THE IMPACT OF MACROECONOMIC CONDITION ON THE BANK’S PERFORMANCE IN INDONESIA

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Abstract

This paper analyzes the impact of macroeconomic indicator (including the production index, inflation, Bank Indonesia rate, Jakarta stock index, exchange rate and the crude oil price) on the state owned banks’ performance. We apply the Vector Error Correction Model (VECM) on the banking data ranging from 2006-2013 and provide us several findings. First, the impulse response function shows the largest response of the bank overhead cost (BOPO) due to the macroeconomic shock; we argue the volatility of this bank efficiency indicator reflects the inefficiency of the banks in Indonesian. Second, the amount of loan and the lending to deposit ratio (LDR) provide the weakest response due to the macroeconomic shock. This is in line with the result of variance decomposition, where the macroeconomic variable explains the least of the NPL variation. Third, from all macroeconomic variables we observe, the shock of Bank Indonesia’s rate generally provides the largest response of most of the bank performance indicators; which supports the use of the Bank Indonesia’s rate as effective monetary instrument.

Keywords: macroeconomic shocks, state-owned banks, indicators of bank performance, VECM.

JEL Classification: C32, E10, G21

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I. INTRODUCTION

Mishkin (2001) stated that the bank is an important institution and a major source for external financing in business in almost all countries. It even has a greater role in developing countries, not least in Indonesia. The role of the banking industry still dominates the financial system in Indonesia with a share of about 77.9 per cent of the total assets of financial institutions (Bank Indonesia, 2013). Banks function as an intermediary institution having a strategic role for the economic development of a country. Performance of the bank either individually or in a system, is expected to increase its contribution in the economy.

Because of the role of banks is so large, it is important to ascertain that the financial system and the economy in a country is also running smoothly and efficiently. Performance can be affected by the internal and external factors to the bank. Internal factors may include the competitiveness among banks, while external factors may include the macroeconomic and financial conditions of a country in general. The competitiveness of each bank may vary according to the characteristics and distinctive advantages they possess. But macroeconomic and financial conditions facing banks are the same when operating in the same economy. Conducive macro conditions can provide a positive environment to the development of banking itself. Conversely, macroeconomic and financial conditions that are less stable can affect market risk and the credit risk of banks, which in turn may have an impact on the bank’s performance. Just like a cycle, the stability of the banking system has an element of social stability of the financial system which empties back to the economic stability of a country.

Several other external shocks from abroad, such as the global financial crisis that followed a series of recessions in the world, can impact directly or indirectly on the bank’s performance. The indirect effect of shocks can affect the macro condition of Indonesia, which in turn would affect the performance of the bank.

In Indonesia, banks generally consist of six groups, namely State Banks (State Enterprise Operations), National Private Foreign Exchange Banks (BUSN), Private Non-Foreign Exchange Banks (BUSN Devisa), Regional Development Banks (BPD), Mixed Banks, and Foreign Banks. In terms of foreign exchange assets, BUSN has the largest share at 39 percent. Next ranked are the State Banks (36 percent), BPD (9 percent), Foreign Exchange Banks (8 percent), Mixed Banks (5 percent), and Non-Foreign Exchange Banks (3 percent). Although the largest portion of assets is BUSN, the number of banks in this group is roughly 38 banks, meaning that the average amount of assets per bank amount to approximately Rp 59 trillion. The state-owned bank group consists of only four banks, with average assets per bank amounting to Rp 523 trillion. State-owned banks contribute the largest share of bank net profits at 44.8 per cent (Bank Indonesia, 2013). In addition, the state-owned bank credit growth rate (24.9 percent) is also higher than the average loan growth of the banking industry (20.6 percent). From this data it can be seen that the role of state-owned banks dominate the banking system in Indonesia. According to Bank Indonesia in the Financial Stability Review in September 2013, state-owned
banks belong to the group of banks that are vulnerable to rising credit risks and interest rates and the weakening price of government bonds.

Two measures of bank performance that is often used is the return on assets (ROA) and return on equity (ROE) (see, among others Gizycki, 2001; Bonin, Hasan, and Wachtel, 2003; Athanasoglou, Brissimis, and Delis, 2005; Ghazali, 2008; Rumlére and Waschinck 2010; Sufian, 2011; Alper and Anbar, 2011; Mirzaei, Liu and Moore, 2011; Sastrosuwito and Suzuki, 2011; Ali, Akhtar, and Ahmed, 2011; Abiodun, 2012).

In addition to using ROA, Naceur (2003), Hamadi and Awdeh (2012), and El-Moussawi Saad (2012) add a variable net interest margin (NIM) as a proxy measure of performance. As with the above researchers, Schinasi (2005), Kool (2006), as well as Festic and Beco (2008) use the non-performing loan (NPL) variable as a performance indicator of the bank.

In general, the macroeconomic variables are often used as a determinant of the performance of the banking in a variety of studies is the national income or economic growth, inflation, and interest rates. Naceur (2003) used per capita GDP growth and inflation as macro variables that affect the performance of the banking system. Ali, et al. (2011), Mirzaei, et al. (2011) used the variables of economic growth and inflation, while researchers such as Gizycki (2001), Alps and Albar (2011), Hamadi and Awdeh (2012) used other macro variables such as interest rates. Festic and Beco (2008), De Bock and Demyanets (2012) used exchange rate a variable.

Factually for the period of 2006-2013, performance measures of ROA and Loan to Deposit Ratio (LDR) of owned banks seemed to have a tendency to increase (each with an average of 3.04 and 73.8 percent). At first glance, the ROA seemed less affected by global conditions, where the average ROA was higher than the previous period in times of crisis. At the same time, LDR had the lowest score at the end of each year (December). In contrast to the ROA, LDR was
likely affected by the global crisis in 2008. This is seen from a lower LDR when compared to the last months before the global financial crisis (August 2008). The LDR had increased again around April 2010 (Figure 1).

Other indicators such as ROA and NPL show the development were also quite good. The ratio of Operational Costs to Revenue (BOPO) value tended to decrease from the year 2006-2013, which indicates the performance of state-owned banks were better and more efficient. The BOPO value jump at the beginning of each year was likely caused by several regular programs. On the average the value of BOPO state-owned banks was still high at 91 percent, but its value in December 2013 was 66 percent. To NPL in the last year was worth about 2.2 percent, down drastically as compared to 2006 where it reached 15-16 percent (Figure 2).

In contrast to the ROA, LDR, ROA, and the NPL, NIM tends to fluctuate with an average value of 6.04 percent, without trending up or down. But from February 2012 until now, the value has been below 6 percent. Meanwhile, total third-party funds (TPF), credits, and state bank profits, continued to rise. The value of credit grew by an average of 22 percent per year, while the value of third-party funds grew about 15.8 percent. On average, annual earnings growth even exceeded loan growth and TPF was about 27 percent, but had experienced a negative earnings growth in 2008 likely due to the impact of the global crisis (Figure 3).

The description above raises the question of the performance conditions of banks in Indonesia. As presented in the literature review previously, a bank’s performance can be specified as a function of the bank’s internal and external conditions. Internal variables refer to specific factors (characteristics) of each bank, while the external variables may include macroeconomic conditions that have been mentioned.
Explicitly, the purpose of this paper is to examine the influence of macro shock conditions on the performance of state-owned banks. It is aimed to see how sensitive the indicators of the banks performance is against external shock variables that include macroeconomic factors. This is the main focus on the research, although researchers realize that reverse causation may occur. Reverse causation is where the performance indicators of a bank, through the credit channel, can also affect macroeconomic variables - such is the Clower constraint theory as proposed by Robert Clower in 1967 (Blancard and Fischer, 1998). Macro variables used include the Industrial Production Index (IPI), inflation, policy interest rate (BI Rate), and the exchange rate. The Jakarta Stock Exchange Composite Index (JCI) will be used as a proxy for external stock market shocks as well as the price of energy as a proxy for world crude oil prices. Proxies for the bank’s performance will be the variable profit, credits, and TPF, as well as financial ratios such as LDR, ROA, NIM, NPL, and ROA.

This paper proceeds with the following sections where the second section reviews the theory and related literature; the third section presents the data and methodology; the fourth section presents the analysis and interim results; and the fourth section presents the conclusions and implications of this study.
II. THEORY

2.1. Bank Performance Measurement

Mishkin (2001) stated that the performance a bank is seen from its main objective, namely how to operate to get the highest profit potential. The operations or business of a bank manager is basically concerned with four main points; i) liquidity management which ensures the bank has sufficient cash to pay depositors who will take the funds; ii) asset management which banks should pursue a low risk level by acquiring assets that have a lower risk and diversify asset holdings; iii) liability management which banks pay attention to on how to obtain funds at a lower cost. Lastly; and iv) capital adequacy management which the bank must decide on the amount of capital that must be managed and how to get the required amount of capital.

Based on Bank Indonesia Regulation Number 13/1 / PBI / 2011 on the Assessment of Commercial Banks, the bank’s performance is one factor that is included in assessing the soundness of a bank in addition to the risk factors. On the regulation, the bank’s performance factor consists of three elements that include the implementation of good corporate governance (GCG), profitability, and capital. The risk profile consists of 8 risks such as credit risk, market, liquidity, operational, legal, strategic, compliance, and reputation. The risk factors and good corporate governance are not included in the scope of the study.

While the bank’s performance in generating profits (earnings) consists of several indicators such as the ROA, NIM, the actual earnings component performance against budget projections, and the ability of the profit component in raising capital. Indicators that are the sources that support profitability is net interest income, operating income other than net interest income, overhead expenses, the burden of provisioning, and the non-core component of net earnings, where all these variables are calculated for average total assets. In addition, the indicators of the sustainability components that support profitability is the core ROA and profitability prospects in the future. Finally, the performance of banks in terms of profitability also looked at the ability of banks to manage profitability.

From the capital side, there are two components, the bank’s capital adequacy and capital management. Indicators in bank capital adequacy is the ratio of capital to risk-weighted assets (RWA), the ratio of core capital to risk-weighted assets, the ratio of the difference in earning assets with impairment loss reserves (CKPN) to total core capital and general reserves, as well as the ratio of the difference in quality assets with low CKPN to low quality assets to the amount of core capital and general reserves. Indicators on the second component for capital management is the management of bank capital and the ability to access capital as seen from internal and external sources.

From previous studies, the overall performance of the bank is measured using a proxy for profitability indicators. Two key indicators according to Bonin, et al. (2003), Athanasoglou, et al. (2005), Ghazali (2008), Sufian (2011), Alper and Anbar (2011), and Ali, et al. (2011),
are the ROA and the ROE. Mirzaei, et al. (2011), uses two variables as proxy for the health of banks using panel data bank in Europe in 1929. The ROA reflects the ability of the bank’s management to generate profit from the bank’s assets, although the value of ROA may be biased due to the activities of the off-balance-sheet. The ROE value shows the return on equity to shareholders. The ROA itself is not distorted by a high equity multiplier, while ROE ignores the risks associated with high financial leverage.

Rumler and Waschiczek (2010) only use ROE as a performance indicator in the case of state banks to Austria, while Gizycki (2001) only use ROA. For the case of Indonesian banks, Sastrosuwito and Suzuki (2011) conducted research on the effect of the bank’s internal factors, internal industry factors and the macroeconomic indicators of the profitability of the banking system post-crisis using panel data. Performance measures referred were proxied by the ROA. For the case in Nigeria, using a dynamic panel, Abiodun (2012) both use ROA as a measure of banking performance.

In addition to using ROA, Naceur (2003) uses a NIM variable as a proxy for the performance of banking, e.g. case in Tunisia. NIM is more focused on profits from activities that produce interest. Meanwhile, Schinasi (2005), Kool (2006), and Festic and Beco (2008) uses a NPL variable as one of the performance indicators of the bank with the justification that the NPL is able to measure the quality of the balance sheet. Gerlach, Peng, and Shu (2005) use a NIM and NPL variable as a factor that is considered to represent the profitability for the case in Hong Kong SAR using panel data. Likewise Hamadi and Awdeh (2012) as well as Saad and El-Moussawi (2012) use NIM as an indicator of banking performance in Lebanon.

In contrast to the above studies, Guerrieri and Welch (2012) uses four proxies for banking performance, i.e. total net charge offs, pre-provision net revenue, NIM, and Tier-1 Capital Ratio. Meanwhile, Awojobi and Amel (2011), use the Capital Adequacy Ratio (CAR) variable as an indicator of bank performance because they are more focused on the efficiency of risk management. Clair (2004) focused his research on the determinants of banking performance and resilience, using a variable of performance that is also slightly different from the others, i.e., interest income, fee income, total income, interest paid, salaries paid, total expenses, employment, capital and liquid assets.

2.2. The relationship between the variables of Finance and Economic Activities

Usually the complexities of the financial markets is generally represented in a macroeconomic model with only two variables, namely the interest rate and the money stock. But this time there are number of literature sources that indicate interest rates alone are not enough to reflect the relationship between a bank and financial markets within an economy (Blancard and Fischer, 1998). Credit availability and the quality of the balance sheet are a major determinant of the
level of investment. Greenwald and Stiglitz (1988) in Blancard and Fischer (1998) emphasizes the role of credit in the business cycle, especially in the transmission of monetary policy to influence the economy. On the other hand, the opposite can happen. Good performance of a financial market may occur in cases where financial institutions are themselves dependent on the environment in which the institution is located. Good macroeconomic conditions of the various indicators may stimulate, support and hasten the development of financial institutions.

Many studies show that the bank’s financial performance is affected by the business cycle (Lowe and Rohling, 1993; Calomiris, Orphanides and Sharpe, 1997; and Kaufman, 1998). When the economy is booming, both companies and households put out a sizeable proportion of their income to debt payments following a procyclical pattern. Assuming everything else constant, the bank’s revenue will rise along with the business cycle. According Clair (2004), the effect of changes in the business cycle to changes in the level of bank profitability is indirect. Because of the income and expenditure is procyclical, the advantages of a bank depends on the spending policies of banks and their credit risk profiles. Furthermore, the relationship between risk and

![Image: Diagram of Interrelations between the Banking Macroeconomic Conditions]

Source: Clair, 2004 (with modifications)

**Picture 1. Interrelations between the Banking Macroeconomic Conditions**
return depends on how prices are set for risk exposure as well as the lag between the decision to take the risk with the risk of crystallization in the profits or losses of the bank. When GDP increases, the bank has the potential to get a larger return by taking greater risks also, and ultimately increase profits. Figure 4 shows the inter-linkage between macroeconomics and banks.

In general, the main macroeconomic variables used in the literature is the national income (as represented by the GDP), interest rates, and inflation, while determinant that is a proxy of the other financial markets are stock prices. By using a panel data for banks in Tunisia, Naceur (2003) found that the macro indicators such as growth in GDP per capita and inflation did not have a significant impact on the NIM, but inflation was found to have a significant negative effect on ROA. At the same time growth in GDP per capita remained influential. Meanwhile, related to the structure of financial markets, the study found that a concentrated market structure is less favorable when compared to the competitive market structure. In addition, the stock market has a positive impact on the profitability of banks. This reflects the complementarities between the two.

In line with the above study, Gizycki’s (2001) research on banking in Australia also found that the internal variables of each bank lead to a variability in both the credit risk and profitability. This is in contrast to Naceur (2003), where macro indicators were used as explanatory variables to provide a strong influence on credit risk and profitability. Variable interest rates negatively affected the ROA while inflation was proxied by the positive effect on the property prices ROA.

The research of Mirzaei, et al. (2011) used the ROA and ROE as a proxy of banking performance. By using unbalanced panel of banks in Europe in 1929, the research found that the rate of inflation and economic growth only had a significant effect on ROA and ROE of banks in countries of advanced economies. Inflation itself was a negative effect, while there was a positive effect of economic growth. For banks in emerging economies, both macro variables were found to have no significant effect. There was a similar study showing that macroeconomic variables were not significant in influencing the performance of the bank, e.g., Alper and Anbar (2011) for the banking industry in Turkey. Empirically, economic growth and inflation had no significant effect on ROA and ROE. But the real interest rate was positive and had a significant impact on ROE.

In the State of Pakistan, Ali, et al. (2011) conducted a similar study using indicators of ROA and ROE as the dependent variable and bank-specific variables and macro variables as explanatory variables. The results showed positive economic growth and significant impact on ROA and ROE, but inflation only had a significant effect with a negative sign ROA. Athanasoglu, et al. (2005) conducted a study on the determinants of bank profitability, namely ROA and ROE. The macro variables used as independent variables were the business cycle, inflation and interest rates on long-term bonds. The results showed that the business cycle and inflation had positive and significant impact on the profitability of banks.
In Indonesia alone, Sastrosuwito and Suzuki (2011) conducted research on the effect of the bank’s internal factors, internal factors to the industry and the macroeconomic indicators of the profitability of the banking system post-crisis. Associated with macroeconomic indicators, the results of this study indicated that the macro variables, only proxied by inflation, had no significant effect on ROA. In addition this study confirmed the structure–conduct–performance (SCP) paradigm in the Indonesian banking system, where industry concentration has a positive and significant effect on profitability. Bonin, et al. (2003) actually found that the macro variables that proxy for economic growth has a significant influence with a negative sign of ROA. Bonin linked economic growth with the level of competitiveness of the banking sector. The higher economic growth associated with the development of the banking sector so was related to more intense competition among the banks, to ultimately reduce the level of ROA.

Festic and Beco (2008) used a variable NPL as an indicator of the performance of banks in Central and Eastern European Countries (CEECs) with the justification that the NPL is able to measure the quality of the balance sheet. The results showed that the macro variables such as economic growth, changes in the nominal exchange rate, and changes in long-term interest rates have a significant effect on the NPL. This influenced negative economic growth, while changes in the nominal exchange rate and interest rate had a positive effect on the NPL. De Bock and Demyanets (2012) found that economic growth and the growth of the exchange rate had a significant negative effect on the NPL. Research Gerlach et al. (2005) used a variable NIM and NPL as a factor that is considered to represent the profitability as with the case in Hong Kong SAR by using panel data. The results showed that an increase in economic growth and the inflation rate reduced NPLs, while the influence of short-term interest rates was positive for NPL. Meanwhile, economic growth, inflation, and short-term interest rates had a positive impact on the NIM.

Hamadi and Awdeh (2012) examined the determinants of Net Interest Margin (NIM) in the banking system in Lebanon by distinguishing between foreign banks and domestic banks. One important finding was the difference in effect size, liquidity, capitalization, and credit risk to the NIM. For domestic banks the influence was negative, but not significant for foreign banks. Likewise with the macro conditions and industrial structures had a weaker influence on the NIM of foreign banks compared to the NIM of domestic banks. Economic growth negatively affected NIM, while inflation and interest rate policy had a positive influence. But, in the same country (Lebanon), and Saad El-Moussawi (2012) found it otherwise. Economic growth was positively associated with the NIM, while inflation had no significant effect on NIM in the study.

By using another methodology, Principal Component Analysis (PCA), Shaher, Kasawneh, and Salem (2011) suggested that a main and most important factor in influencing the performance of banks in the Middle East region is the characteristics of the banks. Characteristics encompasses seven variables, namely, the size of the bank (measured by total assets), the size and duration of the deposit, the size and duration of the loan, the concentration in lending activity, net loan charge offs, capital and capital structure, as well as the operational costs of
banks. While economic indicators that include macro variables is the next most important factor affecting the performance of the bank.

While related to risk management, Awojobi and Amel (2011) explains that the efficiency of risk management for the banking industry in Nigeria is not only influenced by specific factors for each bank, but also by macroeconomic variables. In this study, the authors conclude that economic growth (as a proxy of the business cycle) has a positive influence on the bank CAR in Nigeria, so this implies that the banking industry in Nigeria is pro-cyclical to economic cycles. That is, when the economy is booming, there are more sources of capital to be obtained easily from the financial markets as a buffer from the various possibilities that may occur as a result of risk-taking activities of banks. But inflation itself was found to have no significant effect on CAR.

Research Abiodun (2012) found that none of the macro variables significantly influenced ROA. The macro variables in question was economic growth, inflation, interest rates and exchange rates. Rumler and Waschiczek (2010) only used ROE as a performance indicator for the case of banking in the Austria. In contrast to the results of Abiodun’s research, this study actually found that economic growth, interest rate / yield, and inflation had a positive and significant impact on ROE.

III. METHODOLOGY

The data used in this study are indicators of macroeconomic and financial variables and indicators of banking performance. The data used in this study is the time series data with monthly periods from January 2006 to December 2013. The banking performance indicators used in this study include financial ratios such as ROA, ROA, NIM, NPL, and LDR as well as non-variable ratios such as profit, the amount of outstanding loans, and the number of TPF. All the data was obtained from the Indonesian Banking Statistics, Bank Indonesia, while the macro variables used are the from the IPI as a proxy of national income, inflation, policy interest rate (BI rate), exchange rate, stock index, and world oil prices. Table 1 shows the explanation of the variables used and sources.
Table 1
Data Used in Research

<table>
<thead>
<tr>
<th>variable name</th>
<th>Data source</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance indicators such as Data Rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NIM (%)</td>
<td>SPI, BI</td>
<td>Net interest income (annualized) / average earning assets</td>
</tr>
<tr>
<td>ROA (%)</td>
<td>SPI, BI</td>
<td>Profit before tax (annualized) / average total assets</td>
</tr>
<tr>
<td>ROA (%)</td>
<td>SPI, BI</td>
<td>Operational expenses / operating income</td>
</tr>
<tr>
<td>NPL (%)</td>
<td>SPI, BI</td>
<td>Nonperforming loans / total loans</td>
</tr>
<tr>
<td>LDR (%)</td>
<td>SPI, BI</td>
<td>Credit / Third party funds</td>
</tr>
<tr>
<td>Data in the form of Performance Indicators Non-Rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPF (billion rp)</td>
<td>SPI, BI</td>
<td>Total third party funds</td>
</tr>
<tr>
<td>Loans (billion rp)</td>
<td>SPI, BI</td>
<td>Total lending to non-bank third party</td>
</tr>
<tr>
<td>Profit (billion rp)</td>
<td>SPI, BI</td>
<td>The net profit (annualized)</td>
</tr>
<tr>
<td>Macroeconomic Variables / External</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial Production Index (IPI)</td>
<td>BPS</td>
<td>Index of industrial production of large and medium</td>
</tr>
<tr>
<td>Inflation (%)</td>
<td>BI</td>
<td>YoY inflation calculation</td>
</tr>
<tr>
<td>Interest rate (BI Rate) (%)</td>
<td>SEKI-BI</td>
<td>-</td>
</tr>
<tr>
<td>Exchange Rate (Rp./USD)</td>
<td>SEKI-BI</td>
<td>-</td>
</tr>
<tr>
<td>Composite Stock Price Index (JCI)</td>
<td>SEKI-BI</td>
<td>-</td>
</tr>
<tr>
<td>World Crude Oil Prices ($ / bbl)</td>
<td>World Bank</td>
<td>-</td>
</tr>
</tbody>
</table>

A correlation analysis was used to see a linear relationship between bank performance indicators with the macro variables. Econometric methods such as Vector Error Correction Model (VECM) was applied to observe the macro effect of the performance of state-owned banks. VECM is a form of VAR for non-stationary time series that has a cointegration relationship. The VECM specification restricts the long-term relationship of the endogenous variables that converge into cointegration relationship, but still allows the existence of short-term dynamic conditions (Enders, 2004). The variables used in this study have the potential to be stationary on its first difference, making the model VECM a suitable for use. Actually the macro variables used have factual simultaneity, there by enabling the variable endogeneity problem to be solved with VECM modeling. VECM models in general can be represented as follows (Enders, 2004):

$$
\Delta y_t = a_0 + a_1 t + \Pi y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + u_t
$$

where \( y_t = (y_{1t}, y_{2t}, ..., y_{mt}) \) is the endogenous variable vector. In this research, \( y_t = (\text{LDR}_t, \text{NIM}_t, \text{BOPO}_t, \text{ROA}_t, \text{NPL}_t, \text{KREDIT}_t, \text{TPF}_t, \text{profit}_t) \); \( a_0 \) is vector column of the intercept with the size (nx1); \( a_1 \) is the vector of coefficients for time trend (t); \( \Pi = \alpha \beta' \) where \( \alpha \) is the adjustment matrix and \( \beta' \) contain the long-term cointegration equation; \( \Gamma_i \) is the regression coefficient matrix with size (nxn); and \( u_t \) is the error matrix size.
Implementation VECM involves stationary testing of the data, testing the stability of the model, determining the optimal lag, and testing cointegration relationship with the Johansen-Jusellius method. The analysis is based on innovation accounting in the form of analytical Impulse Response Function (IRF) and Variance Decomposition (VD).

IV. RESULTS AND ANALYSIS

Before discussing the influence of external conditions that affect the performance of the bank, the first part will discuss the correlation analysis of bank performance indicators with external variables, including the macroeconomic indicators. In the correlation analysis, the exchange rate is the macro variable that has the lowest correlation value with all the performance indicators of the bank. The IPI variable, however, appears to have a strong correlation with almost all the performance indicators of the bank, except the NIM. In contrast with respect to the performance indicators of the bank, the NIM is the variable with the lowest correlation with almost all macro variables. Lastly, TPF, as a bank performance indicator, has the largest correlation value (on average) with almost all macro variables.

In particular, LDR and ROA have the same positive relationship and very strong with the IPI and JCI, but has a negative correlation with the BI rate and inflation. Both also have the lowest correlation with the exchange rate variable. For the ROA and NPL, a positive correlation only occurs with variable inflation and with others variables, it is negatively correlated. This is of course consistent with the theory where the increase in inflation can lead to increased operating costs of banks, and assuming a fixed operating income, will increase the value of ROA. Inflation can also increase credit risk and potentially hamper loan payments, thus increasing NPL.

For non-ratio performance indicators as shown in Table 2, deposits, credit, and income have a negative correlation with inflation and BI rate and is positively correlated with the other macro variables. In general if sorted, indicators from the strongest to the weakest macroeconomic

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>IPI</th>
<th>INFLATION</th>
<th>BI RATE</th>
<th>JCI</th>
<th>EXCHANGE RATE</th>
<th>CRUDE OIL PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROA</td>
<td>0.83</td>
<td>-0.55</td>
<td>-0.79</td>
<td>0.89</td>
<td>0.08</td>
<td>0.65</td>
</tr>
<tr>
<td>NIM</td>
<td>0.01</td>
<td>-0.19</td>
<td>-0.14</td>
<td>0.001</td>
<td>-0.31</td>
<td>0.03</td>
</tr>
<tr>
<td>NPL</td>
<td>-0.75</td>
<td>0.61</td>
<td>0.90</td>
<td>-0.71</td>
<td>-0.25</td>
<td>-0.53</td>
</tr>
<tr>
<td>LDR</td>
<td>0.88</td>
<td>-0.42</td>
<td>-0.77</td>
<td>0.82</td>
<td>0.31</td>
<td>0.62</td>
</tr>
<tr>
<td>BOPO</td>
<td>-0.65</td>
<td>0.24</td>
<td>0.47</td>
<td>-0.58</td>
<td>-0.25</td>
<td>-0.47</td>
</tr>
<tr>
<td>CREDIT</td>
<td>0.93</td>
<td>-0.40</td>
<td>-0.72</td>
<td>0.90</td>
<td>0.34</td>
<td>0.59</td>
</tr>
<tr>
<td>TDF</td>
<td>0.93</td>
<td>-0.44</td>
<td>-0.73</td>
<td>0.91</td>
<td>0.32</td>
<td>0.58</td>
</tr>
<tr>
<td>PROFIT</td>
<td>0.91</td>
<td>-0.42</td>
<td>-0.71</td>
<td>0.94</td>
<td>0.22</td>
<td>0.64</td>
</tr>
</tbody>
</table>
variables with a correlation to bank performance, are the IPI, JCI, BI rate, crude oil prices, inflation, and exchange rates. Conversely, the bank performance indicators that have the strongest to the weakest correlation with the macroeconomic variables are deposits (TDF), credit, profit, LDR, ROA, BOPO, and NIM.

Meanwhile, the effect of the macroeconomic variables on the bank performance indicators in this study is derived from the analysis of IRF and VD. IRF analysis shows the response of a variable in the system is the result of shocks from other variables. Analysis of a proportion of the VD illustrates movements in sequence due to the shocks of the variable itself when compared with any other variable shocks. All testing was done in this study, starting with the testing of non-stationary data, the VAR stability testing, the testing of optimum lag, and cointegration testing.

From the analysis of IRF, the average ROA is an indicator of banks with the greatest response to shocks that occurred on macroeconomic variables, especially the BI rate. BOPO illustrates the interest costs to be paid and the bank earnings. The interest costs to be paid depends on the macro variables, especially the BI rate itself which is the basis for determining both lending and deposits. When the BI rate increases, the cost of funds will rise. Assuming a constant operating income, the ROA ratio will increase. In Figure 5 it can be seen that the relationship between the BI rate to the ROA is positive, which is in line with the results of the correlation coefficient (Table 2) which is also positive. Neither of graphic analysis and correlation can conclude that both are in line with the results of IRF BOPO, where BOPO respond positively to shocks that occur to the BI Rate.
Two other banking performance indicators that respond very well to shocks that occur to macro variables are profit and ROA. This contrasts with the results of the study of the Faculty of Economics and Management (FEM) IPB (2012), that found the ROA generally did not overly react to macro variables shocks as indicated by the small value of IRF. But the scope of the FEM study was conducted for one state bank. The results of Abiodun (2012) found that national income, inflation, and exchange rates had no significant effect on ROA. This difference is possible because of the internal variables that characterize the characteristics of each state-owned banks were not included in this study, while Abiodun (2012) added the bank’s internal variables such as the size of banks and capital adequacy. While credit and LDR can be summed up as bank indicators with the smallest response to shocks that occur to the macro variables. FEM study (2012) showed that most small shocks responded by the LDR was the exchange rate and the stock index.

The greatest response of the BOPO occurred due to shocks in the BI rate. Furthermore, the three consecutive smallest response of BOPO occurred due to shocks on inflation, IPI, and the price of crude oil. In contrast to the other bank performance indicators, profit and ROA showed high response in the event of shocks to the price of crude oil. This response indicated the smallest profit in the event of shocks to the exchange rate and inflation. The same with DPK, LDR where very little appeared to respond to shocks that occurred on inflation and IPI, while the greatest response occurred due to shocks in JCI.

The results obtained in this study showed a relatively low influence on inflation and national income on bank performance, which is confirmed by several previous studies, among others Naceur (2003), the Alps and Albar (2011), Sastrosuwito and Suzuki (2011), and Abiodun (2012). Meanwhile, according Mirzaei, et al. (2011), inflation and economic growth only affects the performance of banks in the developed world, and has no effect in developing countries. On the other hand, Gizycki (2001) found that inflation does have an effect, but only on ROA alone.

NPL responded negatively and big enough to shocks that occur in the proxy output or the economy of a country, i.e., the production index. This is in line with the findings of FEM (2012), where the sequence influence of the macro variables to NPL, from largest to smallest, were the BI rate, economic growth, the price of crude oil, JCI, inflation and exchange rates. The difference lies in the proxy output or the economy of a country is used. This study used production index as a proxy, while the FEM (2012) study used economic growth. The influence of shocks on economic growth or the negative production index to NPL was also discovered by De Bock and Demyanets (2012), in which it was concluded that the NPL is countercyclical.

Unlike the other bank performance indicators, NIM had big responses to shocks that occurred on inflation and IPI. Saad and Moussawi (2012) found the same thing to the effect using IPI (as a proxy for output / economy of a country), but the results were the opposite for inflation. In Lebanon, the country’s economy had a positive and significant effect on the NIM. But the opposite was true for inflation, where there was found to be no significant effect of
these variables on the NIM. The development of improved economic activity was accompanied by an increase in corporate profits acted to reduce non-productive loans and related expenses for bad debts so as to reduce the total costs and ultimately improve NIM.

The economic development of a country can be measured by national income, economic growth, or even more generally by influences considered positive to a bank’s performance. When the economy is experiencing a boom, there are more sources of capital that can be obtained easily from the financial markets as a buffer from the various possibilities that may occur as a result of risk-taking activity of the bank. But according to Bonin, et al. (2003), economic growth may negatively affect the performance of the bank. Bonin, et al. (2003) link economic growth with the level of competitiveness in the banking sector. The higher the economic growth associated with the development of the banking sector, the more competition among the banks that can ultimately reduce the level of bank profitability. But the results of this study has shown that the development of the economy or the national income, as proxied by the IPI, only had a large relative positive response to NIM, and negative response to the ROA.

Shocks to the stock market were seen addressed by several indicators of banking performance. The stock market can be influenced positively or negatively on the performance of banks. Growing stock market conditions were considered to be a positive influence on the performance of the bank if the two are complementary (Naceur, 2003). But if the stock market and banking are two parties that replace each other, then the impact of stock market developments on banks is negative. According to Wachtel (2003), bank financing is still dominating both for individuals and for companies. A new investment usually obtain funding from several sources including from internal financing, through banks, or even through the capital markets to acquire new shares. The acquiring of new shares is not a major source of finance. On the other hand, a company also acting as a creditor bank may also be involved in the stock market. When the stock market is bullish, there is the potential diversion of corporate funds in the bank to become an instrument of equity investment, which would have a negative impact on the bank’s performance. Figure 6 shows the responses of the bank performance indicators to external shock variables.
Figure 5.
Response to Shocks Bank Performance Indicators an External Variables
Inflation itself can influence positively or negatively on the performance of banks. Inflation caused by the development of the business cycle will cause an economy to experience a *boom*. Inflation usually has a greater effect on the revenue side than on the cost side, and may end by improving the bank’s performance. Effects of inflation itself depends on whether the inflation was anticipated or not by the bank (Pasiouras and Kosmidou, 2007). If inflation is fully anticipated, then the interest rate applied by bank will increase to cover the risk of inflation. So the revenue would increase faster than costs increases, resulting in a positive impact on the bank’s performance, especially on the level of profitability. But if the bank’s management does not anticipate changes in inflation, then interest rates are adjusted slowly, thus increasing costs faster than the increase in income, and eventually inflation will have a negative effect on profitability. In this study, the shocks on inflation only responded to NIM and ROA.

Over the past 12 years, economic growth has been on average 5.42 per cent, while the average rate of inflation was 8 percent. In 2005, inflation in Indonesia had reached 17.11 per cent, which at that time was due to an increase in world oil prices. Meanwhile inflation itself had a value of up to two digits in the period of the *oil price shock* (the fourth quarter of 2005 - the third quarter of 2006) and the global crisis period (quarter II - IV 2008). To cope with inflation rising during the *oil price shock*, the interest rate (BI Rate) also increased considerably reaching its high at 12.75 percent figure. Conversely, in 2012 the value of the BI rate reached the lowest number (5.75%) in the last 10 years. Macro-economic indicators such as inflation and the BI rate shown a downward trend over the last two years. The decline in the BI rate was followed by relatively low inflation. This policy creates a very favorable economic conditions for banks and businesses.

From the VD analysis, banking indicators were shown to be stable, or in other words diversity is more explained by itself by profit and NPL (Table 3). For the NPL, these results are consistent with FEM (2012) study for the case of the state-owned banks which showed that the influence of the macro indicators, except for the BI rate to NPL, is not very influential. In line with the results of the IRF, apart by itself, the BOPO diversity is more explained by the exchange rate and the BI rate. The value of state-owned bank loans in the form of foreign currency continued to increase in the period of the assessment of the share of total credit to a third-party at about 16-17 percent, meaning the exchange rate could have potentially a considerable influence on ROA.

**BI rate** is variable among other macro indicators which most explains the diversity of deposits (TPF) and loans. This is in line with the results of the correlation analysis and IRF. Either TPF or credit has a strong linear relationship with the BI Rate, as well as with IRF. This is certainly consistent with the theory in the monetary policy transmission mechanism. Where BI Rate changes may affect the real sector through the interest rate channel, especially interest rates on deposits and loans. Because BI Rate is a benchmark interest rate, the decline may lower interest rates on both savings and loans. Finally, credit could potentially increase while
deposits experience the opposite. Macroeconomic indicators that could explain the diversity of the performance of state-owned banks in the top five percent, among others, are the exchange rate for the ROA, the BI Rate, JCI, world crude oil prices, the exchange rate for the TPF, the BI rate to credit, JCI for LDR, inflation, and the BI rate for NIM.

<table>
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<th>Table 3</th>
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<tr>
<td>Result Analysis of Variance Decomposition (average over 20 months, in percent)</td>
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<tr>
<td>TPF</td>
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<tr>
<td>CREDIT</td>
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<tr>
<td>PROFIT</td>
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<td>BOPO</td>
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<td>LDR</td>
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<td>NIM</td>
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<td>NPL</td>
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<td>ROA</td>
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V. CONCLUSION

From the results of correlation analysis, the exchange rate is the macro variable that has the weakest relationship with all the performance indicators of the bank. In contrast, the industrial production index (IPI), as a proxy of national income, has a strong relationship with almost all the performance indicators of the bank. In terms of performance indicators of the bank, NIM is the variable that has the most tenuous relationship with almost all macro variables, and TPF (deposits) has the strongest association with almost all macro variables. From the analysis of the IRF, the ROA is an indicator of banks with the greatest response to shocks that occurred to the macroeconomic variables. While the total amount of loans and LDR can be summarized as banking indicators, they are not too responsive to shocks that occur in a macro variables. From the VD analysis, the diversity of macro variables is explained by income (TPF) and NPL banking indicators. This can mean income and NPL are more stable, or it can also have another meaning where there is the possibility of other macro variables outside these variables that have more influence on both.

In general among all macro shocks, the variable largest response of the bank’s performance indicators is the policy rate (BI rate). BI rate is the most potent instrument owned by Bank Indonesia to maintain the stability of the financial sector, especially banking. In other words, the use of the BI rate as a monetary instrument can be maintained.

The most volatile banking performance indicator is the BOPO which is an indicator of efficiency. BOPO fluctuations show Indonesian banks were actually relatively far compared to
the frontier, and means the banks are still relatively inefficient. These results are supported Alfin, Siregar, and Hasanah (2015) that showed the commercial banks in Indonesia as a whole have not been operating efficiently.

Moreover, real interest rates were also found to have a significant effect on cost efficiency. BOPO fluctuations itself means less stable banking performance. The implication, the BI or the Financial Services Authority (FSA) need to continue to look for more detail indicators related to BOPO in an attempt to stabilize the national banking system. Improved efficiency can be done by increasing revenue and/or reducing the burden/costs. Increasing income requires strategies that are more complex and comprehensive than a decrease in costs. In this context of lowering overhead costs, promoting branchless banking may be seen as relevant strategy. BI and the FSA can more aggressively require banks to implement branchless banking while refining the rules to support it.
REFERENCES


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