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The Dynamics of Macroeconomic and Microeconomic Determinants with The Capital of Rural Banks

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Abstract

*The research aims to investigate the dynamics among rural banks' capital, macroeconomic variables and microeconomic variables. Macroeoconomic variable consists of inflation and interest. Macroeconomic variables consist of loan to deposi ratio, nonperforming loans, and return on assets. The data are excerpted from OJK and BI's website. The data are monthly data extending from January 2010 until May 2021. The testing method used is vector error correction model (VECM). The results show that rural banks' capital is significantly affected the previous state of capital and profitability. This indicates the importance of sustainability of capital in rural banks and how it is very much dependent upon the profitability of the rural banks. Further, the research results show that there ar two cointegrating functions in the model. Both cointegration functions are influential to inflation. The speed adjustment derived from the residuals of capital function is 0.6754% and 13.5669% for residual from inflation function itself. The slow adjustment process is due to the small market share and assets of rural banking sector. In addition, capital, nonperforming loans, and return on assets are pivotal for central bank monetary policy to control inflation.***Key words** : VECM, Cointegration, Rural Banks' Capital

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INTRODUCTION

Banking industry is the most heavily regulated industry. Banks garner deposits from population and distribute them to the deficit units. To ensure the full protection on people's deposits, regulator requires banks to maintain a certain level of capital ratios. This occurs due to the fact that the distibutions of deposits from the surplus units to the deficit units raise certain form of risk, i.e credit risk (Murtiyanti, Achsani, & Hakim, 2015). Therefore, banks need to take some strict measures to ensure the high quality of their loan as part of productive assets. Banks need to score the credit worthiness of potential debtors before granting them the loan. In this stage, procedures should be in place to avoid the problem of adverse selection. Adverse selection occurs when banks grant loans to debtors that are not credit worthy (Okuyan, 2014). Subsequent to that, banks will still monitor the progress of loan repayment by the debtors. However, it is probable that loan given to the debtors (deficit units in the population) will become default. When this happens, banks will write down their capital to absorb the losses from the delinquent loans. Therefore, the capital requirement set by regulator will be ins-trumental in absorbing the loss experienced by the banks and give assurance to the depositors that their funds are well-guarded by the banks (Usman, Lestari, & Puspa, 2019). Banks' capital is also important in main-taining stability of the banking system. Well-capitalized banks can weather economic instability and financial crises. Resilient banks tend to have bigger capital. Therefore, well capitalized banks can prevent systemic risk from materializing (Wibowo, 2017; Anginer, Asli, & Mare, 2018). The sample in this research is rural banks in Indonesia. Indonesian banking sector comprises of Islamic and conventional banks. Within each category, there is a further segregation into commercial and rural banks. Therefore, there are Islamic rural banks and Islamic commercial banks. There are also conventional rural banks and conventional commercial banks. The majority of banks that have the most market share is conventional banks, followed by Islamic banks. All kinds of banks are under the dual supervisio of Indonesian central bank and Indonesian Financial Service Authority. In the case of capital requirement, Financial Service Authority has the authority. In the case of banks' capital research, almost all research use capital adequacy ratio for the proxy for banks' capital (Bhattarai, 2020; El-Ansary, El-Masry, & Yousry, 2019; Murtiyanti et al., 2015; Phi, Hoang, Taghizadeh-Hesary, & Yoshino, 2019; Shingjergji & Hyseni, 2015; Sudiyatno, Puspitasari, Susilowati, Sudarsi, & Udin, 2019; Thoa, Anh, & Minh, 2020; Vu & Dang, 2020). This is because they use commercial banks as sample. However, there is one research using commercial banks sample that use the magnitude of capital as the proxy for capital (Pegnet & Fofana, 2011). Pegnet & Fofana (2011) found the short-term influence from loan and profitability on the banks' capital. This research will investigate the dynamic relationship among rural banks' capital and macroeconomic and microeconomic factors. In this research, capital will be proxied by the magnitude of core capital of the rural banks. While macroeconomic factors are proxied by inflation and interest. Factors that comprise microeconomic factors are nonperforming loan rate, profitability, and loan to deposit. This is confounded also by the fact that Financial Service Authority does not publish the data on rural banks' CAR. Research on rural banks' capital is still very rare. Therefore, this research will shed light on the behavior and resilience of rural banks' capital to the macro and micro-economic factors. This research will also be among the few to investigate how rural banks in Indonesia contribute to the economy through inflation and interest rate target set by central banks.

Murtiyanti, Achsani, & Hakim (2015), employed LDR as a representation of loans magnitude of a bank. They posited that bigger loans will require bigger provision that will eventually eradicate capital. They found that only a segment in banking indus-try in which loans affect CAR namely state-owned banks. Therefore banks have to pro-vide larger capital for the cushion. Research on loans proxied by LDR was also conducted in MENA region (El-Ansary et al., 2019). Research regarding banks' CAR was also conducted in Albania (Shingjergji & Hyseni, 2015). Shingjergji & Hyseni (2015), repre-sented loan magnitude proxied by LDR. They found negative influence from LDR. The bigger the loans distibuted to the economy by Albanian banks, the lower the capital will be. This shows that many loans will become delinquent. As a consequence, delinquency requires write off of the bnks' capital. El-Ansary, El-Masry, & Yousry (2019), distinguished banks into conventional and Islamic banks. For each bank, the effect of loans is estimated. They found that loans as represented by LDR affects CAR for Islamic banks. Furthermore, loans also affects CAR in conventional banks. This means all types of banks should have an improved risk ma-nagement practice. Sudiyatno, Puspitasari, Susilowati, Sudarsi, & Udin (2019), sampled Indonesian commercial banks to focus on the effect of LDR on CAR. They found that there was a negative influence of loans (represented by LDR) to CAR. The higher the LDR, the lower the CAR will be. This proved the existence of bad risk management practice in which loan write off depreciate the banks' capital. Usman, Lestari, & Puspa (2019), investigated many factors that are assumed to influence banks' capital. Two variables are of interest here, namely loans and profitability. Usman, Lestari, & Puspa (2019), found that loans affect CAR negatively. The bigger the loans, the more risks should be assumed by the banks. In turn, those risks will materialize and banks have to write down their capital. Phi, Hoang, Taghizadeh-Hesary, & Yoshino (2019), used VECM as the statistical test for their vietnam banks sample. They found cointegration relationship between loan and CAR. The magnitude of loan determines the level of CAR. Vu & Dang (2020), also inves-tigated the influence of loan on CAR. Contrary to other research, they found that loan imposed no influence on CAR. Hence banks in Vietnam do not adjust their CAR according to the magnitude of loan distributed to the economy. However, loans quality exerted significant effect on CAR. Bad loans will induce more CAR. This shows how a bank's CAR will react instantly to deteriorating productive assets quality. This prompts attention from regulator to scrutinize the practice of risk management regarding credit risk that a bank is exposed to (Vu & Dang, 2020).

Murtiyanti, Achsani, & Hakim (2015), used ROA for profitability in their endeavor to investigate determinants of CAR. They found that particularly two segments of banking indus-try did have positive ROA effect on CAR. For nonforeign exchange commercial banks and re-gional development banks, ROA have positive influence on CAR. Therefore banks should strive to achieve higher profitability to enhance their CAR. On the contrary, reseach conducted by Sudiyatno, Puspitasari, Susilowati, Sudarsi, & Udin, (2019), proved no influence from ROA to the CAR. Usman, Lestari, & Puspa (2019), also investigated the effect of probability on capital. The proxy chosen for profitability is net interest margin. They later found that profitability indeed influenced CAR positively. The higher the profitability the higher the capital, and vice versa. Banks can add capital as cushions to the absorbed loss by increasing their profits. Vu &

Dang (2020), employed two different measures of profitability in attempting to account for variances in CAR. ROA and ROE are used as two different proxies on their own in the model against CAR. Both variables are significant. However, ROA effects CAR posi-tively, while ROE negatively. This result is interesting. For the same concept of pro-fitability, both proxies behave differently. Based on this, Vu & Dang (2020), recommend that banks endeavor to increase its pro-fitability. A profitable bank will have more buffer to weather bad economic condition that will endanger its capital. Another research on Vietnam banking system fail to prove significant effect of profitability on CAR (Thoa et al., 2020). However, Thoa, Anh, & Minh (2020) found further that banks' size and liquidity will determine its position of CAR. Bhattarai (2020), endeavored to investigate factors influencing CAR in Nepal. Proftability sat as one of the independent variables. However, Bhattarai failed to prove any influence of profitability to CAR. Murtiyanti, Achsani, & Hakim (2015), researched the effectd of NPL on CAR. NPL depicts the magnitude of bad loans. This is a representation of bad quality asset owned by a bank. NPL affect CAR for foreign exchange commercial banks according to their research. For state-owned banks and non foreign exchange commercial banks, no effect from NPL is observed to impinge on CAR. This result is in contrast to research conducted by (Sudiyatno, Puspitasari, Susilowati, Sudarsi, & Udin, 2019). NPL does not affect CAR in Indonesian banking system. El-Ansary, El-Masry, & Yousry (2019) proxied NPL as an independent variable that can affect CAR. Two types of banking system exist in MENA namely conventional and Islamic banks. Both types experience the positive effects of NPL on CAR. Bigger NPL warrants bigger CAR from the banks. Banks that could not afford bigger CAR will experience financial distress situation when they have raising NPL. Bhattarai (2020), also used NPL in his research. Using sample of Nepal banks, he found no influence of NPL to CAR.

Not many research use macroeconomic variables as predictor of CAR. El-Ansary, El-Masry, & Yousry (2019), used the variable GDP in his research, while Bhattarai (2020), used GDP and inflation. Bhattarai (2020), later found that inflaton negatively affects CAR. The lower the inflation, the higher banks' capital. In this regard, inflation is a depiction of economic condition. Higher inflation is indicative of bad economic condition. Thus, in high inflationary environment, banks' CAR will be depreciated due to write offs recorded by banks. When the inflation is low, the economy is booming. It will provide positive atmosphere to the banking industry. CAR will rise as the consequence. Phi, Hoang, Taghizadeh-Hesary, & Yoshino (2019), use time series modelling of VECM to investigate the dynamics of banking industry and economic variables. They found that there existed cointegration relationship in the model. This means there is a long-run effect among variables. Specifically, interest affects CAR although not instantly. It takes some time for CAR to absorb fully the effect from interest. According to the result, interest need at least two lag period before exerting the effect. The sample used is Vietnam banking sector.

This research will combine macroeconomic and microeconomic variables in their relation banks' CAR. Macroeconomic factors consist of inflation (INF) and interest (INT). The microeconomic factors consist of NPL, ROA, and LDR. By combining macro and microeconomic factors, we will have a better understanding of factors affecting ROA. The methodology used is VECM. VECM allows us to see long-run and short-run causality among variables.

METHOD

The purpose of this research is to investigate the factors affecting rural banks' capital. The independent variables will consist of two parts, macroeconomic and micro-economic variables. The macroeconomic variables are inflation (INF) and interest (INT). Inflation is indicative of the conomic condition. This variable will show how economic condition affects rural banks' capital. On the other hand, interest is indicative of central bank's monetary policy. Low interest rate denotes loose monetary policy. It is part of central bank's strategy to increase money supply in the economy. High interest rate represent tight money policy.

High interest rate will entice savers to deposit their savings with the bank. Money supply will decrease in the economy and becomes absorbed by the banking system. The microeconomic variables are noperforming loan rate (NPL), return on assets (ROA), and loan to deposit ratio (LDR). These factors are part of bank's operation. Thus we will be able to see whether banks ar emore incline to be affected by macroeconomic factors, or microeconomic factors, or both simulatenaously. The summary of variables used is as follows:

Table 1. Research Variables

Variables	Proxy	Source
CAP	Ln (Core Capital)	OJK
INF	Inflation Rate	BI
Interest	Interbank	BI
NPL	Nonperforming	OJK
LDR	Loan to Deposit	OJK
ROA	Return on Assets	OJK

All the variables above are taken from either Financial Service Authority (OJK)'s website or Bank Indonesia's website. The data comprise monthly data extending from January 2010 until May 2011. After extracting all the data necessary, the research proceeds to vector error correction model (VECM). The first test performed is stationarity test. Stationarity test will avoid the problem of spurious regression that frequently occur to variables experiencing trend and seasonality Subsequent to that, Johansen Cointegration test will be performed to determine the right amount of lag lenth that must be used for VECM. The third test will be VECM. VECM will generate the result for long-run and short-run causality among variables. The general equations for VECM is as follows:

$$\Delta Y_t = \alpha_1 + \alpha_2 e_{t-1} + \beta_1 Y_{t-1} + \gamma_1 X_{1t-1} + \gamma_1 X_{2t-1} + \ldots + \gamma_n X_{nt-1} \quad (1)$$

$$\Delta X_1 = \alpha_3 + \alpha_4 e_{t-1} + \beta_1 Y_{t-1} + \gamma_1 X_{2t-1} + \gamma_2 X_{3t-1} + \ldots + \gamma_n X_{nt-1} \quad (2)$$

$$\Delta X_2 = \alpha_5 + \alpha_6 e_{t-1} + \beta_1 Y_{t-1} + \gamma_1 X_{1t-1} + \gamma_1 X_{3t-1} + \ldots + \gamma_n X_{nt-1}$$

$$\ldots \quad (3)$$

$$\Delta X_n = \alpha_r + \alpha_s e_{t-1} + \beta_1 Y_{t-1} + \gamma_1 X_{1t-1} + \gamma_1 X_{2t-1} + \ldots + \gamma_n X_{nt-1} \quad (4)$$

VECM general equations above utilize all the variables to occupy the position of independent and dependent variables. The error component in each equation shows how the dependent variable will be affected by shocks coming from outside the system of equations. These shocks will operate as a long-term effect of the equation. Therefore, a significant residual indicates the speed of correction adjustment from the previous period. Following Sahu & Pandey (2018), short-run causality will be investigated by performing the Wald test on VECM models. The Wald test investigates whether the coefficient for independent variables besides constant and cointegrating functions are significant or not.

RESULTS AND DISCUSSION

Time-series analysis requires that all the variables used are stationary. Stationary can be of two types, level and 1st difference. If a variable is not stationary at level, then the variable should be differenced and remeasured for stationarity (Setiawan, Utomo, Astuti, Akbar, & Ahmad, 2020). In most cases, 1 st difference will render the variables stationary. The table below shows the result of stationarity test.

Table 2. Stationarity Test

Variable	Level		1st Difference	
	ADF	PP	ADF	PP
CAP	0.0040	0.5697	0.0161	0.0000
ROA	0.9055	0.9166	0.0000	0.0000
LDR	0.6782	0.0424	0.1162	0.0000
NPL	0.0934	0.6912	0.5370	0.0000
INF	0.8916	0.4218	0.0000	0.0000
INT	0.1633	0.3083	0.0398	0.0000

Table 2 above shows that most variables are not stationary at level. Based on Augmented Dickey Fuller (ADF), only CAP variable that is stationary. All toher variables are not stationary. However, according to Phillips Perron (PP) test, LDR is the only stationary variable. Therefore, all variables are differenced once and then retested. After first differencing, ADF reveals that LDR and NPL remained nonstationary. On the other hand, PP shows that all variables are statistically stationary with p-value less than 0.01. Therefore, the test result supports the view that all variables have to be differenced once before undergo subsequent test. The below table shows the result of lag length determination test:

Table 3. Lag Length Determination

Lag	FPE	AIC	SC	HQ
0	1.30e-22	-33.36637	-33.23061	-33.31121
1	1.94e-27	-44.48224	-43.5319*	-44.0961*
2	1.46e-27	-44.76807	-43.00320	-44.05110
3	1.61e-27	-44.68302	-42.10360	-43.63513
4	1.44e-27*	-44.80993	-41.41595	-43.43113
5	1.97e-27	-44.52680	-40.31827	-42.81709
6	2.46e-27	-44.35220	-39.32912	-42.31159
7	3.32e-27	-44.11670	-38.27906	-41.74517
8	4.60e-27	-43.88172	-37.22953	-41.17928
9	4.73e-27	-43.97568	-36.50893	-40.94233
10	4.05e-27	-44.28839	-36.00708	-40.92413
11	4.17e-27	-44.46503	-35.36918	-40.76987
12	2.41e-27	-45.2786*	-35.36828	-41.25262

Table 3 above shows the results of lag length determination. The most notable criteria are Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC), and Hannah-Quinn Criterion (HC). AIC recommends the research use 12 lag length. 12 lag length is the maximum number of lag length that can be applied due to the nature of monthly data. On the conntrary, SC and HQ recommend 1 lag length. Based on this tetsing result, this research will use 1 lag length. The less the amount of lag length, th emore parsimonious the research model. Long lag length will consume much degree of freedom and render the model less robust. The following table displays the result of Johansen cointegration test.

Table 4. Johansen Cointegration Test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigen-value	Trace Statistic	0.05 Critical Value	Prob
None *	0.23178	107.9099	95.75366	0.0056
At most 1 *	0.18969	72.31159	69.81889	0.0312
At most 2	0.15890	43.91552	47.85613	0.1118

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		**Trace**	**0.05**	
No. of CE(s)	**Eigen-value**	**Statistic**	**Critical Value**	**Prob**
At most 3	0.10197	20.55451	29.79707	0.3860
At most 4	0.03595	6.033707	15.49471	0.6916
At most 5	0.0080	1.090256	3.841466	0.2964
Trace test indicates 2 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Table 4 above displays the result of cointegration test. The null hypothesis is that there is no cointegration in the model. Cointegration is the long-run causality in the model. The null hypothesis that no cointegration exists in the model is rejected with a p-value of 0.0056. Therefore, we are convinced that cointegration does really exists. Further statistical testing also reveals that the null hypothesis that there is only one cointegration is also rejected with a p-value of 0.0312. The null hypothesis that there are at most 2 cointegrations is not rejected (p-value 0.1118). Therefore, we conclude that the model contains two cointegration. The following table reveals the cointegration functions.

Table 5. Cointegration Functions

CAP	INF	INT	LDR	NPL	ROA
1.00	0.00	-17.27614	36.27828	69.08167	28.36092
		(14.1721)	(6.1905)	(20.277)	(31.4453)
0.00	1.00	0.421056	-1.907977	-2.05324	2.266398
		(0.7362)	(0.3215)	(1.05337)	(1.63350)

Table 5 above shows that cointegration functions' dependent variable are CAP and INF. CAP is influenced by INT, LDR, NPL, and ROA. The other cointegration is the one with INF as the dependent variable. The independent variables are INT, LDR, NPL, and ROA. VECM testing that follows will reveal whether the coefficients of cointegration functions are signi-ficant or not.

Table 6. VECM Results: Model 1, Cointegration of CAP

Dependent Variable: D(CAP)

D(CAP) = C(1)*(CAP(-1) - 17.2761364001*INT(-1) + 36.2782784548*LDR(-1) + 69.0816668362*NPL(-1) + 28.3609202815*ROA(-1) - 63.4821951401) + C(2)*(INF(-1) + 0.421056197843*INT(-1) - 1.90797745016*LDR(-1) - 2.05324733019*NPL(-1) + 2.26639777331*ROA(-1) + 1.518253621) + C(3)*D(CAP(-1)) + C(4)*D(INF(-1)) + C(5)*D(INT(-1)) + C(6)*D(LDR(-1)) + C(7) *D(NPL(-1)) + C(8)*D(ROA(-1)) + C(9)

	Coefficient	Std. Error	t-Statistic	Prob
C(1)	0.00957	0.016410	0.583464	0.56
C(2)	-0.16017	0.306774	-0.522132	0.60
C(3)	-0.34812	0.097874	-3.556830	0.00
C(4)	0.00362	0.665761	0.005448	0.99
C(5)	-0.16695	0.882263	-0.189232	0.85

Dependent Variable: D(CAP)				
D(CAP) = C(1)*(CAP(-1) - 17.2761364001*INT(-1) + 36.2782784548*LDR(-1) + 69.0816668362*NPL(-1) + 28.3609202815*ROA(-1) - 63.4821951401) + C(2)*(INF(-1) + 0.421056197843*INT(-1) - 1.90797745016*LDR(-1) - 2.05324733019*NPL(-1) + 2.26639777331*ROA(-1) + 1.518253621) + C(3)*D(CAP(-1)) + C(4)*D(INF(-1)) + C(5)*D(INT(-1)) + C(6)*D(LDR(-1)) + C(7) *D(NPL(-1)) + C(8)*D(ROA(-1)) + C(9)				
	Coefficient	**Std. Error**	**t-Statistic**	**Prob**
C(6)	-0.15427	0.332959	-0.463358	0.64
C(7)	0.40528	1.476722	0.274449	0.78
C(8)	-3.54954	2.048342	-1.732885	0.08
C(9)	-0.01277	0.003747	-3.407579	0.00
R-squared	0.214043	Mean dependent		-0.0
Adjusted R-squared	0.164141	S.D. dependent		0.04
S.E. of regression	0.041726	Akaike info criterion		-3.4
Sum squared resid	0.219376	Schwarz criterion		-3.2
Log likelihood	241.9446	Hannan-Quinn		-3.37
Durbin-Watson stat		2.093423		

The above table shows us the complete function that includes both long-run and short-run causality. The dependent variable is the first difference of CAP. The first cointegration function is C(1)*(CAP(-1) - 17.2761364001*INT(-1) + 36.2782784548*LDR(-1) + 69.0816668362*NPL(-1). This equation has been identified in table 5. The coefficient for C(1) is 0.009575 with a p-value of 0.5606. Thus, the first cointegration function is not statistically significant. The sign of the coefficient is also not as expected. A cointegration function should have a negative sign. Therefore, we have to look at the next cointegration function. The second cointegration function is C(2)*(INF(-1) + 0.421056197843*INT(-1) 1.90797745016*LDR(-1) - 2.05324733019*NPL(-1) + 2.26639777331*ROA(-1) + 1.518253621). The coefficient for this cointegration function is denoted by C(2). The coefficient is -0.160176. The sign of this coefficient is negative, as expected in a cointegration function. Unfortunately, the coefficient is statistically insignificant with a p-value of 0.6025. Hence although 2 cointegration functions exist for CAP, there are no long-run causality of residuals derived from CAP(-1) – INT(-1) – INF(-1) – LDR(-1) – NPL(-1) – ROA(-1) and from INT(-1) – INF(-1) – LDR(-1) – NPL(-1) – ROA(-1). Therefore, we cannot expect to measure the speed adjustment for deviations that occur in a certain periode for CAP. To test for simultaneous effect from CAP(-1), INF(-1), INT(-1), NPL(-1), and ROA (-1), we perform Wald test next. The result of the Wald test is shown below.

Table 7. Wald Test Result, CAP as Dependent Variable

Wald Test:			
Equation: Untitled			
Test Statistic	**Value**	**df**	**Prob**
F-statistic	0.722	(5,12)	0.6079
Chi-square	3.6116	5	0.6066

The table above shows that the F-statistic probability is 0.6079. It is not statistically significant. Therefore, there is not simultaneous effect altogether from CAP(-1), INF(-1), INT(-1), NPL(-1), and ROA (-1) to CAP. Therefore we will consider individual influence from CAP(-1), INF(-1), INT(-1), NPL(-1), and ROA (-1) to CAP. If we look at again at table 6, we can see that the p-value for C(3) is statistically significant. C(3) is the coefficient for CAP(-1). This means that the CAP from previous period can be used to predict CAP at current period. This is typical of time-series data in which large value of a variable in a period will be followed by large value of the variable in the next period. The coefficient C(8) is roughly significant at 0.1 level. C(8) is the coefficient of ROA(-1). This means capital of a bank at a certain period is influenced by profitability of the bank at previous period. This results, provide compelling evidence that rural banks need to have a sustainable capital. A sus-tainable capital will provide a foundation for the next year operation and therefore will determine whether or not the rural banks can achieve a good operating performance. The capital adequacy of rural banks then should be closely monitored by the financial service authority. Any rural banks that show an indication of falling capital should be overseen and stringent measures should be taken before the rural banks fall further into much worse condition. This is especially through in the current condition of pandemic. Rural banks have the potential to suffer from capital inadequacy due to stagnant macroeconomic condition in which growth in domestic product is surpressed. Furthermore, rural banks should also strive to increase their profitability. The higher the probability, the stronger the capital owned by the banks. Therefore, it is crucial for the rural banks to have managerial competence in order to in-crease revenue and lower expense so that the profitability will be higher. Profitable rural banks will provide more stability to the banking system in the economy. Rural banks are more capable of attracting funds and later allocate the funds to the productive sector of the economy. One factor affecting profitability is the nonperforming loan. Rural banks need to have good risk management practice to limit the nonperforming loan rate. Credit activity of rural banks need to be im-proved so that credits are allocated to the truly productive sectors that are capable of generating products and services and repaying the loans of rural banks. We proceed with the VECM test for model 2 in which INF is the dependent variable.

Table 8. VECM Results: Model 2, Cointegration of INF

Dependent Variable: D(INF)

Method: Least Squares (Gauss-Newton / Marquardt steps)

Sample (adjusted): 3 137

Included observations: 135 after adjustments

D(INF) = C(10)*(CAP(-1) - 17.2761364001*INT(-1) + 36.2782784548*LDR(-1) + 69.0816668362*NPL(-1) + 28.3609202815*ROA(-1) - 63.4821951401) + C(11)*(INF(-1) + 0.421056197843*INT(-1) - 1.90797745016*LDR(-1) - 2.05324733019*NPL(-1) + 2.26639777331*ROA(-1) + 1.5182536212) + C(12)*D(CAP(-1)) + C(13)*D(INF(-1)) + C(14)*D(INT(-1)) + C(15)*D(LDR(-1)) + C(16) *D(NPL(-1)) + C(17)*D(ROA(-1)) + C(18)

	Coefficient	Std. Error	t-Statistic	Prob
C(10)	-0.00675	0.002005	-3.368481	0.0010
C(11)	-0.135669	0.037484	-3.619422	0.0004
C(12)	-0.001626	0.011959	-0.135997	0.8920
C(13)	0.338290	0.081347	4.158617	0.0001
C(14)	0.112316	0.107800	1.041893	0.2995
C(15)	-0.030237	0.040683	-0.743230	0.4587
C(16)	0.208318	0.180435	1.154529	0.2505
C(17)	0.172985	0.250279	0.691166	0.4907
C(18)	4.65E-05	0.000458	0.101524	0.9193

Dependent Variable: D(INF)				
Method: Least Squares (Gauss-Newton / Marquardt steps)				
Sample (adjusted): 3 137				
Included observations: 135 after adjustments				
D(INF) = C(10)*(CAP(-1) - 17.2761364001*INT(-1) + 36.2782784548*LDR(-1) + 69.0816668362*NPL(-1) + 28.3609202815*ROA(-1) - 63.4821951401) + C(11)*(INF(-1) + 0.421056197843*INT(-1) - 1.90797745016*LDR(-1) - 2.05324733019*NPL(-1) + 2.26639777331*ROA(-1) + 1.5182536212) + C(12)*D(CAP(-1)) + C(13)*D(INF(-1)) + C(14)*D(INT(-1)) + C(15)*D(LDR(-1)) + C(16) *D(NPL(-1)) + C(17)*D(ROA(-1)) + C(18)				
	Coefficient	**Std. Error**	**t-Statistic**	**Prob**
R-squared	0.193736	Mean dependent		0.0001
Adjusted R-squared	0.142545	S.D. dependent		0.0055
S.E. of regression	0.005098	Akaike info criteria		-7.6554
Sum squared resid	0.003275	Schwarz criterion		-7.4617
Log likelihood	525.7428	Hannan-Quinn c		-7.5767
Durbin-Watson stat				1.901795

Table 8 above shows the result for VECM testing with INF as the dependent variable. There are two cointegration functions for this model. The first cointegration function involve residuals derived from CAP equation. The measurement of this cointegration function is from CAP(-1) – INT(-1) – INF(-1) – LDR(-1) – NPL(-1) – ROA(-1). The coefficient for this cointegration function is -0.006754. It is statistically significant with a p-value of 0.0010. Long-run causality arises which affect inflation. The causality is coming from the shocks thatoccur to the equations in which CAP is the dependent variable. We can also see that any deviations in the INF will be corrected at the speed of adjustment of 0.6754%. This provides evidence on how shocks that affect capital will also influence inflation. The second cointegration function is denoted by coefficient C(11). The value of the coefficient is -0.135669. It is statistically significant with a p-value of 0.0004. This is actually the residuals derived from the equation in which INF is the dependent variable and INT, LDR, NPL, and ROA are the independent variables. This is a self-correction mechanism in which any deviations from previous period will be corrected at a speed of 13.5669% per period. This is also a slow correction process. For testing the individual effect of each coefficient, we can see that the coefficient of C(13) is statistically significant. INF(-1) influences INF. This means inflation at prior period is a good predictor of inflation at the next period. Therefore, high inflation will be followed also by high inlfation and vice versa. These results show that shocks that affect rural banks' capital will also influence the inflation rate. This should provide an early warning signal for the regulators. The time rural banks' capital is showing signs of inadequacy or deterioration, inflation will be later affected. Deprecation of capital will be followed by increasing inflation. Uncontrolled inflation will depress economic growth and trigger recession. The time gap between the erosion of banks' capital and inflation tends to be long-term. This is due to the small asets of rural banks compared to the overall total assets of banking system.

Next, to investigate the dynamics of some variables, we perform the Wald test. The result is shown below:

Table 9. Wald Test Result, INF as Dependent Variable

Wald Test:			
Equation: Untitled			
Test Statistic	**Value**	**df**	**Probability**
F-statistic	3.686	(5,126)	0.0038
Chi-square	18.431	5	0.0025

Table 9 above shows that the null hypothesis is rejected. The indicated p-value from the joint test is 0.0038, statistically significant at even 1% level. It can be inferred that there is a short-term dynamic in which INT, CAP, NPL, and ROA influence INF. Central banks must include rural banks in its monetary policy operation to control inflation. INT indicates the level of interest that reflects monetary policy taken by the central bank. INT needs other variables to contain inflation. The level of rural banks' capital, nonper-forming loans, and profitability is important to help monetary policy of central bank achieves its objective. Therefore, central bank must take measures to improve the compe-tence and managerial skills of rural banks executives. Helathy rural banks will be instrumental to the economy.

CONCLUSION

This research aims to investigate the dynamics of rural banks' capital with macro and microeconomic variables. The macro-economic variables are represented by inlfation and interest. The microeconomic variables are loan to deposit ratio, nonpeer-forming loans, and profitability. The research result shows that there is a long-run causality between rural banks capital and inflation. This shows the important role of rural banks in the economy in that it contributes to the economy. Rural banking system contribute to the correction of imbalances that happens to the infation at the speed of 13% per period. The magnitude of rural banking sector explains this small contribution. However, our ability to measure the contribution of rural banking system is important because now we know exactly the influence and contribution of rural banks. A significant portion of Indonesian population still resides in the rural area. Therefore, rural banks are pivotal for the Indonesian economy. Rural banks' micro-economic condition also is instrumental for the health of economy. Good capital, strong profitability, and low nonperforming loans are desired for good economic conditions. Central bank should pay attention to the development of managerial skills and competence of rural banks' management. Good rural banking system can be instrumental for achieving the target of monetary policy.

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