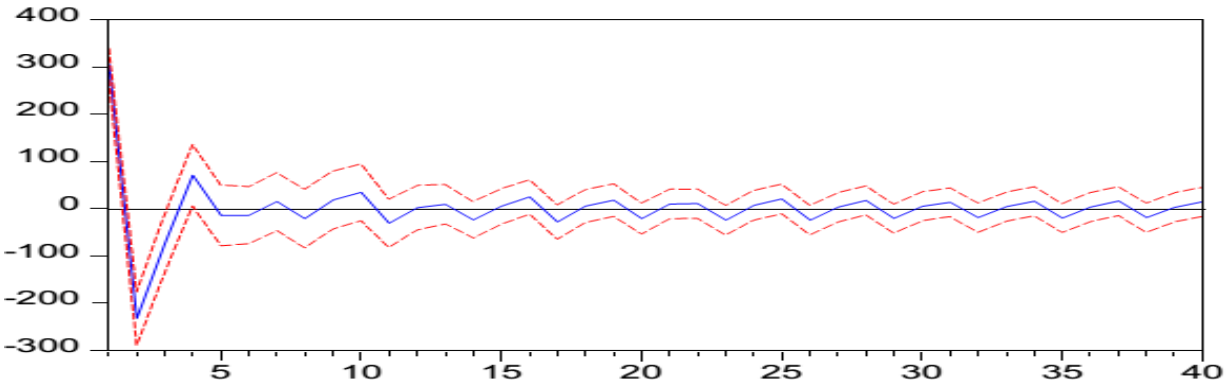


Figure 6. Impulse Response Function DDKURS Towards DDKURS

Figure 6 shows the impact of rupiah exchange rate changing (DDKURS) amounting to one standard deviation towards rupiah exchange rate changing (DDKURS), by having 40 months horizontal time. At the beginning of the first month the exchange rate (DDKUR) has positive impact on rupiah exchange rate shock amounting to one standard deviation. In the 2nd month average shock of exchange rate changing (DDKURS) gives negative response towards exchange rate changing (DDKURS). In 3rd and 4th month the average shock of exchange rate changing (DDKRS) gives positive response towards exchange rate changing (DDKURS). Starting the 5th month and forth it has up and down movement and tend to reach the balance or close to the balance.

Variance Decomposition Analysis

Variance decomposition provides estimation on how high the contribution of a variable towards the changing of that variable itself and other variables in several upcoming periods. By using this analysis, we can estimate which variable that has the highest contribution towards certain variable. Variance Decomposition analysis often called as *forecast error decomposition variance* (FEDV) analysis. FEDV analysis result on rupiah exchange rate variable for 40 periods can be seen in Table 7.

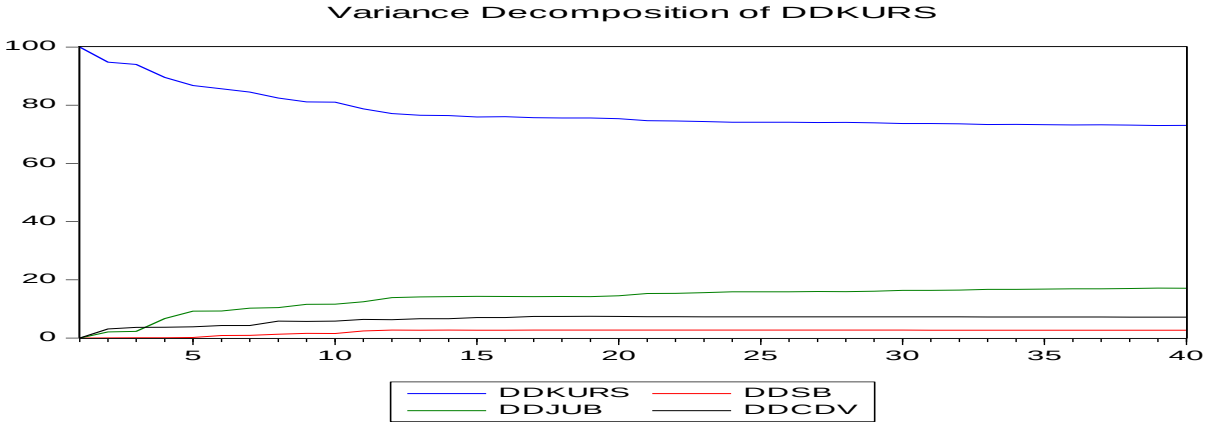


Figure 7. Variance Decomposiion of DDKURS

Figure 4.1 shows that in the first period 100 percent rupiah exchange rate variance is explained by the average of exchange rate itself, while the interest rate, money supply and net foreign asset variables is zero percent. In the second period rupiah exchange rate variance is explained by the average of exchange rate itself as 94,77 percent, while interest rate variable is 0,00295 percent, money supply is 2,095 percent and net foreign asset is 3,097 percent. In the next period until the 40th period the rupiah exchange rate variance is explained by the average of exchange rate itself as 75,37 percent, while interest rate variable is 2,724 percent, money supply is 14,49 percent and net foreign asset is 7,409 percent. Until the 40th period rupiah exchange rate variance is explained by the average of exchange rate itself become lower, while the interest rate variable slightly decreases, money supply variable is getting increase and net foreign asset also slightly decreases. From three variables, money supply variable give the greatest contribution towards rupiah exchange rate stability, the second variable is net foreign asset and the last one is interest rate.

Conclusion

1. Rupiah exchange rate process towards US dollar in Indonesia is based on *Cholesky Ordering* that is obtained from *Granger Causality* test result. The Ordering process was conducted as follows: net foreign asset significantly impact money supply, then significantly will impact interest rate and significantly will impact rupiah exchange rate in Indonesia.
2. There is causality among interest rate, net foreign asset and money supply towards stability on rupiah exchange rate in Indonesia.
3. Based on VAR estimation, there is significant impact on net foreign asset, money suppy, interest rate shock simultaneously towards rupiah exchange rate in Indonesia.
4. Based on Impulse response and Variance decomposition analysis, it can be concluded that the highest rupiah exchange rate response towards US dollar is from money supply, then net foreign asset and finally interest rate.

Suggestion

1. It is suggested that the government pays more attention to monetary sector policies, in this case Bank Indonesia must concentrate on the determination of interest rate, money supply, net foreign asset resource as these are factors that will give impact to rupiah exchange rate stability.
2. It is needed to have effective and pure monetary policy application and use interest rate indicator as economic control in order to keep the exchange rate stability, manage money supply and create net foreign assets resource, as well as the government must avoid creating new money which can vanish interest function or role as economic control.

References

Agustin, G. (2009). Analisis Paritas Daya Beli Pada Kurs Rupiah terhadap Dolar Amerika Serikat Periode September 1997 – Desember 2007 dengan Menggunakan Metode Error Correction Model, 1(1).

Alimi, S. R., & Ofonyelu, C. C. (2013). Toda-Yamamoto Causality Test Between Money Market Interest Rate And Expected Inflation : The Fisher Hypothesis Revisited. *European scientific journal. 9*(7), 125–142.

Alper, C. E., & Saglam, I. (2007). The Equilibrium Real Exchange Rate: Evidence from Turkey. *MPRA Paper No. 1924, Posted 27. February 2007*, (1924).

Bank Indonesia, (1998). *Laporan Tahunan Bank Indonesia*. Beberapa nomor penerbitan.

Campbell, J.and R.H. Clarida. (1987). The Dollar and Real Interest Rates. *An Empirical Investigation, Carnegie- Rochester Conference Series on Public Policy*, *27*, 103–140.

Cumby, R. E. and Obstfeld, M. (1982). International Interest-rate and Price-level Linkages Under Flexible Exchange Rates: A Review of Recent Evidence. Bilson et al.(eds.) *Exchange Rates: Theory and Practic.* Chicago, University of Chicago Press.

Dorothy, C. O and Sabina, E. A. (2014). Empirical Analysis of the Relationship Between Foreign Exchange Rate and Economic Growth in A Developing Economy: Nigerian Experience World. *Journal of Management and Behavioral Studies*, *2*(2), 28–36.

Fadli F. A. H. A Nurul S.B, Nurmadihah J, Zuraida M, N. S. and K. J. (2011). Vector Error Correction Model, VECM. Approach in Explaining the Relationship Between Interest Rate and Inflation Towards Exchange Rate Volatility in Malaysia. *World Applied Sciences Journal*, *12*, 49–56.

Frenkel, J. (1979). On The Mark: A Theory of Floating Exchange Rates Based on Real Interest Differentials. *American Economic Review. 69:610-622.*, *69*, 610–622.

Hakkio. C. (1986). Does the exchange rate follow a random walk? A Monte Carlo study of four tests for a random walk. *Journal of International Money and Finance*, *5*(2), 221–229.

Hooper, P.and J. Morton, 8. (1980). Fluctuations in The Dollar: A Model of Nominal and Real Exchange Rate Determination. *Federal Reserve Board International Finance Discussion Paper*, (168).

Hsieh, W. (2009). Study of the Behavior of the Indonesian Rupiah / US Dollar Exchange Rate and Policy Implications, *6*(September), 41–50.

Karahan, Ö. (2012). The Effect of Exchange Rate Uncertainty On Interest Rate in Turkey, (May), 179–189.

Kayhan, S., Bayat, T., & Uğur, A. (2013). Interest Rates and Exchange Rate Relationship in BRIC-T Countries, 227–236.

Kemre. (2002). *Macroeconomics Theory for The Open Economy*.

Krugman, P. R. and O. M. (2011). *The International Economic, Theory and Policy* (Pearson Ed).

Meese, R. A. and K. R. (1988). Was It Real? The Exchange Rate-interest Differential Relation Over The Modern Floating Period. *Journal of Finance*, *43*(4), 923–948.

Murtala, Raja Masbar, Fajri, and Muhammad Nasir. (2017). Fluctuation Analysis Of Rupiah Exchange Rate Of Dollar United States In Indonesia. *European Journal of Agriculture and Forestry Research*, *5*(6), 37–50.

Sargent, T. J. and N. W. (1981). Some Unpleasant Monetarist Arithmetic. *Federal Reserve Bank of Minneapolis Quarterly Review, 5*, 1–18.

Scott, R., H. K. Karlsson., A. K. M. (2014). An Investigation Of The Causal Relations Between Exchange Rates And Interest Rate Differentials Using Wavelets. *International Review of Economics and Finance*, 321–329.

Szakmary, A. C. and I. M. (1997). Central Bank Intervention and Trading Rule Profits in Foreign Exchange Markets. *Journal of International Money and Finance*, *16*(4), 87–101.

Vidyamukti, R. (2013). Hubungan Antara Jumlah Uang Beredar, Nilai Tukar Dan Indeks Harga Saham Gabungan, Pendekatan Vektor Autoregression dan Kointegrasi. *Jurnal Manajemen Indonesia.*, *12*(4), 329–343.

Working, N., Series, P., Deficit, T. H. E. B., Dollar, T. H. E., Bureau, N., & Economic, O. F. (1986). Feldstein, (1898).

Zahid, S., & Anwar, S. (2011). Supply-side effects of exchange rates , exchange rate expectations and induced currency depreciation ☆. *Economic Modelling*, *28*(4), 1650–1672. https://doi.org/10.1016/j.econmod.2011.02.017