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Financial Performance and Macroeconomics toward Capital Adequacy: Empirical Evidence from Indonesian Banking

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The banking industry is a business unit that needs to be managed properly so that it can benefit and be sustainable, and still refer to the rules of the regulator, one of which is Capital Adequacy. This research was conducted at Indonesian banks. The dependent variable in this study is the Capital Adequacy Ratio (CAR) while the independent variables are financial performance and macroeconomics. Financial performance consists of Profitability, Credit Risk, and Liquidity. Whereas macroeconomics consists of Exchange Rate Risk and Interest Rate Risk. The purpose of this study is to determine the effect of financial performance and macroeconomics on capital adequacy in Indonesian banking. The results of this study found that capital adequacy is influenced by financial performance (profitability, credit risk, and liquidity) and macroeconomics (exchange rate risk and interest rate risk) shows various levels of significance.

Keywords: *Financial performance, Macroeconomics, Capital adequacy, Profitability, Liquidity, Exchange rate, Credit risk, Interest rate risk.*

Introduction

Banking institutions are one of the pillars of a country's economy, because they have an intermediary function between capital owners (fund suppliers) and users of funds (fund users), and one business unit that needs to be managed properly but still refers to the rules set by the regulator.

The capital aspect for banks is very important because banks need large capital in global competition. Besides that, capital for banks is also one of the important factors in providing loss reserves.

Almost all aspects of banking are influenced by the availability of capital directly or indirectly. Availability of capital is one of the key factors to consider when reviewing the security and health of the bank. Capital becomes a reserve of losses and provides a basis for maintaining customer trust. Capital is also the main determinant of bank credit capacity. Availability of capital ultimately determines the maximum level of assets that can be given to customers.

The measurement of bank financial stability, is determined by the capital adequacy rate of the bank (CAR). So, in the Basel Accord to minimise risk, the Bank for International Settlements (BIS) proposes rules related to the level of capital required for a bank (Berger & Bouwman, 2009) dan (Cetorelli, 1999).

In the Financial Services Authority (SE OJK) No. 14 / SEOJK.03 / 2017 concerning Rating of Commercial Bank Soundness, parameters or indicators in assessing capital include Bank Capital Adequacy.

The process of increasing and maintaining capital stability faces a trade-off between the stabilisation of operations and the high cost of capital. While banks as lenders must be conservative, so they demand collateral to receive the full amount of the borrower's obligations. From a business perspective, bank managers will consider anticipation policies for higher risks and higher returns. Because banks as lenders expect operating profit so that they do not experience an unhealthy financial period. Thus, the bank manager prepares a good plan to meet a sufficient amount of resources, namely capital, to handle unexpected losses, thus sharing the potential burden on depositors (Binh & Thomas, 2015). Capital Adequacy Ratio (CAR) is a benchmark for assessing the levels of capital adequacy of a bank that is oriented to international standards, with the aim that the bank is able to maintain its survival.

There are a number of things that affect the capital fluctuation, which include financial performance and macroeconomics. Synchronisation between macro (monetary) policies towards the micro sector (banks) is the main factor in maintaining the health of banks facing the global economic fluctuations that have occurred in the past decade.

Research on capital has been carried out by several researchers, but in this study, the researchers want to confirm that capital is associated with the dynamics of internal factors and external factors of the bank.

Research conducted (Dreca, 2013), (Büyükşalvarcı & Abdioğlu, 2011), (Raharjo, Hakim, Manurung, & Maulana, 2014), (Polat & Al-khalaf, 2014), (Nuviyanti & Anggono, 2014), (Singjergji & Hyseni, 2015), (Bouheni & Rachdi, 2015), (Masood & Ansari, 2016), conveys determinant factors that influence Capital Adequacy Ratio / CAR, seen from internal factors. The dynamics of market risk in the Indonesian banking structure require management to be able to manage capital adequacy (CAR), which is able to adapt to external turmoil. As also conveyed by (Nnanna, 2003), macro indicators developed by the IMF in assessing the health of the Bank with CAMELS Acronyms of Capital (adequacy), are Assets, Management, Earnings, and Liquidity.

Research that combines internal factors and external factors is carried out by (Abba, Peter, & Inyang, 2013), (Aktas, Acikalin, Bakin, & Celik, 2015), (Ogege, Williams, & Emerah, 2012), (Yahaya, Mansor, & Okazaki, 2016) dan (Binh & Thomas, 2015).

From these studies, different results were obtained. So the aim of this research is to obtain a more comprehensive research model to complement some of the previous studies, that can still be developed more fully and comprehensively to find out the influence of financial performance and macroeconomics toward capital adequacy in Indonesian banking.

Literature Review

Bank Capital Structure

The structure of a bank's capital is not same as the capital structure of non-financial companies, because the characteristics of operating such companies are different from those of banks (Buser, Andrew H, & Edward J, 1981).

Bank capital has three functions (Johnson & Johnson, 1985) namely, among others (1) as a buffer that absorbs operational losses and other losses. In this function, capital provides protection against bank failures or losses and protection of depositors; (2) as a basis for setting the maximum credit limit. This is an operational consideration for the central bank, as a regulator to limit the amount of credit to individual bank customers. Through this limitation, the central bank forces banks to diversify their credit so they can protect themselves against credit failures from one individual debtor; (3) becomes the basis for calculating market participants to evaluate the bank's ability level relatively to generate profits. The level of profit for investors is estimated by comparing net profits with equity. Market participants compare return on investment among existing banks.

Bank Capital Adequacy

Capital adequacy is a measure of risk exposure for banks. Bank risks are grouped into interest rate risk, credit risk, exchange rate risk, and interest rate risk, which are included in the calculation of CAR (Al-Sabbagh, 2004).

The critical concept in the banking industry is capital adequacy ratio (CAR) , which shows the amount of bank capital in connection with the amount of weighted credit risk (Irawan & Anggono, 2015). The implementation of the minimum capital adequacy ratio function is to improve the test efficiency and capability of the financial system by reducing the possibility of banks becoming bankrupt. If this happens, this causes loss of confidence in the financial system , which causes problems for other banks and may threaten the financial market (Abba, Peter, & Inyang, 2013).

$$CAR = \frac{Equity}{RWA} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

Financial Performance

Profitability

Profitability ratio is the level of effectiveness achieved through the bank's operational efforts, which includes: (1) Profit margin and (2) Return on Assets (ROA). ROA is a picture of bank productivity in generate profits (Muhamad, 2014).

Return on Assets (ROA) is a ratio that is used to measure the ability of bank management to obtain profits (profits) as a whole. The greater the ROA of a bank, the greater the level of profit achieved by the bank (Irawan & Anggono, 2015); (Masood & Ansari, 2016).

$$ROA = \frac{earning\ before\ tax}{average\ of\ total\ asset} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Credit Risk

Credit risk management is the core of functionality for most banks. We can reduce Credit risk by reducing related party loans and large exposure to related parties. Asset classification and further provisions on provisions not only affect the value of investment products and portfolios but also the basic value of bank capital (Van Greuning & Iqbal, 2011).

To measure bank risk related to credit risk, one of them uses NPL Ratio. It shows the ability of banks in managing the problem of loans (Raharjo, Hakim, Manurung, & Maulana, 2014); (Karina & Anggono, 2014).

$$NPL = \frac{loss\ loans - Impairment\ provision\ on\ earning\ assets}{total\ loans} \ldots.(3)$$

Liquidity

Liquidity risk measurement is Loan to Debt Ratio (LDR), the financial ratio associated with the function of one bank as a financial intermediary. This ratio shows the relationship between third party funds and loans. The high percentage of LDR means that banks provide excessive loans which can cause financial pressure (Karina & Anggono, 2014).

$$LDR = \frac{total\ loans\ given}{total\ third\ party\ funding} \ldots\ldots\ldots\ldots\ldots(4)$$

Macroeconomic

Exchange Rate Risk

The vulnerability of banks to the rupiah exchange rate can occur through the Net Open Position (NOP) exposure of banks in terms of on-balance sheet and off-balance sheet. The indicator of Net Open Position (NOP) is Net Open Position on foreign money with capital (Ikatan Bankir Indonesia, 2015).

Interest Rate Risk

The bank's vulnerability to the risk of an increase in interest rates is measured through net billing exposures and short-term rupiah liabilities (under 1 year) that are sensitive to changes in interest rates based on bank maturity profile data. Banks that experience a positive gap on their balance sheet will benefit if there is an increase in interest rates. On the other hand, a bank with a negative gap will experience a loss that will hinder the increase in capital and can reduce CAR. Interest costs and Interest income are influenced by interest rates changes. Because of the difference in sensitivity to changes in rates of interest on productive assets and bank sources, the impact of changes in interest in income and interest costs is different (Raharjo, Hakim, Manurung, & Maulana, 2014).

$$\text{Interest Rate Risk (IRR)} = \frac{Interest\ Sensitivity\ Asset}{Interest\ Sensitivity\ Liabilities} \ldots\ldots\ldots\ldots\ldots (5)$$

Data and Methodology

The secondary data used in this study is a quarterly financial report taken from the website of the Financial Services Authority (OJK) within the 2008-2017 research period, detailing bank companies that are used as samples with BUMN and BUSN and a minimum capital of 5 trillion.

The dependent variable in this research is Capital (CAR), independent variables in this research are ROA, LDR NPL, exchange rate (NOP) and interest rate risk (IRR). Data analysis was performed using panel data regression analysis, and analysed using the EVIEWS 9 econometric statistical program. The selection of models was carried out with Pooled Leas Square (PLS), Fix Effect Model (FEM) and Random Effect Model (REM) by testing: Chow Test, Hausman Test and Legrange Multiplier (LM) Test. The discussion was conducted in two parts, starting with descriptive analysis and followed by a discussion of capital structure / regression data analysis.

The econometric model built to answer the objectives of this study is as follows :
$CAR_t = \beta_0 + \beta_1(ROA) + \beta_2 (NPL) + \beta_3(LDR) + \beta_4(NOP) + \beta_5(IRR) + \varepsilon$ ……. (6)

From the econometric model, the hypotheses of this study are:

a. Profitability on the Bank Capital
Return on Assets (ROA) used as a proxy for profitability (Büyükşalvarcı & Abdioğlu, 2011), states that profitability tends to increase capital.

Hypothesis 1: *Return on Asset* (ROA) has a positive impact on the bank capital in conventional banking in Indonesia.

b. Credit Risk on the Bank Capital
The Non-performing loan (NPL) has a negative and significant impact on the capital adequacy ratio in Indonesian banks (Abusharba, Triyuwono, Ismail, & Rahman, 2013); this is supported by research (Singjergji & Hyseni, 2015).

Hypothesis 2: NPL has a negative impact on the bank capital in conventional banking in Indonesia.

c. Liquidity on the Bank Capital
Loan on Deposit Ratio (LDR) has a negative and significant effect on the capital adequacy ratio in Indonesian banks (Nuviyanti & Anggono, 2014), (Singjergji & Hyseni, 2015) and (Binh & Thomas, 2015).

Hypothesis 3: LDR has a negative impact on the bank capital in conventional banking in Indonesia.

d. Exchange Risk on the Bank Capital

Williams (2011) put forward the important determinant of CAR. There is an inverse relationship between the exchange rate and CAR, an increase in the real exchange rate reduces foreign direct investment and thus reduces CAR. This is supported by the research of (Yahaya, Mansor, & Okazaki, 2016) in line with (William, 2011).

Hypothesis 4: Exchange rate (NOP) has a negative effect on the bank capital in conventional banking in Indonesia.

e. Interest Rate Risk on Bank Capital

Interest costs and Interest income are influenced by changes in rates of interest. Because of the difference in sensitivity to changes in rates of interest on productive assets and bank sources, the impact of changes on interest costs and on interest in income is different. The difference in sensitivity to changes in rates of interest will influence the bank's net interest income. And if net interest income becomes negative, it will erode bank capital (Raharjo, Hakim, Manurung, & Maulana, 2014).

Hypothesis 5: Interest Rate Risk (IRR) has a positive effect on the bank capital in conventional banking in Indonesia.

Result And Discussion

Table 2: Descriptive analysis

Variable	Total Sample	Mean	Std. Dev	Min	Max
CAR	520	16.87473	3.264168	10.27	28.49
ROA	520	2.279596	1.122595	-4.89	6.42
NPL	520	1.377923	0.946894	0	6.37
LDR	520	83.95079	13.28322	47.79	120.65
NOP	520	2.462611	2.945393	0	30.4
IRR	520	236.1376	72.3903	104.45	484.25

Source: Authors' Computation (2019)

Table 2 displays the results of descriptive analysis of panel data of the observation variables used to discover the factors that affect capital. Capital (CAR) has the highest average value of 28.49%, the lowest is 10.27%. The standard deviation value of 3.26% is smaller than the mean value which is equal to 16.87%, indicating data in the CAR variable has a small value of data distribution and the variation in the value of the data is getting closer to the same.

Profitability (ROA) has the highest average value of 5.42%, the lowest is 4.89%. The standard deviation value is 1.12% smaller than the mean value of 2.28%, indicating that the data on the ROA variable has a small value of data distribution and the variation in the value of the data is getting closer to the same. Credit Risk (NPL) has the highest average value of 6.37%, the lowest is 0%. The standard deviation value is 0.95% smaller than the mean value which is equal to 1.38% indicating that the data on the NPL variable has a small data distribution value and the variation in the data value is getting closer to the same. Liquidity (LDR) has the highest average value of 120.65%, the lowest is 47.79%. The standard deviation value is 13.28% smaller than the mean value of 83.95%, indicating that the data on the LDR variable has a small value of data distribution and the variation in the value of the data is getting closer to the same. Exchange Rate (NOP) has the highest average value of 30.4%, the lowest is 0%. The standard deviation value is 2.95% greater than the mean value, which is equal to 2.46% indicating the data on the NOP variable has a large data distribution value and yet the variation in the data value is getting closer to the same. And Interest Rate Risk (IRR) has the highest average value of 484.25%, the lowest is 104.45%. The standard deviation value is 72.39% smaller than the mean value which is equal to 236.14%, indicating that the data in the IRR variable has a small data distribution value and the variation in the data value is getting closer to the same.

Table 3: Correlation Matrix

	ROA	NPL	LDR	PDN	IRR
ROA	1.000				
NPL	-0.547	1.000			
LDR	-0.178	0.262	1.000		
NOP	0.045	-0.139	-0.074	1.000	
IRR	0.704	-0.504	-0.121	0.131	1.000

Source: Authors' Computation (2019)

Table 3 shows the value of the correlation coefficient between independent variables <0.90, it can be said that the regression model can be expressed as the absence of multicollinearity.

Model Selection

Table 4: Lagrange Multiplier Test

LM Test	Cross-section	Time	Both
Breusch-Pagan	468.5361	112.0305	580.5666
p-value	(0.0000*)	(0.0000*)	(0.0000*)

(*) 5% significant level, Source : Authors' Computation (2019)

Table 4 shows the Breush-Pagan Probability (BP) value of 0.0000. The hypothesis is if Breush-Pagan Probability (BP) is smaller than Alpha (0.0000 <0.05) then H0 is rejected and H1 is accepted, so the right model in the above results is REM.

Table 5: Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	11.400617	5	0.0440*

(*) 5% significant level, Source : Authors' Computation (2019)

Table 5 obtained the probability value of Chi-Sq. The statistics are 0.0440 <0.05, according to predetermined criteria then H0 is rejected and H1 is accepted, so the right model in the above results is FEM.

Table 6: Chow Test

Effects Test	Statistic	d.f.	Prob.
Cross-section F	16.024877	(12,502)	0.0000*
Cross-section Chi-square	168.636990	12	0.0000*

(*) 5% significant level, Source : Authors' Computation (2019)

Tabel 7: Fix Effect Model (FEM)

Variable	Coefficient	Std. Error	t-Statistic	P-Values
C	12.653	0.781	16.196	0.000
ROA	-0.597	0.084	-7.073	0.000*
NPL	0.632	0.100	6.322	0.000*
LDR	0.029	0.009	3.170	0.002*
NOP	-0.055	0.022	-2.550	0.011*
IRR	0.010	0.001	7.081	0.000*

R-Square = 0.501, F-Statistic=29,673, Prob (F-stat) n = 0.000
(*) 5% significant level, Source : Authors' Computation (2019)

Table 7 illustrates the results of regression analysis that explains the effect of profitability, credit risk, liquidity, exchange rate risk and interest rate risk on capital. Then the model of the regression analysis can be written as follows:

CAR = 12,653 – 0,597ROA + 0,632NPL + 0,023LDR – 0,055NOP + 0,01IRR + ε (0,499)……..(7).

Return on Asset (ROA) has a negative direction towards capital and is significant (p-value <0.05). Every increase in ROA of 1% will reduce the capital adequacy ratio (CAR) by 0.597. Negative ROA indicates that the total assets used do not provide benefits. When a bank experiences a loss, the bank will try to improve the quality of their capital so that it increases

their capital adequacy ratio (CAR), so that banks increase their capital by using other sources not only from operational income. This research is in line with the results of research conducted by (Dreca, 2013), (Jaseviciene & Jurksaityte, 2014), (Yahaya, Mansor, & Okazaki, 2016) and (Alajmi & Alqasem, 2015).

Furthermore, it can be seen that the non-performing loan (NPL) has a positive direction towards capital and is significant (p-value <0.05). Every increase in NPL of 1% will increase the capital adequacy ratio (CAR) of 0.632. The increase in credit risk is anticipated by management by means of banks increasing capital to absorb potential losses. This result is supported by (Raharjo, Hakim, Manurung, & Maulana, 2014), (Karina & Anggono, 2014), (Polat & Al-khalaf, 2014), (Nuviyanti & Anggono, 2014) and (Irawan & Anggono, 2015).

Table 7 shows the result that the Loan to Deposit Ratio (LDR) has a positive direction towards capital and is significant (p-value <0.05). Every increase in LDR of 1% will increase the capital adequacy ratio (CAR) by 0.029. Banks with high liquidity tend to maintain high capital adequacy (CAR). Research conducted by (Abusharba, Triyuwono, Ismail, & Rahman, 2013) and (Romdhane, 2012) obtained the same results, namely LDR has a positive influence on the capital adequacy ratio (CAR).

Exchange rate risk (NOP) has a negative direction towards capital and is significant (p-value <0.05). Every increase in NOP of 1% will reduce the capital adequacy ratio (CAR) by 0.055. An increase in the real exchange rate reduces foreign direct investment and thus reduces CAR. Research conducted by (Yahaya, Mansor, & Okazaki, 2016) and (William, 2011) produced the same results, that exchange rate risk has a negative influence on capital.

Interest rate risk (IRR) has a positive direction towards capital and is significant (p-value <0.05). Every increase in IRR of 1% will increase the capital adequacy ratio (CAR) by 0.010. Interest rate risk has a direction that is directly proportional to the capital adequacy ratio, because an increase in net interest income will have an effect on increasing core capital (Tier 1). So that interest rate risk has a positive influence on the CAR. Research conducted by (Romdhane, 2012) and (Aspal & Nazneen, 2014) also found that interest rate risk has a positive effect on the capital adequacy ratio.

R-square value = 0.501 (50.1%) and Prob (F-stat) n = 0.000, then overall the model can explain that capital (CAR) is influenced by profitability (ROA), credit risk (NPL), liquidity (LDR), exchange rate risk (NOP) and interest rate risk (IRR) of 50.1%; the rest is influenced by variables other than those explored in this study.

Conclusion

The study was conducted on 13 state-owned and BUSN banks during the period 2008-2017. The findings in this study found that capital was significantly affected by profitability, credit risk, liquidity, exchange rate risk and interest rate risk. Profitability (ROA) and exchange rate risk (NOP) have a negative influence on capital, while credit risk (NPL), liquidity (LDR) and interest rate risk (IRR) have a positive effect on capital. From internal and external factors, external factors (interest rate risk, exchange rate risk) are obtained according to expectations, while internal factors (profitability, credit risk and liquidity) get results in the opposite direction to the hypothesis proposed. Profit (ROA) has a negative influence on capital, here it is expected that management can maximise the assets owned to be able to increase profits and not only rely on income from operational activities, but also from other activities that increase income. Credit risk (NPL) has a positive influence on capital, management is expected to be able to manage credit, especially bad credit, so that existing capital is not eroded. Liquidity (LDR) has a positive influence on capital. Banks are expected to continue to carry out strict supervision in lending, so that the loans disbursed are not much greater than the third party funds obtained.

This research examined a number of internal factors and external factors that influence capital, further research is needed to determine internal factors and other external factors that affect capital.

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