Effects of Macroeconomic Conditionson Non-Performing Loan in Retail Segments:
AnEvidence from theIndonesian Banking

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Abstract- The fluctuation of global economy condition in 2014 – 2015 will continuously change up to the end of 2016 and it makes uncertainty for players in industrial sectors of developing countries, including Indonesia. The changing of macroeconomicfactors like Gross Domestic Product (GDP) that is represented by Industrial Production Index (IPX), Currency Exchange Rate, BI rate, Consumer Price Index (CPI), and The Total of Money Circulation (M2) that happens in that period of time which also influences the banking industrial sector in Indonesia.Loan provision for Small Medium Enterprises (SMEs), which is generally known by retail segment, is facing a deceleration causing Non Performing Loan (NPL) on that segment.By using times series data on the macroeconomy variables and then it is conducted and analyzed by using *Vector Error Correction Model* (VECM) can be obtained that the NPL level in retail segment is influenced from the changing factors or macroeconomy variables. In short time, the varibale of money circulation (M2) will be a macroeconomy variable that has positive and significant impact towards NPL in retail segment, meanwhile in long term, currency exchange rate variable and the total money circulation (M2) will be macroeconomy variables that have positive impacts towards the NPL in retail segment.

Index Terms- *Macroeconomic Factors*, *Banking Industry*, *Retail Segment*, *Non Performing Loan*

I. INTRODUCTION

In period of 2014 – 2015 and up to 2016, there wasa fluctuative condition in global economy that gives uncertainty for players in industrial sectors of developing countries,including Indonesia. This deceleration phenomenonabout the exchange rate Rupiah against US Dollar (USD) occurs since the early of 2014 that reach up to 14% until in the middle of December 2014 and it's keep decelerating up to 16% on the third quartal of 2015 (*year to date*),even up to the end of 2016 and the first semester of 2017 the rupiah exchange rate always lies above Rp. 13.000 per US Dollar.

It is also followed by the inflation that shows a rising trend, reflected by an excessive growing of CPI during the period. By this condition, Bank Indonesia (BI) creates a regulation to increase the BI rates even up to 7.75%. The deceleration of rupiah currency against US Dollar, the hipe of inflation and regulation to raise BI rates in the period of 2014 – 2015 create an impact to any industries in Indonesia, including banking sector especially, there is a deceleration in loan growing level as in small medium enterprise loan or as is known by retail segment.

In other side, since the 2014 – 2015 up to middle of 2016, small medium enterprise IPX as the representation of the GDP, for this segment and money circulation (M2) in Indonesia is merely shows a growing trend, even though there is also a deceleration. By this global and local economy condition as is explained above, the troublesome loan or NPL in banking industry in Indonesia is growing. It is experienced by on of the big bank in Indonesia that has business core which mostly in retail segment. The macroeconomy factor like GDP that is represented through IPX, rupiah exchange towards USD, CPI, BI rate and money circulation (M2) are external or macroeconomy factors that is assumed influencing the NPL. This is the background of the study to do further research.

II. LITERATURE REVIEWS

The exchange rates of Indonesia Rupiah is value or price of domestic rates comparing to others (Salvatore, 2008). Trading between each countries in betweeen each of them has their own exchange tools emphasizing a comparative value between one currency to others that is called foreign exchange or currency. Consumer Price Index (CPI) is a cost metrics of the whole goods and services that is bought by consumer. According to Case and Fair (2002), inflation is a growth of price level entirely. It can be happen when the price growing simultaneously. Meanwhile, inflation rate is a rates on the price index from previous period (Mankiw, 2012). BI rate is a regulation of interest rates that reflects a stance in determining the monetary policy that is firmed by Bank Indonesia, announced to public and implemented on monetary operation that is done by Bank Indonesia through liquidity management in money market to achieve the monetary policy. Industrial Production Index (IPX) is a measurement of the changing in real of the total production in certain industry that can be calculated nationally. Because of the stocks of GDP data that only occurs every one quartal, for the approach to measure the economy growth can be used another indicator that is Industrial Production Index (IPX) as is used by

Kasri and Kassim (2009). According Lipsey *et al.* (1993) total money circulation can be identified as a total stocks in the economy of a certain period. *Non Performing Loan* (NPL) is a financial term that shows a constraints in paying a loan / claim.

Many studies have been conducted on*Non Performing Loan* (NPL) and influence of macroeconomic factors in banking sector.For example, a study by Zaib (2014) stated that NPL is affected by the external macroeconomicfactors such as GDP,*growth rate*, *exchange rate*, *lending interest rate*, *inflation rate*, and *unemployment rate.* Makri *et al* (2014) and Warue (2013) also stated that there is a strong realtionship between NPL and macroeconomicvariables such as GDP, interest rates level, infltion, and exchange value.

III. DATA AND METHODOLOGY

Data in this study consist of NPL of retail segment from2010 to 2016 at the bank.The variable used are macroeconomic variables in which IPX, exchange rates or Rupiah currency against US Dollar, CPI, BI rate, and total money circulation (M2). The choosing and data limitation and variable on this study is based on the data availability. The type of data that is used on this study is secondary data with time series type in a form of Industrial Production Index (IPX), Rupiah exchange against US Dollar, CPI, BI rate and total money circulation and also NPL data of Bank XYZ retail segment during the period 2010 up to 2016. Bank XYZ is one of big banks in Indonesia that showing the lowest loan growth in first quartal of 2016 and comparing to other bank in first quartal, it shows the biggest NPL ratio growth in retail segment comparing to other bank. Time series data as IPX is acquired from Statistic Department (BPS), rupiah exchange data against US Dollar, CPI, BI *rate* dan total money circulation (M2) is acquired from Bank Indonesia website http://www.bi.go.id. Meanwhile NPL data of retail segment is acquired from Bank XYZ. The software that is used in this study is *Microsoft Excel* 2010 to collect the data then after that to be conducted by using Eviews program. One of the research variable, which is IPX variable that consists of data series that is acquired quarterly so that to match with VECM modelity overally the variables are using monthly data, thus it is done an interpolation towards this quarterly data series by ussing CubicSpline. Then, data analysis technique that is used in this study is using Vector Auto Regression (VAR) method or Vector Error Correction Model (VECM).

The general VAR equation model that will be used to find the relationship between each macroecnomic variables in NPL retail segment level will follow the general model below :

$$y_t = A_0 + A_1 y_{t-1} + A_2 y_{t-2} + \ldots + A_p y_{t-p} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots 1)$$

Description:

y_t = Vector from endogen variable sized (n x 1), that is NPL retail segment variable and macroeconomic variables (IPX, CPI, Exchange Rate, BI rate, and total sirculation money)

A_0 = Intercept vector sized (n x 1)

A_1 = Coefticient matrix / parameter sized (n x n) for each$i$ = 1, 2, , p

ε_t = *Error vector sized* (n x 1)

Meanwhile, whenever using VECM model, the VECM general equation model inside this study is described below:

$$\Delta y_t = \mu_{0x} + \mu_{1x} + \Pi_x y_{t-1} + \Sigma \Gamma_{ix} \Delta y_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots 2)$$

Description:

y_t = Vector from the endogen variable difference sized (n x 1), that is NPL retail segment variable and macroeconomic variables (IPX, Exchange Rate, CPI, BI rate, and total sirculation money/M2)

μ_{0x} = Intercept vector from a model

μ_{1x} = Regression coefisien vector from a model

t = *time trend*

Π_x = $\alpha_x \beta'$ whereβ' include long-term co-integration equivalence

y_{t-1} = variable*in level*

Γ_{ix} = Regression coefficient matrix

k-1   = VECM class from VAR

ε_t = *error term*

IV. DISCUSSION AND RESULT

Non Performing Loans (NPL) is one of the main performance ratios that is generally used by bank to measure their ability to cover failed risk (default) based on debtor loan refund. It can be said that NPL has a risk in loan. Due to it represents loan risk, the more NPL also represent, the lower loan risk that is guaranteed by bank. Analysis ability factors that are done by bank to give loan can

determine the eligibility of their debtor to pay back the obligation (*first way out)*. Then, after loan is given , the bank is obligated to do a monitoring to the debtor by keeping observing them the eligibility and discipline aspects in fulfilling the obligation in the given period of time. Besides strengthen in the first way out, bank should also do the analysis to the guarantees as a second way out for the loan given through a commitment agreement of the loan by legal. All of the banks in Indonesiahave responsibilities to keep maintaining the NPL below 5% (*bank wide*) so that it can't be categorized Bank Under Intensive Monitoring as legalied in Bank Indonesia Regulation. The mobility of payment performance of retail segment debtor is influenced by other internal factor if its debtor, also it is affected by external factors such as the condition of economy climate and also other economy instruments, thus by time series it faces NPL fluctuation date to date.

Then, in this section it will be explained that the result given based on the shortlist or VAR/VECM modelling procedurethat is done related to time series data conducting of all variable in this study :

Stationairity Test

The main time series data analysis requirement on each data that is done is stationary. In stationairity test that is conducted as it's shown on table 1, all of the variable on this stationarystudy for the first difference so that the data analysis technique that is done in this study is using VECM methods.

Table1Stationarity Test Result

Variable	Level			First Difference		
	t statistics	Prob	Desc	t statistics	Prob	Desc
NPL	-2.274487	0.1828	Not stationair	-3.485210	0.0110	**Stationary**
LNEXCHANGE RATE	-2.498630	0.3282	Not stationair	-9.262572	0.0000	**Stationary**
IPX	1.011866	0.9964	Not stationair	-3.317838	0.0173	**Stationary**
CPI	-1.963033	0.6122	Not stationair	-8.225197	0.0000	**Stationary**
BIRATE	-1.428810	0.5643	Not stationair	-6.239812	0.0000	**Stationary**
LNM2	-1.969515	0.6090	Not stationair	-11.22955	0.0001	**Stationary**

Optimal Lag Test

After the data is selected by using VECM method, then it is done by using optimal lag. The selection of optimal lag in this model by using minimum lag recommendation value based on 5 optimal lag examination that lies in Eviews application,such as LR *test statistics* (LR), *Final Prediction Error* (FPE), *Akaike Information Criterion* (AIC), *Schwarz Information Criterion* (SIC), dan *Hannan-Quinn Information* (HQ). Based on the lag optimal test table on table 2 below, it can be known that optimal lag test can be tried until get the highest lag, which is up to 7-lag (AIC). It indicates that on that lag there are no autocorrelation problem.

Table 2. Optimum Lag Test

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-342.7799	NA	0.000346	9.059218	9.241852	9.132270
1	213.2435	1010.952	4.73e-10	-4.447882	-3.169443	-3.936517
2	299.7838	143.8593	1.29e-10	-5.760619	**-3.386374***	-4.810942
3	362.8127	94.95261	6.69e-11	-6.462668	-2.992618	-5.074678
4	436.3857	99.37126	2.74e-11	-7.438588	-2.872734	-5.612287
5	489.8266	63.85155	2.01e-11	-7.891601	-2.229941	-5.626987
6	529.9744	41.71192	2.27e-11	-7.999334	-1.241869	-5.296407
7	622.6069	81.80537*	7.38e-12*	-9.470309*	-1.617039	-6.329070*

However, based on the test that is done several times and to get best model especially when the variables are impulsed and to get the stability for a long term, the best model can be obtained at lag 2.

VAR Stability Test

According to the VAR stability test (Table 3), it can be guessed that VECM model that is used to analyse IRF and FEVD is stable. VECM stability requirement model should have modulus value between 0 and 1.

Table3VAR Stability Test

Root	Modulus
0.953095 - 0.017012i	0.953247
0.953095 + 0.017012i	0.953247
0.734984 - 0.502581i	0.890387
0.734984 + 0.502581i	0.890387
0.781630	0.781630
0.375551 - 0.298606i	0.479795
0.375551 + 0.298606i	0.479795
0.382655	0.382655
-0.251020 - 0.082682i	0.264286
-0.251020 + 0.082682i	0.264286
0.059563	0.059563

Cointegration Test

Based on cointegration test, the estimation result gives an overview that on each models they have more than one cointegration on a real level of 5. The total rank information as shown in Table 4 used as an error correction model (ECM), that will be included on the VAR model become VECM.

Table4Cointegration Test Results

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.656823	214.9448	150.5585	0.0000
At most 1 *	0.373524	127.2452	117.7082	0.0108
At most 2 *	0.309964	88.89832	88.80380	0.0492
At most 3	0.259753	58.47533	63.87610	0.1309
At most 4	0.181866	33.81208	42.91525	0.2972
At most 5	0.107927	17.35231	25.87211	0.3891
At most 6	0.092813	7.987357	12.51798	0.2527

Granger Causailty Test

Granger causality test that is done in this study is to determine the relationship between one variable to another variable. All of the variables can be considered as dependent or independent factors. In other words, all of the variables has a chance to influence or to be influenced by other variable. It is served with Granger causality test from each models.

Table5Granger Causality Test Results

	NPL	LNEXCHANGE RATE	IPX	CPI	BIRATE	LNM2
NPL					→	
LNEXCHANGE RATE			↔			
IPX				↔		
CPI		→				
BIRATE		→		→		
LNM2		↔	→	→		

Based on the causality test (Table 5), between IPX and EXCHANGE RATE variable has two-way relationship, so that the IPX and CPI variable, and M2 with EXCHANGE RATE variable. Meanwhile the NPL variable has one-way relationship with BI rate variable, the result on table 5 shows a one-way relationship between CPI against EXCHANGE RATE, BI rate against EXCHANGE RATE, BI rate against CPI, M2 against IPX and M2 against CPI.
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VECM Model Results

VECM estimation that is done to see the long term and short term analysis. Good VECM results for long term or short term can be seen on Table 6 :

Table6VECM Estimation Result

Variable	Coef	t
Short Term		
CointEq1	-0.038809**	[-2.49175]
D(NPL(-1))	-0.184907	[-1.36775]
D(NPL(-2))	-0.164394	[-1.26398]
D(BIRATE(-1))	-0.436302	[-1.16628]
D(BIRATE(-2))	-0.089034	[-0.22748]
D(EXCHANGE RATE(-1))	-2.919429	[-0.90085]
D(EXCHANGE RATE(-2))	3.876883	[1.15569]
D(M2(-1))	11.863759*	[1.68476]
D(M2(-2))	12.807019*	[1.91388]
D(CPI(-1))	0.082428	[0.66542]
D(CPI(-2))	0.110219	[0.89086]
D(IPX(-1))	0.004503	[0.05092]
D(IPX(-2))	-0.036926	[-0.42147]
Long Term		
IPX(-1)	-0.00145452**	[2.30546]
EXCHANGE RATE(-1)	0.5609662439**	[2.88384]
BIRATE(-1)	0.006837253	[0.49202]
CPI(-1)	-0.014123069**	[2.09679]
M2(-1)	0.3673964989**	[2.17927]
C	-6.2010689	
R-squared	0.306992	
Adj. R-squared	0.172528	
F-statistic	2.283075	

Note: *shows a significant variable on 10% level.
         **shows a significant variable on 5% level.

From table 6 it can be known from the VECM estimation result for short term and long term as in below :

a. Long Term

- IPX has negative and significant influence against NPL growth on retail segment during research period as 0.00145452. It means, once IPX is growing 1%, then NPL of retail segment will fall to 0.00145452%. The finding is similar with the study conducted by Akinlo and Emmanuel (2014). They stated that the economy growth represented by GDP gives a negative impact to NPL in the long run. Messai and Jounini (2013) also stated that GDP and ROA have negative impact towards NPL, meanwhile the unemployeement and interest rates give positive impact. The deceleration of economy represented by GDP and in detail is represented through IPX from each industry is a main cause for the hipe of NPL inspite of other factors like unemployement and. Skarica (2014) stated that the main cause of the hipe of NPL is there is an economy deceleration that can be seen from the CPIlevel, unemployement and CPI. If the production output that is located on a country falling, it indicates there is a depression on business performance. It effects against financial performance of a debtor so it will increase the payment fail ratio that leads problematic loans.

- EXCHANGE RATEhas positively significant against the growth of NPL of retail segment during a period of conductivity is 0.5609662439. It means, once EXCHANGE RATE is increasing by 1%, then the NPL of retail segment will be increasing up to 0.5609662439%. It is aligned with Akinlo and Emmanuel (2014) which stated that the currency exchange has a positive impact to NPL. The currency exchange between USD/IDR that is depressed will be followed by the increasing of NPL, that is caused by value exchange in which it represent relative price only in domestic by with that is situated on foreign countries. When the value exchange is depressed, then the goods and service import will push the business income through each players in which in this circle process is flowing through import mechanism. It can be depicted to explain the condition in which the exchange value is relatively influencing against loan provision in a foreign exchange. When the exchange rate depreciates, the principal amount of the loan in the rupiah denomination will increase and the interest expense to be paid by the debtor will also increase. It may burden the debtor's performance and may cause the debtor to default and potentially lead to problem loans. According to Kaminsky and Reinhart (1999), the unexpected depreciation of the domestic currency exchange rate threatens bank profitability and NPL performance.Another thing that can also explain this condition is the influence of the exchange rate is relatively influential on the provision of credit in foreign currency. When the exchange rate depreciates, the principal amount of the loan in the rupiah denomination will increase and the interest expense to be paid by the debtor will also increase. It may burden the debtor's performance and may cause the debtor to default and potentially lead to problem

loans. According to Kaminsky and Reinhart (1999), the unexpected depreciation of the domestic currency exchange rate threatens bank profitability and NPL performance.

- The BIRATE variable has a positive and insignificant effect on the NPL of the retail segment (0.006837253). It means when BIRATE increases by 1%, then the NPL of retail segment will increase by 0.006837253%. The increased interest rate will be accompanied by an increase in NPL. This condition is caused by the increase in the interest rate (BI Rate) will be responded by raising lending rates. This will have an impact on debtors who have to pay a larger credit interest burden. The increase in interest expense payable by the debtor will increase the likelihood of the debtor failing to pay. This is supported by previous research from Ekanayake and Azeez (2016) which states that interest rates have a positive effect on NPLs. According to Ahmad et al. (2008) and Giesecke et al. (2014), in long-term perspective, deteriorating corporate condition or corporate failures are positively and significantly influenced by changes in macroeconomic factors, such as interest rates. Specifically, it may affect the individual performance of the debtor and subsequently the deteriorating performance of the debtor will have an impact on the NPL rate increase.

- The CPI variable has a negative and significant influence on the NPL of the retail segment during the research period of 0.014123069. Which means, when the CPI increased by 1%, then the NPL of retail segment will decrease by 0.014123069%. This is in line with the results of research from Ekanayake and Azeez (2016) which states that the CPI negatively affect the NPL. Touny and Shehab (2016) also concluded that CPI rates and improved macroeconomic and financial conditions had a negative impact on NPL levels. There is even a research from Owusu-Antwi et al. (2016) stating that CPI has no effect on banking performance including NPL.

- Variable Amount of Money Supply (M2) has a positive and significant influence on NPL of retail segment during the research period of 0.3673964989. Which means, when M2 increases by 1%, then the NPL of retail segment will increase by 0.3673964989%. This is in accordance with research from Rashid (2014) which states that the money supply has a positive and significant effect on the NPL. The greater the amount of money in circulation (M2), will indicate the higher public purchasing power that can increase the level of public consumption and in the long run can encourage high CPI levels and ultimately can affect the business world. This condition will affect the debtor's performance in the long run. The increase of M2 in that period can cause the price increase of goods which further causes the increase of operational expense and the decrease of demand from the consumer so that it can affect the financial performance of the business actors, which in the end may impact on ability to pay the debtor in fulfilling its obligation to the bank. The greater the money supply (M2), indicating the higher purchasing power of the public that can increase the level of consumption of the people and in the long run can increase inflation (Ihsan and Anjum, 2013).

b. Short-Term

In the short term, only one variable of the macroeconomics conditions affects to NPL of the bank. The M2 variable has a positive and significant effecton the NPL of the retail segment are only M2 variables. Other macroeconomic variables which also have a positive but not significant influence are the EXCHANGE RATE and CPI variables, while the BIRATE and IPX variables have a negative and insignificant effect on the NL retail segment. This is in accordance with research from Rashid (2014) which states that money supply has a positive and significant effect on NPL and Akinlo and Emmanuel (2014) stating that in the short term, credit to the private sector, exchange rate is one of the determinant factors of NPL. There is an error correction of 0.038809 which has a statistically significant impact. Which means It means that the error is corrected by 0.038809% every month to go to long-term balance.

From the explanation of the VECM model estimation result in the long-term and short-term above, it should also be considered that there are other factors outside macroeconomic factors which can also affect the NPL, including NPL of retail segment, that is internal factor of each bank as perpetrators of the banking sector as well as factors of the debtor itself. Internal factors of the bank include weaknesses in the process of credit analysis conducted by the Bank. This is in accordance with research from Richard (2011) which concludes that a weak credit analysis becomes an NPL factor. In addition, the size of the bank and the size of the loan provided also affected the NPL, according to research from Yang Li (2003) which stated that the size of the bank loan and the size of the bank correlated positively to the NPL ratio. Malik et al. (2016) also states that the internal causes of bank size (total assets) have a positive and significant influence on bank performance, among others, ROE, ROA and NPL. Furthermore, other factors that may also affect the NPL are the factors of the debtor itself, namely the business experience and business diversification by the debtor (Damayanti, 2016).

Impulse Respon Function **(IRF) Analysis**

Impulse Respon Function (IRF) is shown in Figure 1. It shows how the NPL variable of retail segment respons a shock of macroeconomy varibale such as IPX, EXCHANGE RATE, BIRATE, CPI, and M2 during 100 period forward:
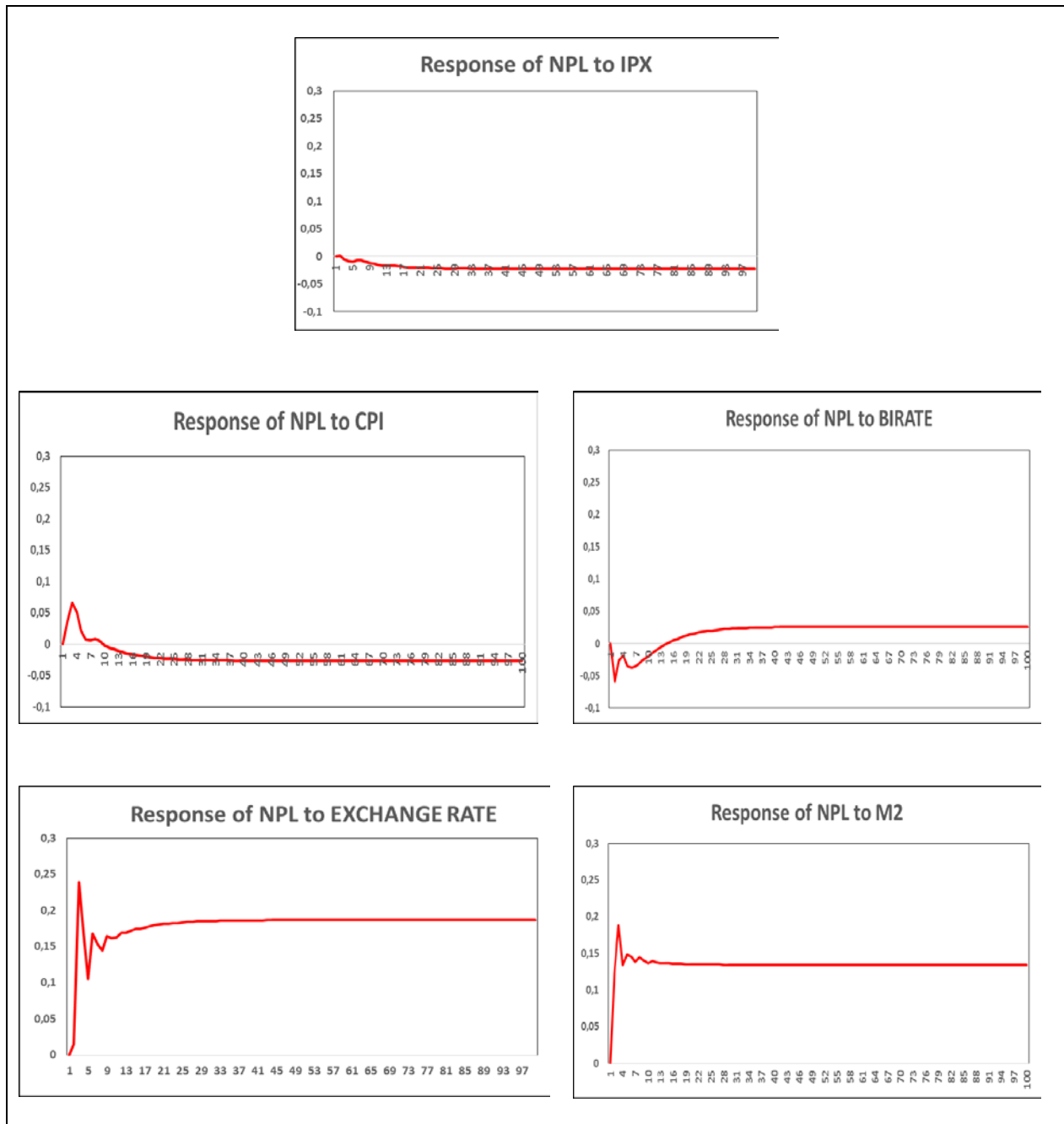
Figure1NPL of retail segment Response if IPX, EXCHANGE RATE, BIRATE, CPI M2 are impulse

Based on the results of impulse response in Figure 1can be explained that the negative NPL response is below the equilibrium point if the IPX variable is impulsed, the shock period until the 9th period and stable after the 9th period, the shock of 1 standard deviation impacts the NPL decrease of 0.02%. While the shocks that occur in EXCHANGE RATE variables responded positively by the NPL. Shock of 1 standard deviation impacted the NPL which decrease by 0.23% in the third period, then stabilized in the 9thperiod. The shocks that occur in the BIRATE variable are responded negatively by the NPL. Shock of 1 standard deviation resulted in decrease of NPL equal to 0,02% only until 14th period and the influence instantly rose (positive) of 0.03% after 14th period, NPL stabilized to BIRATE variable shock after 14th period. The shocks that occur in the CPI variable are positively responded by the NPL. Shock of 1 standard deviation resulted in NPL increase of 0.05% in the 4th period, then decreased (negative) after the 10th period of 0.0018%. Meanwhile, NPLs respond positively to shocks that occur in variable M2. Shock of 1 standard deviation impacted the NPL increase by 0.14% in the 9th period and started to stabilize after the 10th period.

***Forecasting Error Variance Decomposition* (FEVD) Analysis**

An analysis of the dominant macroeconomic variables contributing to the change in NPL of the retail segment is by using the output of Forecasting Error Variance Decomposition (FEVD). An analysis based on FEVD will show the macroeconomic warizers that make up the largest contribution to the long-term NPL in the retail segment. The dynamic structure between variables in VAR can be seen through FEVD analysis, where the pattern of FEVD indicates the nature of multivariate causality among the variables in the VAR model. The sorting of variables in FEVD analysis is based on cholesky katorization. The following will present the results of the FEVD analysis of the NPL of the retail segment in Figure 2:
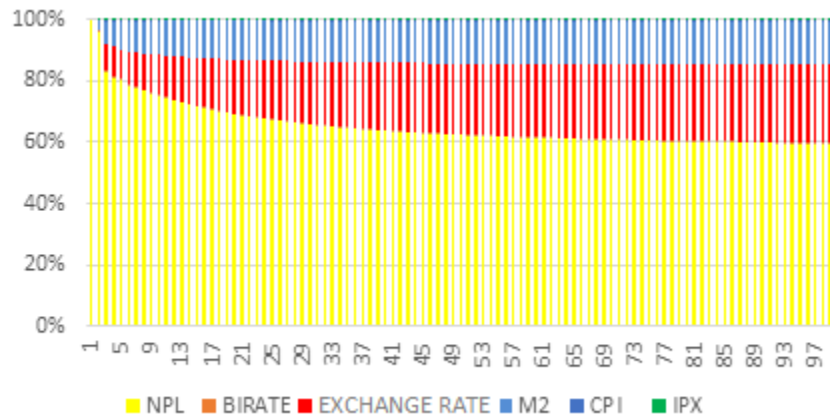

Figure2FEVD against NPL ofRetail Segment

Based on the variance decomposition results above, at the first period the variability and NPL value fluctuation can be explained on 100% by the NPL score itself, meanwhile the impact of other variable is not yet seen. The impact of other variable can be seen started in the second period, where EXCHANGE RATE give the most second fluctuation which reach 25% that is followed by M2 which reach 14%. IPX variable only give variability and fluctuation only 0.3% and BIRATE variable only gies variability and fluctuation around 0.4% whereas CPI variable only gives variability and fluctuation around 0.5%.

Managerial Implications

Based on the results of the discussion in the previous section, there are managerial implications that can be used by various parties in making decisions, among others useful as an early warning indicators if there is a shock to macroeconomic variables entered in the scope of this study. Managerial implications for banking practitioners as creditors who disburse credit is to anticipate macroeconomic factor changes in credit schemes to debtors, for example in the event of fluctuations in the rupiah exchange rate against the US dollar and according to the bank this may take a long time, the bank can reduce the portion of loan disbursement to debtors whose business field is directly related to export / import activities because it is directly related to the exchange rate of exchange which potentially causes losses in the foreign exchange transaction. Furthermore, the recommendation for debtors that most of the direct transactions relating to the exchange rate is by hedging mechanisms against transactions that could potentially disrupt cash flow or sources of business revenues, as well as seek other sources of funding other than banks to meet the funding requirements for operational sustainability business.

The next implication is in the form of recommendations to banking practitioners to be more stringent in monitoring the quality of their credit portfolios in the event of shocks to macroeconomic variables, especially shocks on the variable exchange rate. This is due to the exchange rate variable contribution in the contribution to NPL. Recommendations for regulators include the need for intensive coordination between Bank Indonesia (BI) and the Financial Services Authority (FSA) respectively as holders of monetary authority and supervision of the banking system in the event of or before economic shocks. The role of BI in maintaining the stability of monetary conditions and the role of OJK in supervising banks can be coordinated in order to keep the banking condition strong and stable. This becomes crucial given the potential for systemic risk arising during the disturbance of the banking system.

V. CONCLUSION AND RECOMMENDATIONS

Conclusion

It can be concluded that there is a relationship between macroeconomic variables changes with NPL of segment retail. The NPL level of the retail segment may be affected by changes in macroeconomic factors or variables such as IPX, Exchange Rate, BI Rate, CPI, and Total Money Supply (M2). These macroeconomic variables have an effect on NPL of retail segment in the short and long term. In the short term macroeconomic variables that have a positive and significant influence on NPL of retail segment only variable Money Supply (M2). In the long term, macroeconomic variables that have positive and significant influence are the variables

of Exchange Rate and the Money Supply (M2), the BI Rate variable also has a positive but not significant influence. Meanwhile, the macroeconomic variables that have a negative and significant influence are the IPX and CPI variables. In the long term, the macroeconomic variables that most influence the NPL of retail segment are the Exchange Rate variables. From the results of Impulse Response Function (IRF) analysis performed, the shock on the IPX variable will affect other macroeconomic factors in the longer term. Furthermore, the macroeconomic variables that provide the greatest contribution to the change of NPL of retail segment are the variables of exchange rate and the money supply (M2), while other variables such as IPX, BI Rate and CPI are the least variable of contribution to the change of NPL of retail segment.

Recommendations

Suggestions that can be given related to the result of this research is mainly for banksin order to give credit which always can consider the change of condition macroeconomic condition and bank expected to actively and aware to macroeconomic situation development so that macroeconomic changes can be identified earlier and can be anticipated the effect of such changes on the performance of banks, especially the NPL level. Furthermore, the suggestions that can be given related to the next research development is in addition to macroeconomic factors, it is also necessary to consider the condition of bank internal factors such as human resources, infrastructure, risk management undertaken, internal regulations etc. as other factors that can affect NPL in addition to internal factors of the debtor itself. In addition, the scope of research can be extended to all banks that have loan portfolios to small businesses, both conventional banks and sharia banks and so that further research is expected to enrich the study of the dynamics of changes in banking conditions to changes in economic conditions.

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