

# THE EFFECTS OF MACRO ECONOMIC INDICATOR AND FINANCIAL RATIO ON NON PERFORMING FINANCING OF SHARIA COMMERCIAL BANKING IN INDONESIA

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## ABSTRACT

This research aims to analyze the relationships and effects of macroeconomic indicator variable and financial ratio on non performing financing (NPF) of sharia commercial banks in Indonesia. Data used in this research is obtained from Bank Indonesia, Central Bureau of Statistics (BPS), and Financial Services Authority (OJK). This research uses time series data from January 2010 to August 2016. This research method uses quantitative method by VAR approach through eviews program. This research showed that there was no long-run equilibrium relationship between variables of NPF, inflation, exchange rate, FDR, CAR and OER. Besides, all independent variables simultaneously affected NPF variable. Based on variable contribution on NPF shock, macroeconomic indicator variables contributed on NPF shock were inflation and exchange rate, meanwhile financial ratio variables contributed on NPF shock were CAR and OER. Seen from NPF response, only CAR variable was responded positively in the early period, meanwhile other variables were responded negative and fluctuatingly. The effects of each variable on NPF were temporary since those effects would vanish after an over-five month period. Based on causality test, there was only a one-way relationship from FDR to OER

Keywords: non performing financing, macroeconomic indicator, financial ratio, VAR

## ABSTRAK

Penelitian ini bertujuan untuk menganalisis hubungan dan pengaruh variabel indikator makroekonomi dan rasio keuangan terhadap non performing financing (NPF) pada bank umum syariah di Indonesia. Data yang digunakan dalam penelitian ini diperoleh dari Bank Indonesia, Badan Pusat Statistik dan Otoritas Jasa Keuangan. Penelitian ini menggunakan data time series dari bulan Januari 2010 sampai dengan Agustus 2016. Metode penelitian ini menggunakan metode kuantitatif dengan pendekatan VAR melalui program eviews. Hasil penelitian menunjukkan bahwa tidak terdapat hubungan keseimbangan jangka panjang di antara variabel NPF, GDP, Inflasi, nilai tukar, FDR, CAR, dan OER. Selain itu, seluruh variabel independen berpengaruh secara simultan terhadap variabel NPF. Berdasarkan kontribusi variabel terhadap shock NPF, variabel indikator makroekonomi yang berkontribusi terhadap shock NPF adalah inflasi dan kurs, sedangkan variabel rasio keuangan yang berkontribusi terhadap shock NPF adalah CAR dan OER. Dilihat dari respon NPF, hanya variabel CAR yang merespon secara positif oleh NPF pada awal periode sedangkan variabel yang lainnya merespon secara negatif dengan fluktuatif. Pengaruh masing-masing variabel terhadap NPF bersifat sementara karena pengaruh tersebut akan hilang setelah periode lima bulan ke atas. Berdasarkan uji kausalitas, hanya terdapat hubungan searah dari FDR ke OER.

Keywords: non performing financing, indikator makroekonomi, rasio keuangan, VAR

## 1. Introduction

Banking is a financial institution based on trust system. This trust background triggers clients to save their money at the bank. The money collected by these clients then becomes fresh fund which can be utilized by bank through

financing. By distributing the fund through financing, bank will gain *earning asset* which can provide positive signal for financial performance of sharia banking.

Financing which occurs in the sharia banks is not entirely a smooth financing.

There are also some troubled financings. Those troubled financings in sharia banking commonly called *non performing financing* (NPF). NPF is a phenomenon that commonly occurs in financing distribution activities in sharia banks. If the number of NPF exceeds the determined limits, so it will affect the performance of sharia bank itself (Khalifaturofi'ah & Nasution, 2016). Since besides threatening the profitability, the liquidity also decreases and the banks will eventually be liquidated.

The determined good NPF ratio is less than 5 % (Bank Indonesia, 2012). Up to 2015, there are 12 sharia banks whose NPF exceeds the set ratio. Among these are 5 from sharia banks and 7 sharia business units. This high NPF ratio is a negative signal for sharia bank so that it can evaluate its financial performance and overcome some matters that can make NPF soaring.

Based on Table 1, the highest NPF is experienced by Maybank Sharia around 35,15%. This high NPF is an extreme condition in which sharia commercial

bank should re-evaluate the credit quality and its credit risk so the impact of soaring NPF does not cause a decrease in banking quality. This condition is similiar to the case of sharia financial institution which firstly established in Indonesia, that is Teknosa Expertise Services Cooperative. This cooperative is the first sharia cooperative operating in Indonesia but was forced to close due to troubled financing or the high NPF. Yet this cooperative is has reached the asset achievement of Rp 1,5 billion from the initial capital of Rp 34 million. Therefore, sharia bank should as far as possible suppress NPF speed so that it can maximize the profitability and performance.

Of condition presented above, it is necessary to conduct a research which examines factors which affect *non performing financing* on sharia commercial banks. This is motivated by NPF ratio of several sharia commercial banks which show negative signal for the quality of sharia banking in the future.

**Table 1. NPF Ratio on Sharia Commercial Bank (BUS) and Sharia Bussiness Unit (UUS)**

NAME OF BUS	NPF RATIO	NAME OF UUS	NPF RATIO
Maybank syariah	35,15%	Bank of North Sumatra	16,59%
Bank Victoria syariah	9,80%	Bank of East Kalimantan	7,91%
Bank Muamalat	7,11%	Bank of South Sumatra	7,18%
Bank BJB Syariah	6,93%	Bank Riau	6,68%
Bank Syariah Mandiri	6,06%	Bank of Jakarta/DKI	6,13%

Source: Birl (2016)

## 2. Literature Review

Some researches have raised theme of *non performing financing* (NPF) both published in national and international journals. NPF is affected by macro and micro factors. Macro factors which affect NPF derived from macroeconomic indicators namely GDP, interest rate, unemployment rate while micro factors are derived from credit allowance and the banking credit growth itself. GDP and

bank asset profitability are correlated positively with NPF and NPF is correlated positively with unemployment rate, credit loss allowance and interest rate (Messai & Jouini, 2013). Besides, macro factors which affect NPF are exchange rate, inflation, and economic growth. These variables negatively affect NPF while PUAS (Sharia Interbank Money Market) variable and quasi money

have a positive effect on NPF (Nursechafia & Abduh, 2014).

Factors derived from financial ratio are given by FDR variable. FDR has a positive effect on NPF while Operating Expenses to Operating Revenues (BOPO) and bank size have no effect on NPF. Besides, other macro factors, GDP and inflation have a negative effect on NPF (Firmansyah, 2014). The research conducted by Iriani and Yuliadi (2015) stated that NPF is affected by macro variables such as inflation, JII (Jakarta Islamic Index), money supply and bank behaviour on credit risk in Sharia BPR (People's Credit Bank). By using time series data and VAR VECM as its analysis methods, the result is gained that in short term, inflation and JII have a negative effect on NPL. In long term, inflation and financing have a positive effect on NPF. The variables of JII, exchange rate and money supply have a negative effect on NPF in the long term. From the impulse response, the result showed that inflation and exchange rate give a positive response on NPF. On the contrary, JII, financing and money supply give a negative response on NPF.

The research conducted by Havidz and Setiawan (2015) stated that NPF is affected by financial ratios namely ROA, CAR, FDR, OER, bank size and macro variables namely GDP and inflation. By using data panel from BMI, BSM, BNIS and BMS from 2008 to 2014 and least square panel, it obtained the result that bank size has a negative effect on NPF. Besides, GDP give a massive positive effect on NPF. On the other words, if economic growth increases, NPF will also increase.

Research conducted by Lin *et al.*, (2016) stated that NPF and NPL are affected by IPI (Indonesia Publication Index), SBI (Bank Indonesia Certificates), exchange rate, money supply and economic condition (crisis or not). By

using data panel and regression method, it obtained the result that money supply and inflation have a negative effect on NPL, and a positive effect is given by crisis dummy, exchange rate and SBI variables. Differ from NPL, on conventional banks, NPF on BUS is only affected by exchange rate and money supply. It shows that BUS tend to be resistance toward crisis. Government's role is necessary in giving the fair and beneficial policies for banking so it can minimize NPF or NPL ratios.

Research conducted by Setiawan and Bagaskara (2016) stated that factors which affect NPF are GDP, exchange rate, inflation, CAR, FDR and OER. By using data panel of BUS from 2012 to 2015 and pooled least square regression method, it found that only FDR has no significant effect on NPF. The positive effect is given by variables of exchange rate and OER while the negative effect is given by variables of GDP, inflation and CAR.

## **2.1 Non Performing Financing (NPF) as Endogenous Variable.**

NPF or Non Performing Financing is a term derived from sharia banking while in conventional banking, it is known as NPL (*Non Performing Loan*). NPF is one of indicators of bank asset quality health. NPF which is used is NPF netto, that is NPF which has been adjusted. According to the Regulation of Bank Indonesia Number 6/10/PBI/2004 on 12th April 2004 regarding the assesment system of the level of commercial/general bank, if NPF ratio is more than 5%, it means that bank is categorized as unhealthy bank. The high NPF causes the decreasing of profit received by the bank. The profit decrease resulted on decreasing dividend distributed so it causes the disturbed banking financial performance.

## **2.2 Economic Growth**

Economic growth of a country is shown by GDP variable. GDP is a final total of goods and services produced by a country during a certain period. Components found in GDP are revenue, expenditure/investment, government expenditure, difference of export and import. According to some researches, economic growth measured by GDP has an effect on NPF. If GDP of a country increases, it will become a positive signal for society. The high GDP growth will increase purchasing power of society. Society's ability to pay goods and services will increase so the relationship with NPF it means there will be less group of society or client who will delay the payment or their financing in the bank.

### **2.3 Inflation**

Inflation is a condition where the prices of goods and services commodity become more expensive than before. The existence of inflation will make the currency value decreases. The effect of inflation change on NPF is the high inflation will cause the decreasing society's real income so the society's life standard also decreases (Mutamimah & Chasanah, 2012). Some researches show that inflation effect on NPF is negative and significant. Research conducted by Iriani and Yuliadi (2015) shows that inflation has a different effect on long term and short term. On the long term, inflation has a positive effect on NPF while on the short term, inflation has a negative effect on NPF. Thus, inflation is one of macro variables which is influential on *non performing financing*.

### **2.4 Exchange rate**

Exchange rate is divided into two; nominal exchange rate and real exchange rate. Real exchange rate is an exchange rate used in this research since it shows the high relevance on competition in an economy. Some researches show that

exchange rate has an effect on sharia banking performance. Exchange rate has a positive significant effect on NPF which is proven by the research of Setiawan and Bagaskara (2016), but it is contrary to the researches of Nursechafia and Abduh (2014) and Iriani and Yuliadi (2015) which show that exchange rate has a negative significant effect on NPF. The depreciation and the decreasing of exchange rate will cause the high risk level and it eventually causes the decreasing profitability of sharia banking.

### **2.5 Financing to Deposit Ratio (FDR)**

Financing to Deposit Ratio is liquidity ratio which is used to measure sharia bank ability in paying the short term loan and repay to its depositors and able to fulfill the financing demands punctually. Theoretically, the higher fund distribution by financing, the risk possibility of troubled financing will increase. According to Firmansyah (2014), the high FDR ratio shows that sharia banks are relatively not liquid because the amount of funds needed to finance the financing is greater. This is strengthened by the results of the research, which shows the positive effect of FDR on NPF.

### **2.6 Capital Adequacy Ratio (CAR)**

Capital Adequacy Ratio is a ratio or comparison between bank capital and weighted Risk-Weighted Assets (ATMR). CAR shows how much bank capital is sufficient to support its need and as a basis to asses the sustainability of bank business itself (Dendawijaya, 2009). CAR shows that a ratio can reduce the risk of credit failure, so the higher this ratio, the lower the NPF. BUS are encouraged by OJK to be able to increase their capital since by the increase of CAR ratio, NPF ratio can be minimized. According to Circular Letter of Bank Indonesia No, 26/5/BPPP of 29<sup>th</sup> May 1993, the amount of CAR should be achieved by a bank is at least 8%

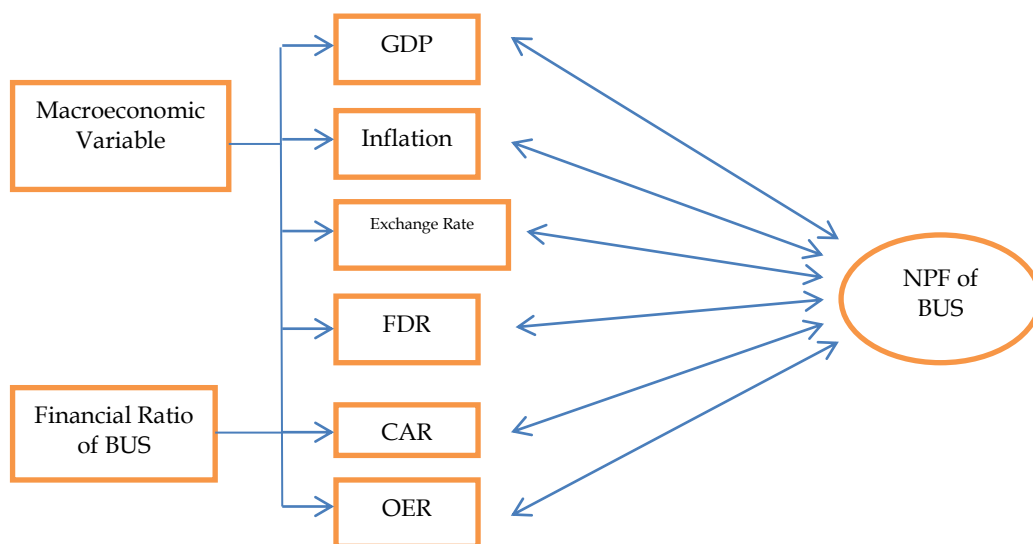
since the end of 1995, and since the end of 1997, CAR should be achieved is at least 8%. If CAR ratio of a bank is below 8% means that bank is not able to absorb the losses may arise from the business of the bank, then if CAR ratio is above 8% indicates that the bank is more *solvable*.

## 2.7 Operational Efficiency Ratio (OER)

Operational Efficiency Ratio (OER) also affects the troubled financing level. According to stipulation of Bank Indonesia, the operational efficiency is measured by comparing total operational cost with operational revenue/income or abbreviated as BOPO. This ratio which is often called the efficiency ratio, is used to measure the ability of bank management

in controlling operational costs to operational income. The more effective the bank in running its operational activity, the least problems faced in banking. According to stipulation of Bank Indonesia, maximum ratio of OER is 90%. The greater this ratio means sharia bank is becoming more inefficient. On the contrary, the smaller the ratio means operational cost is more efficient in other words, sharia bank is more efficient. It is proven by the research of Setiawan and Bagaskara (2016) which shows that OER has a significant positive effect on NPF. The higher the OER means the higher the NPF. On the contrary, the lower the OER means the lower the NPF.

The thought framework of this research can be seen in Figure 1.



**Figure 1: Theoretical Framework**

Source : Data Processing (2018)

Based on the theoretical framework above, then the hypotheses proposed in this research are as follows:

H<sub>1</sub>: There is cointegration relationship between NPF, GDP, Inflation, exchange rate, FDR, CAR and OER.

H<sub>2</sub>: There is a significant effect between NPF, GDP, Inflation, exchange rate, FDR, CAR and OER.

H<sub>3</sub>: There is one strongest *shock* variable which affects other shock variables on VAR model.

H<sub>4</sub>: There is a temporary effect between NPF, GDP, Inflation, exchange rate, FDR, CAR and OER.

H<sub>5</sub>: There is a causality relationship between NPF, GDP, Inflation, exchange rate, FDR, CAR and OER.

### 3. Research Methods

Data used in this research is secondary data with the data source derived from several institutions such as BPS, BI and OJK. By using time series data from Januari 2010 to August 2016, observation method obtained 80 observations from sharia banks in Indonesia. Variables and data source of the research can be seen in Table 2.

**Table 2. Variable, Symbol, Research Source of Data**

No	Variable	Symbol	Source of Data
1	NPF	NPF	Statistics of Sharia Banking (BI and OJK)
2	Economic Growth	GDP	BPS
3	Inflation	INF	BI
4	Exchange Rate	ER	BI
5	Financing to Deposit Ratio	FDR	Statistics of Sharia Banking (BI and OJK)
6	Capital Adequacy Ratio	CAR	Statistics of Sharia Banking (BI and OJK)
7	Operational Cost on Operational Income	OER	Statistics of Sharia Banking (BI and OJK)

Source: Data Processing (2018)

Time series data is an in order-time data taken based on certain time range in the research. Data analysis uses time series in order to explain the pattern or behavior of data through observation period or forecasting (Nursechafia & Abduh, 2014). This research uses some time series data which use VAR (Vector Auto Regressive) method. This research process uses eviews analysis tool since using eviews includes VAR model so econometrical analysis will work better.

The first step in analyzing *time series* data is examining the data stationarity. From stationarity test, it can figure out whether *time series* data has been stationary at level or not. If *time series* data has not yet been stationary at level, it can be decreased or stationary at *1<sup>st</sup> difference*. Data analysis method depends on data to be analyzed. In this research, if data has been stationary at level, or some have been stationary at level, and some are at *1st difference*, so it can use research method by using VAR approach. Yet, if all *time series* data have been stationary at *first difference*, it may

use VECM if integration occurs. In this research, there are several steps in analyzing *time series* data by using VAR method.

#### 3.1 Unit Root Test

Time series data considered stationary if it shows the constant pattern form time to time. Unit root test used in this research is *Augmented Dickey Fuller* (ADF) test. If ADF t-statistics value is less than Mac Kinnon critical value, so that variable has not got unit root so it is stationary at certain real level. On the other words, if the probability is less than determined real level, e.g 0.05, that variable has been stationary. If the tested data is not stationary at level, data will be examined by using *first difference*. If probability value is less than 0.05 means data is stationary at first difference.

#### 3.2 Optimal lag Determination

Optimal lag determination is necessary to figure out the length of *optimal lag* which then will define the VAR model estimation. VAR model

estimation is very sensitive on lag length so it requires accuracy in determining lag length. Determining lag length in VAR model can use *akaike information criteria(AIC)*, *Schwarz information criterion (SIC)*, *Final prediction Error (FPE)*, and *Hannan-Quinn Information Criterion (HQ)* on eviews. Way to determine *optimal lag* is by finding the most numerous stars (the lowest lag value) on each *optimal lag* test.

### 3.3 VAR Stability Test

The next step after optimal lag determination is determining whether VAR model to be tested on choosen *optimal lag* is stable or not. This test aims to find out whether VAR model that is *Impuls Response Function* is valid or not. If VAR model is stable, IRF is valid, on the contrary, if VAR model is not stable, IRF is not valid. Stability criteria on VAR model is based on modulus value. If modulus value is less than 1, VAR model has been stable.

### 3.4 VAR Model Analysis

VAR Model Analysis is simultaneous dinamic equation with a variable hypothesis on certain period depends on that variable movement and other variable engaged in the system on the previous periods (Enders, 2004). VAR is an alternative approach of simultaneous equation with consideration of minimizing theoretical approach in order to be able to catch economic growth well (Widarjono, 2007).

VAR model is used if cointegration is not found or effect that shows long run equilibrium relationship. The equation of VAR model in this research is as follows :

$$\begin{bmatrix} NPF_t \\ LnGDPT \\ INF_t \\ LnER_t \\ FDR_t \\ CAR_t \\ OER_t \end{bmatrix} = \Lambda_{7 \times 1} + \sum_{i=1}^n Bi_{7 \times 7} \begin{bmatrix} NPF_{t-i} \\ LnGDPT_{t-i} \\ INF_{t-i} \\ LnKURSt_{t-i} \\ FDR_{t-i} \\ CAR_{t-i} \\ OER_{t-i} \end{bmatrix} + Et_{7 \times 1}$$

in which:

- $\Lambda$  : Constant matrices, the size of  $7 \times 1$
- $Bi$  : Coefficient matrices, the size of  $7 \times 7$
- $Et$  : Residual matrices, the size of  $7 \times 1$
- $i$  : shows time lag
- $t$  : shows time period
- NPF : *non performing financing*
- LnGDP : *gross domestic product*
- INF : *Inflation*
- LnER : *Exchange rate*
- FDR : *financing to deposit ratio*
- CAR : *capital adequate ratio*
- OER : *Operational efficiency ratio*

The above equation is tested simultaneously by f test meanwhile t-test statistics is used partially. Zero hypothesis in F test is independent variable does not affect dependent variable simultaneously, while zero hypothesis in t test is independent variable does not affect dependent variable partially. Testing criteria on F test and t test is rejecting  $H_0$  if statistics values of F test and t test are bigger than table value, or rejecting  $H_0$  if probability F statistic and t statistic are less than real level (5%).

### 3.5 Variance decomposition

Variance decomposition is an analysis in VAR model which gives a description of how important a variable because of the existence of *shock*. VD gives a description on how big a contribution of an endogenous variable on *shock*. Generally, the biggest *shock* which affect the diversity of each variable is *shock* which derives from the variable itself.

### 3.6 Impulse Response Function (IRF)

Impulse Response Function is used to find out the *shock* effect of a variable on other variables. A *shock* on endogenous variable will affect that endogenous variable itself and then will affect other endogenous variables. IRF is one of innovation points on VAR model which can give a relationship direction of how much the effect of an endogenous variable.

### 3.7 Causality Test

Granger causality test aims to figure out whether on endogenous variable, there is an inter-influential relationship. Generally, on this test, it can be evaluated the forecasting ability from a time series variable in the previous period on other time series variable in current period. The relationships that may occurs from this test, according to Gujarati (2004) are:

1. One way causality relationship from  $x_t$  to  $y_t$ .
2. One way causality relationship from  $y_t$  to  $x_t$ .
3. Two-way causality relationship or inter-influential relationship.
4. There is no inter-dependant relationship.

On granger causality test, statistics F test is used. Hypothesis zero in this granger causality test is X has no effect grangerly on Y and vice versa. The testing criteria is rejecting  $H_0$  if probability statistic F value is less than real level (5%).

## 4. Result and Discussion

### 4.1 Data Stationarity Test (unit Root Test)

The result of data stationarity test using *augmented dickey fuller test* shows that not all variables are stationary at the same level. NPF and CAR variables are stationary at origin level meanwhile LnGDP, INF, LnER, FDR and OER variables are stationary at *first difference*. It is shown by probability ADF test value at level is bigger than 0.05 while probability ADF test value at *first difference* is less than 0.05. Thus, not all variables are stationary at the same level so VAR model approach is used.

Cointegration test cannot be conducted since variables in this research such as NPF, LnGDP, INF, LnER, FDR, CAR and OER have different integrity degree. Cointegration only occurs on variables which have the same integrity degree so it can conclude that there is no cointegration among research variables.

On optimal lag testing, it is needed to obtain the best lag which shows efficient estimation and free residual. The existence of *optimal* lag also shows solution of autocorrelation problem. The shorter the lag, the better the model. Optimal lag testing uses criterias of FPE (*Final Prediction Error*), AIC (*Akaike Information Criteria*), and HQ (*Hannan Quinn Information Criteria*). Based on the result of *optimal* lag testing, the best criteria according FPE, SC, and HQ is on lag 1, while according to LR is on lag 3. The biggest lag is lag 7 determined by AIC as the best lag. So based on the most criteria, the first lag order is the best to further testing on VAR model.

### 4.2 VAR stability Test

VAR stability test is conducted after conducting the testing to find out the *optimal* lag. VAR stability test aims to find out the validity of VAR model analysis or



more precisely to find out the validity of *Impuls Response Function (IRF)* test. If the result of VAR stability test result shows unstable, so IRF result is not valid. But if VAR stability test result shows stable, IRF result is valid. The criterion of whether it is stable or not of this VAR stability test is if modulus value is less than 1.

Based on Table 3, if it is seen of modulus value of VAR stability test result shows that VAR equation with lag one has modulus value which is less than one. It shows that VAR model has been stable on its *optimal* lag that is lag one.

**Table 3. VAR Stability Test Result**

Root	Modulus
0.783023	0.783023
0.577413	0.577413
-0.286860	0.286860
0.251556	0.251556
-0.078305 - 0.145111i	0.164890
-0.078305 + 0.145111i	0.164890
-0.047732	0.047732
No root lies outside the unit circle.	
VAR satisfies the stability condition.	

Source: Data Processing (2018)

### 4.3 VAR Model Testing

Individually, the parameter of estimation result on VAR model is difficult to interpret. Therefore, the researcher will emphasis the deeper discussion on this research based on the results of *impuls response function (IRF)* and *variance decomposition (VD)*.

### 4.4 Variance Decomposition

Variance decomposition explains about how big the *shock* source of a variable. Based on Table 4, it found the

composition of NPF *Shock*. The biggest NPF *shock* is caused by the NPF *shock* itself. Besides, NPF *shock* is also influenced by OER change and exchange rate change. OER change is able to contribute up to the variation of 3,70% while exchange rate change is able to contribute up to the variation of 2,36%.

In this case, it concludes that NPF *shock* will be better explained by OER variable instead of other variables. It is due to other variables only have a little effect on NPF.

**Table 4. Variance Decomposition of NPF**

Period	S.E.	DNPF	DLNGDP	DINF	DLNKURS	DFDR	DCAR	DOER
1	0.340891	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.375671	92.35927	0.074552	2.025751	1.427045	0.199171	0.820398	3.093818
3	0.382631	90.00196	0.124474	2.201728	2.196774	0.342004	1.493784	3.639271
4	0.383625	89.65594	0.162373	2.192731	2.331770	0.353185	1.608749	3.695252
5	0.383781	89.59158	0.172290	2.197595	2.360263	0.352944	1.621772	3.703553
6	0.383799	89.58411	0.174084	2.197854	2.364330	0.352931	1.622194	3.704502
7	0.383801	89.58316	0.174277	2.197912	2.364936	0.352937	1.622176	3.704601
8	0.383802	89.58305	0.174291	2.197912	2.365016	0.352938	1.622183	3.704609
9	0.383802	89.58303	0.174292	2.197912	2.365028	0.352938	1.622186	3.704610
10	0.383802	89.58303	0.174292	2.197912	2.365029	0.352938	1.622186	3.704610

Source: Data Processing (2018)

#### 4.5 Impuls Response Function

Impuls Response Function (IRF) shows how long the effect of shock in a variable on other variables. IRF is an additional approach in VAR model which is able to show forecasting about duration of the shock in a variable, shock's characteristic, and response of NPF on each shock variable. IRF shows NPF's sensitivity in responding shock of each variable based on past periods (Nursechafia & Abduh, 2014).

Based on Figure 2 (see appendix), it found that shock effect of each variable both macroeconomic indicator variables such as GDP, exchange rate, inflation, as well as financial ratio variables such as FDR, CAR, and OER, is temporary. It is shown in the figure 2 that the effect shown by the line in the image will move to point 0 after the period of approximately seven

months upwards. All variables responded by NPF with various responses except the inflation variable. NPF response to the presence of shock or inflation changes is negative meanwhile NPF response to other variables is negative and positive depending on the current period.

Table 5 shows that based on Figure 2, shock of each variable is responded by NPF with different responses. NPF response to shock of all variables is temporary. It is in contrast to the research conducted by Nursechafia and Abduh (2014) which shows that shock of macroeconomic variable is responded by NPL with permanent and stable respond after a period of approximately seven months and upward. It shows that research period and research object also affect the conducted research result.

**Table 5. NPF Response on Variable Shock**

<i>Shock</i>	<i>NPF Response</i>
<b>LnGDP</b>	Fluctuating and temporary, will disappear after a 7-month period
<b>INF</b>	Negative and temporary, will disappear after a 7-month period
<b>LnER</b>	Fluctuating and temporary, will disappear after a 8-month period
<b>FDR</b>	Fluctuating and temporary, will disappear after a 5-month period
<b>CAR</b>	Fluctuating and temporary, will disappear after a 6-month period
<b>OER</b>	Fluctuating and temporary, will disappear after a 7-month period

Source: Data Processing (2018)

##### 4.5.1 NPF Response on GDP shock

At the beginning of the month to the sixth month, NPF response to the occurrence of GDP shock is fluctuating, that is positive and negative (up and down). Shock on GDP variable is responded by NPF with negative response at the beginning of the month to the second month. On the third month NPF response to GDP changes is positive and on the fourth month its response is negative. On the fifth month NPF response to GDP changes is positive. After the fifth period, NPF response to GDP changes is tiny. It is shown by the line on the image that is close to zero. The

effect of this GDP shock will disappear after the fifth period. It means it requires more than seven months for NPF to regain its balance.

Economic growth is an indicator of a country welfare. The higher the rate of economic growth of a country, the greater the purchasing power of the society. Society's ability to pay for financing will increase if society's income rises. It is in line with the researches of Nursechafia and Abduh (2014), Firmansyah (2014), and Setiawan and Bagaskara (2016). NPF response to the occurrence of GDP shock is fluctuating up to the fifth month. If it is seen from NPF shock source, the

contribution of GDP is tiny on NPF change, that is about 0,17%. It shows that GDP effect on NPF change is tiny proven by NPF response which will disappear after the fifth period. NPF only requires a short period over the shock occurred on GDP.

#### **4.5.2 NPF Response on Inflation shock**

Inflation shows the increasing of consumption goods price. The higher inflation will decrease the real income. Thus, the higher inflation will tend to increase the NPF. In this research, it has not been able to prove that inflation gives a bad effect on NPF. Yet, based on the result of NPF shock source, one of them is because of the inflation change. Inflation change contributes 2,20% on NPF shock.

Based on IRF, inflation shock is responded negatively by NPF from the early period to the sixth period. NPF reaches its balance after the sixth period. Theoretically, the existence of inflation will increase the price of goods and services. The increased goods and services price and unfollowed by the increasing income of the society will decrease society's ability to buy the goods and services. As the result, society's ability in paying the loan will also decrease.

In this research, inflation shock which is responded negatively by NPF is in line with the researches of Nursechafia and Abduh (2014), and Setiawan and Bagaskara (2016) which state that NPF response on inflation shock is negative. The Difference from the previous researches is that on the previous researches, the effect of inflation shock is permanent and stable after the seventh period while in this research, the effect of inflation shock is temporary and it will disappear on the seventh period. From other perspective, the existence of inflation will indirectly increase

company's income which increases the price of goods and services. As the result, this increasing income will cause the increasing ability of society that owns the business to pay the loan.

#### **4.5.3 NPF Response on Exchange Rate Shock**

Exchange rate is one of macroeconomic variables which shows the stability of a country. There are two exchange rate systems usually controlled by the government, those are fixed exchange rate system and floating exchange rate system or floating rate. The impact of this policy is that the exchange rate that occurs can be appreciated and depreciated. If a country's exchange rate depreciated, the prices of goods and services in the country will fall. The prices of imported goods will rise so people will be happier to buy local goods which are much cheaper than imported goods. The impact is society's income will increase because of the increased domestic purchasing power of society so society's ability in paying the loan will increase. It eventually causes the declining of NPF.

In early period to the third period, exchange rate shock is responded negatively by NPF which means when the shock of exchange rate occurs, in this case when the exchange rate of rupiah to dollar depreciated, it will cause the decreasing of NPF (Nursechafia & Abduh, 2014); (Poetry & Sanrego, 2011); (Iriani & Yuliadi, 2015). The result of this research is in line with the research of Setiawan and Bagaskara (2016) which states that exchange rate has a positive significant effect on NPF. The exchange rate change itself contributed around 2,37 % on NPF shock. This contribution is more than 1 on NPF which means there is a change on exchange rate which give a significant impact to NPF. It is shown by NPF response on the fluctuating exchange

rate shock on the seventh period. The effect of exchange rate shock will disappear after the seventh period.

#### **4.5.4 NPF Response on FDR shock**

Financing to Deposit Ratio (FDR) is a ratio used to measure the level of financing on the third party fund collected by BUS. The higher the FDR ratio, BUS will be more effective in managing their financing. Based on the standard of Bank Indonesia, FDR ratio considered good if it is on 80% to 110%. If FDR of BUS is less than 80%, means there are more third party funds of society which have not been managed properly. The average of FDR in this research is 100,22% in less than 7 years period. Theoretically, the high FDR in this research will also cause the higher NPF ratio (Firmansyah, 2014). Yet, this research result has not yet been able to show enough evidence regarding FDR effect on NPF. This research result is similar to the research of Setiawan and Bagaskara (2016) which shows that FDR has no effect on NPF.

It can be concluded from NPF shock source. FDR change is only contributed 0,35% on NPF shock. This contribution is tiny since it is less than 1%. However, if it is seen from IRF, shock of FDR is responded fluctuatingly by NPF. In the early period to the third period, NPF response on FDR shock is negative. It means that FDR shock occurred, in this case when FDR of BUS decreases, NPF will increase. On the contrary, when FDR of BUS increases, NPF will decrease. It is in line with the research of Poetry and Sanrego (2011) which states that FDR shock is negatively responded by NPF. The impact of FDR shock will disappear after the fifth period.

#### **4.5.5 NPF Response on CAR shock**

Capital is one of important aspects in banking which can be used to

overcome the risk. Capital in sharia general bank is represented by Capital Adequate Ratio (CAR) shows how much the banking ability in supplying fund for operational interest and overcoming the emerged problems. Theoretically, the higher the CAR, the NPF will be lower (Setiawan & Bagaskara, 2016). BUS which own adequate capital will be easier overcoming the emerged problems because of troubled financing.

This research result has not been able to show the effect of CAR on NPF. It is shown from NPF shock source. CAR change only contributes 1,62%. This contribution is smaller than inflation change which contributes 2,20% on NPF shock. Based on IRF, CAR shock is responded by NPF variously. The difference of CAR shock and shock of other variables is in the early period to the third period, NPF response on CAR shock is positive. It shows that when CAR increases, NPF will also increase. Generally, when CAR increases, NPF could decrease (Setiawan & Bagaskara, 2016). Yet, in this case, the increased CAR triggers BUS to distribute their financing. Therefore, the determination of financing distribution is loosen since the increasing of CAR makes the financing risk of BUS increases as well (Poetry & Sanrego, 2011).

Furthermore, on the third and fifth period, NPF response on CAR shock is negative while on the fourth period, NPF response on CAR shock is positive. The effect of CAR shock will just disappear after the sixth period. It means that NPF requires more than six months to be able to record CAR shock. Shock of CAR responded negatively by NPF means the increasing CAR will be able to decrease NPF. It is in line with the research conducted by Setiawan and Bagaskara (2016) which shows that CAR has a negative significant effect on NPF.

#### 4.5.6 NPF Response on OER shock

Operational Efficiency Ratio (OER) is a ratio which shows how much the operational burden done by BUS on operational revenue. The lower the level of OER, the more effective the BUS. If BUS are not efficient in running their business, the more cost spent, the banking financing and services to customers will more decrease. The impact is the increasing problem in banking as one of them is troubled financing. Theoretically, the lower the OER, the lower the NPF (Setiawan & Bagaskara, 2016).

OER change has bigger contribution than other variable changes in explaining NPF shock source. OER contribution on NPF shock is 3,70% bigger than inflation change and CAR change whose contributions are less than OER contribution. It is also explained by IRF, that OER shock is responded variously by NPF. On the early period to

the fifth period, NPF response is fluctuating on OER shock. After the fifth period, NPF response has started decreasing. NPF response starts from negative response. It shows that the increasing operational cost will decrease NPF in BUS. The increasing operational cost in BUS which is intended to reduce financing risk, indirectly will cause the decrease on NPF level. However, the increasing operational cost which is not intended to overcome financing risk will eventually more increase NPF (Setiawan & Bagaskara, 2016).

Shortly NPF response on shock of each variable summarized based on information of Figure 2 (see appendix). On the early period, NPF response on all variables is negative except on CAR shock. It indicates that sharia banking should be cautious in managing the capital to overcome the financing risk on sharia banking.

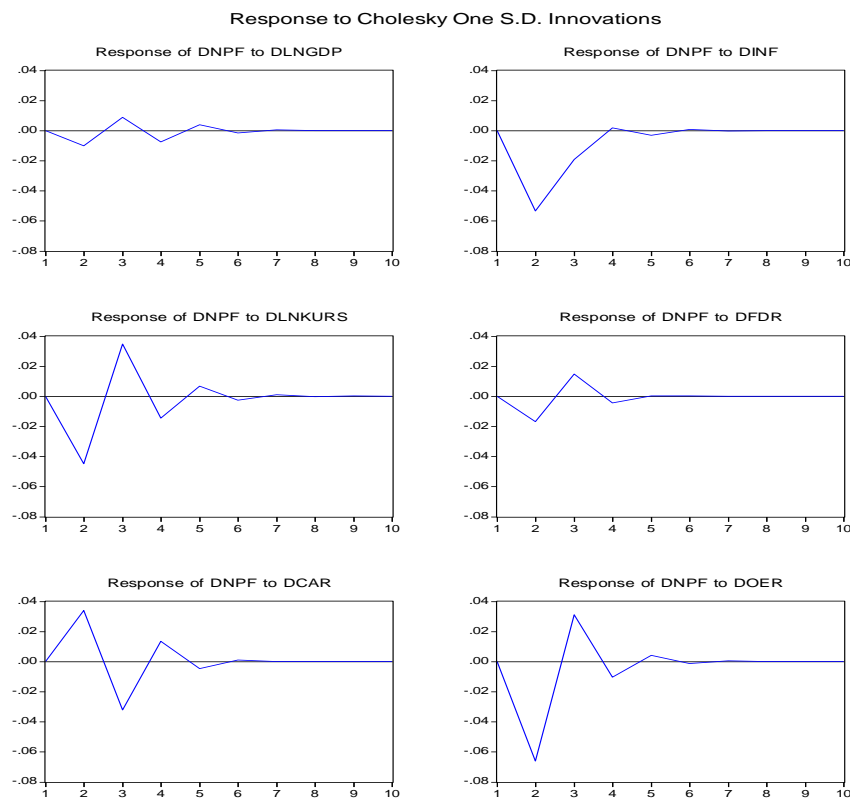


Figure 2. Response of NPF to other variables

#### 4.6 Granger Causality Test

Based on granger causality test, there is one way relationship from FDR to OER. It shows that FDR has an effect on OER but not vice versa. If financing from society has a great quantity, it will be very

influential to burden and operational revenue on sharia banking. Other variable shows that there is no causality relationship since the probability value is more than 0,05.

**Table 6. Granger Causality Test**

No	Hubungan	F-statistik	Probability
1	GDP → NPF	0.00451	0.9466
	NPF → GDP	0.09062	0.7642
2	INF → NPF	1.21841	0.2732
	NPF → INF	0.42629	0.5158
3	KURS → NPF	1.68773	0.1979
	NPF → KURS	0.23201	0.6314
4	FDR → NPF	0.22958	0.6332
	NPF → FDR	0.46611	0.4969
5	CAR → NPF	0.19728	0.6582
	NPF → CAR	0.04749	0.8281
6	OER → NPF	1.90582	0.1715
	NPF → OER	0.66122	0.4187
7	INF → GDP	0.59865	0.4415
	GDP → INF	1.1E-05	0.9974
8	KURS → GDP	1.86051	0.1766
	GDP → KURS	0.33545	0.5642
9	FDR → GDP	0.88435	0.3500
	GDP → FDR	0.00672	0.9349
10	CAR → GDP	0.12638	0.7232
	GDP → CAR	0.84459	0.3610
11	OER → GDP	0.31981	0.5734
	GDP → OER	0.09057	0.7643
12	KURS → INF	0.47232	0.4940
	INF → KURS	2.89428	0.0930
13	FDR → INF	0.10528	0.7465
	INF → FDR	0.07042	0.7915
14	CAR → INF	3.37071	0.0703
	INF → CAR	0.08317	0.7738
15	OER → INF	0.07466	0.7854
	INF → OER	0.49021	0.4860
16	FDR → KURS	1.59282	0.2108
	KURS → FDR	0.56266	0.4555
17	CAR → KURS	1.21103	0.2746
	KURS → CAR	0.09076	0.7640
18	OER → KURS	0.00458	0.9462
	KURS → OER	0.00032	0.9858
19	CAR → FDR	0.96229	0.3298
	FDR → CAR	0.92149	0.3402
20	OER → FDR	0.39651	0.5308
	FDR → OER	4.26750	0.0423
21	OER → CAR	0.03980	0.8424
	CAR → OER	0.06785	0.7952

Source: Data Processing (2018)

#### 4.7 Managerial Implication

The findings of this research have other implications as well for the practitioners of BUS to pay attention on ratio level in non performing financing. The ratio level of NPF can be minimized by society's income, exchange rate appreciation, capital, and operational revenue and cost of BUS themselves. Strong or not a sharia commercial bank in facing the challenge of credit risk will affect the stability of the economic itself. Therefore, since the biggest impact is from CAR, sharia financing is expected to be more cautious in managing the capital to press the financing risk level in BUS.

The finding of this study may serve as a reference for government policy makers to pay attention to bank specific variable to keep the stability of NPF since mostly of macroeconomic variable do not give significant impact.

#### 5. Conclusions

Based on results and discussion above, the conclusion are as follows: In this research, there is no cointegration among variables like NPF, GDP, inflation, exchange rate, FDR, CAR and OER. It is due to on the equation with this VAR model, model is not fully stationary at the same level. NPF and CAR variables are stationary at level while other variables are stationary at *first difference*. Thus, cointegration test which shows inter-cointegrated variable and has long-run equilibrium cannot be continued.

Based on VAR model, determination coefficient test explained by adjusted R squared, Adjusted R squared at *first difference* VAR model is 0,21. It shows that VAR model is good enough since adj R squared value is less than 1. According to F test, it gained the result that only NPF variable whose all independent

variables are significant simultaneously. It shows that on NPF variable, all independent variables affect NPF variable. While according to t test, it can conclude that as the outline, NPF, inflation, exchange rate, CAR variables are affected by the variables themselves in the past.

The variable *shock* component which strongest affects other variables is the variable *shock* itself. It is accordance with *variance decomposition* result which shows that the biggest *shock* of NPF, GDP, inflation, exchange rate, FDR, CAR, and OER are from variable *shock* itself. Based on NPF *shock*, macroeconomic indicator variables which affect NPF *shock* are inflation and exchange rate which each contributes 2,20% and 2,37% while financial ratio variables which affect NPF *shock* are from CAR and OER which each contributes 1,62% and 3,70%.

Based on *Impuls Respons Function*, *shock* of macroeconomic variable and financial ratio is is temporary. NPF response on inflation *shock* is negative while NPF response on *shock* of other variables is fluctuating, that is at the beginning, NPF response is negative then positive and repeated twice and found the balance above the fifth period. As the outline, NPF response starts from negative response except CAR *shock*. It shows that CAR *shock* has a bad impact on NPF.

Causality relationship only occurs on FDR and OER variables. Based on the causality test, it gained the result that there is one way relationship from FDR to OER. It shows that FDR or the amount of funds collected by BUS will affect its operational revenue and cost (OER).

#### 5.1 Research Limitation

In this research there are several limitations :

1. That is in this research, it does not use data of all sharia banks. The samples of this research are only BUS and the data taken by using time series.
2. The period for taking the samples is less than seven years.
3. Variables used in this result tend to be quantitative variables which are obtained from macroeconomic variable and financial ratio.

## 5.2 Suggestions

The suggestions that may be given is for further research:

1. It is better to use all sharia banks whether they are BPRS, UUS, and BUS so it will obtain the completed research result.
2. For upcoming research, it is expected, if using time series data, to take longer period, e.g. 10 years or more so it will obtain the significant result.
3. It is expected for further research to be able to use qualitative variables that is from client side, business activity and financing quality.

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