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PROFITABILITY MODEL USING INTERVENINGS VARIABLE CAPITAL ADEQUACY RATIO

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Abstract

The purpose of this research is to analyze the influence of the variables Loan to Deposit Ratio (LDR), Interest Rate (IR), and Capital Adequacy Ratio (CAR) on the profitability of Return on Assets (ROA) using the intervening variable CAR. This is based on the phenomenon of inconsistencies in various previous studies, thus encouraging researchers to do it again. This type of research is quantitative descriptive with multiple regression analysis method of panel data using 20 cross section samples and 5 year time series. This research formula is to maximize the ROA value through the intervening variable CAR with the research object of banking sector companies on the Indonesia Stock Exchange. Two research models were developed and integrated into one research model with model selection test stages, Chow Test, Hausman Test, and Lagrange Multiplier Test. Results from the first research model; that IR can explain the influence on CAR with a positive correlation where these results confirm the applicable theory. The results of the second research model show that IR and CAR can significantly explain their influence on ROA with a positive correlation and these results also confirm the applicable theory, besides that the intervening variable CAR is only able to mediate the influence of IR on ROA. The other variables cannot explain their influence on the endogenous variable CAR in the first model and ROA in the second model. It is hoped that these results can help as a guide for banking practitioners in Indonesia to maximize ROA profitability.

Keywords: Loan to Deposit Ratio, Interest Rate, Capital Adequacy Ratio, Return on Assets.

INTRODUCTION

The interest rate in Dendawijaya (2006) is one of the conventional instruments for controlling the rate of inflation, a high increase in inflation will have an impact on decreasing the profitability of a company. There are two types of meaning, namely nominal interest rates, which can be observed in market conditions, and real interest rates with the concept of nominal interest rates minus the inflation rate. The factors that influence the determination of interest rates are the need for funds, time period, desired profit target, quality of guarantee, government policy, company reputation, good relations, and competitive products. In Khotijah et.al., (2020), Kalengkongan G. (2013), that interest rates have no significant effect on profitability. Different results in Suarmi et.,al. (2014), Widiantari et.,al., (2014), Pranata et.,al., (2016), Novitasari (2018), Sumawati N. K. A., (2019) that interest rates have a significant effect and are positively correlated with profitability.

Interest rates are an element of risk in the banking sector. The risks experienced as a result of changes in interest rates in the market can have a negative impact on banking business income. This risk is one of the models used to detect the general level of sensitivity of banking businesses to interest rate movements. Interest rate risk has a positive influence on CAR. Interest rate risk is related to the source of bank funds which is very dependent on the sensitivity of the interest rate to the assets being financed, Siamat (1993). Banking businesses need to

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increase their capital to be able to bear the interest rate risk from used sources of funds. Measuring interest rate risk is proxied by the Interest Sensitivity Ratio (ISR). This ratio is a comparison ratio between interest sensitivity assets and interest sensitivity liabilities, Kasmir (2007). A high ISR means interest income is higher than interest expenses, which means the bank gets excess profits from a high ISR. Increasing profits have a positive impact on bank capital which can increase. Because banks can set aside a portion of profits to be allocated to bank capital. Thus, interest rate risk has a positive influence on CAR. In the research results of Khaled et al (2013), interest rate risk has a positive influence and correlation with CAR. On the other hand, in Ratna S.D., (2018), interest rate risk has an influence and is negatively correlated with CAR. The research results are very different in Yunialdo et., at., (2015), interest rate risk has no significant influence on CAR.

In relation to ROA, it is a ratio used to measure management's effectiveness in generating profits with available assets. Bank profitability is determined by factors that can be controlled by management and factors beyond management's control. Factors that can be controlled by management are factors that describe the bank's own policies and management decisions, such as fund raising, capital management, liquidity management and cost management. Meanwhile, factors outside management's control include environmental factors and bank characteristics. Environmental factors include market structure, regulations, inflation, interest rates and market growth.

Several studies have been conducted to determine the factors that influence banking ROA, including Almanaseer & Alsehat (2016), Pardede and Pangestuti (2016), Hendrayati (2013), Hidayati (2014), Wibowo and Syaichu (2013), Ali et al. al. (2012), Durraj & Moci (2015), Malik et al. (2015), Sahara (2013) and the results of their research are that there are factors that influence profitability including inflation, interest rates, financing risks. However, different results were produced by researcher, Agung Gumelar (2016) where inflation, interest rates, exchange rates, NPF, BOPO, had an insignificant effect on ROA. Credit interest rates will affect credit distribution from a bank. If credit interest rates increase, people are less likely to borrow money from banks. So the profitability obtained by the banking sector will decrease due to low interest income. As credit interest rates increase, there is also the potential for bad credit to occur, which may make it difficult for parties to pay their debts. In Saputra's (2012) research, credit interest rates have no significant effect on profitability with the research object of Islamic banks, whereas in Wulandari's (2011) research results on conventional bank research objects, credit interest rates have a negative effect on profitability..

The research uses ROA profitability ratio analysis considering that Bank Indonesia as a banking supervisor and supervisor prioritizes the value of a bank's profitability as measured by assets whose funds mostly come from community savings funds, Dendawijaya (2009). Besides that, ROA is an objective measurement method that is based on available accounting data and the amount of ROA can reflect the results of a series of company policies, especially banking, as in Ahmad Buyung Nusantara in Bambang Riyanto (1995). In Mashhud (2006), ROA is used to measure a company's effectiveness in generating profits using the assets it owns. The greater the ROA of a bank, the greater the level of profit achieved by the bank and the better the bank's

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position in terms of asset use, so that the Capital Adequacy Ratio (CAR), which is an indicator of bank health, increases. Every time a bank experiences a loss, the value of the bank's capital decreases and conversely, if the bank makes a profit, its capital will increase. CAR is a source of capital for first party funds, namely the amount of funds invested by the owner for the establishment of a bank. If a bank is already operational, capital is a very important factor for business development in order to maximize profitability and anticipate the risk of loss. What is determined by banking for settlements is a CAR of 8% in Lukman and Wijaya (2010). If the CAR value is high then the bank is able to finance operational activities and make a large contribution to profitability and CAR is also an indicator of the bank's ability to cover the decline in its assets as a result of banking business losses caused by risky assets which could affect the banking business. This bank's income would be much better if the interest costs were much smaller, but to get such small interest costs, the bank must have the ability to choose a third party. Capital shows the ability of bank management to monitor and control risks that occur, which can affect the amount of bank capital, Prastiyaningtyas (2010). If a bank has adequate capital, it can carry out its operational activities efficiently, and will provide profits to the bank. Capital adequacy is reflected in the Capital Adequacy Ratio (CAR). If the ratio is above 8%, it shows that the bank's business is increasingly stable, because there is great public trust. This is because the bank will be able to bear the risk of risky assets. Theoretically, banking companies that have a CAR above 8% are very good because the bank is able to bear the risks that arise, Armelia (2011). It can be concluded that CAR has a significant positive correlation with profitability, in the research results of Ogboi (2013), Faturrahman (2012), Tjiptowati (2011), Anggita (2012). These results are in accordance with the results in Sari et.al., (2016), Anggreni M. R., Suardhika M. S., (2014). On the other hand, in Abdurrohman et.,al., (2020) the Capital Adequacy Ratio (CAR) has an insignificant effect on profitability and ROA.

One of the things that influences CAR or profitability, ROA besides the interest rate which has been discussed in the paragraph above is the Loan to deposit ratio (LDR) which is a measurement that shows time deposits, current accounts, savings and others used in fulfilling loan requests (loans). Request) of its customers. This ratio describes how savings are used to provide loans, as stated in Latumaerissa (2014). This ratio is also an indication of whether a loan can still experience expansion or vice versa. LDR in a banking sector indicator is very high, this sector will face a high level of risk of bad debt because high loans at a certain point in the banking sector will be faced with a high level of losses. Therefore, Bank Indonesia as the central bank has set a standard for banking LDR ratios in the range of 80% to 92% so that this ratio is closely related to the Capital Adequacy Ratio (CAR). One of those who conducted research on this variable is in Debby Cynthia Ananda Sari and Herizon (2017), Lewina and Salim (2020) that LDR has a significant effect on CAR. The results of research on the Loan to Deposit Ratio (LDR) in Sari et.al., (2016), Avrita and Pangestuti (2016), Sarifudin (2005), show that the Loan to Deposit Ratio (LDR) has an insignificant effect on profitability. Different results in Almilia and Hedyningtyas (2005), Yogianta (2013), Kuncoro (2002), Budi Ponco (2008), that the Loan to Deposit Ratio (LDR) has a significant effect on ROA with a positive correlation. The existence of inconsistent research results among previous researchers is the basis for conducting this research.

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LITERATURE REVIEW AND HYPOTHESIS

Researchers who conducted research on the Loan To Deposit Ratio (LDR) variable are in Debby C. A. S. and Herizon (2017), Lewina and Salim (2020) that LDR has a significant effect on CAR.

H_1: There is an influence of the Loan to Deposit Ratio (LDR) on the Capital Adequacy Ratio (CAR).

Increasing profits have a positive impact on bank capital which can increase. Because banks can set aside a portion of profits to be allocated to bank capital. Thus, interest rate risk has a positive influence on CAR. In the research results of Khaled et al (2013), interest rate risk has a positive influence and correlation with CAR. On the other hand, in Ratna S.D., (2018), interest rate risk has an influence and is negatively correlated with CAR. The research results are very different in Yunialdo et., at., (2015), interest rate risk has no significant influence on CAR.

H_2: There is an influence of interest rates on the Capital Adequacy Ratio (CAR).

In the research results of Almilia and Hedyningtyas (2005), Yogianta (2013), Kuncoro (2002), Budi Ponco (2008), the Loan to Deposit Ratio (LDR) has a significant effect on ROA with a positive correlation. Other research results by Almanaseer & Alsehat (2016), Pardede and Pangestuti (2016), Hendrayati (2013), Hidayati (2014), Wibowo and Syaichu (2013), Ali et al. (2012), Durraj & Moci (2015), Malik et al. (2015), Sahara (2013), Suyono (2005). Different results in the research results of Werdaningtyas (2002) with LDR results have a significant effect with a negative correlation with ROA. In Avrita and Pangestuti (2016), Sarifudin (2005), Sari et.al., (2016), that LDR has no significant effect on ROA.

H_3: There is an influence of Loan to Deposit Ratio (LDR) on Return on Assets (ROA).

In Khotijah et.al., (2020), Kalengkongan G. (2013), that interest rates have no significant effect on profitability. Different results in Suarmi et.,al. (2014), Widiantari et.,al., (2014), Pranata et.,al., (2016), Novitasari (2018), Sumawati N. K. A., (2019) that interest rates have a significant effect and are positively correlated with profitability.

H_4: There is an influence of interest rates on Return on Assets (ROA).

In the research results of Ogboi (2013), Faturrahman (2012), Tjiptowati (2011), Anggita (2012), Sari et.al., (2016), Anggreni M. R., Suardhika M. S., (2014), that the Capital Adequacy Ratio (CAR) has a significant positive correlation with profitability.

H_5: There is an influence of Capital Adequacy Ratio (CAR) on Return on Assets (ROA).

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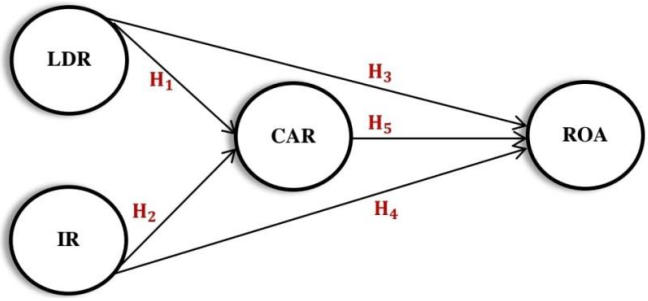
Figure 1: Research Framework Model



RESEARCH METHODS

The approach used in this research is descriptive qualitative and quantitative using the panel data multiple regression analysis method which is a combination of 5 year time series data or the 2015 or 2019 year period and cross section. The objects used in this research are banking companies listed on the Indonesia Stock Exchange. Taking samples from the population, purposive sampling was used as a technique to determine the selected sample using the following criteria:

1. Banking companies listed on the Indonesia Stock Exchange for the 2015-2019 period.
2. Banking companies that have never been delisted or suspended.
3. Banking companies that have complete and published financial reports
4. Conventional banking companies are not sharia.
5. Banking companies are not owned by local governments

By using the criteria above, a total research sample of 20 companies has been obtained.

Operational Variables:

Table 1: Operational Variables

No	Variables	Notation	Formulas
1	Loan to Deposit Ratio	LDR it	$\frac{\text{Amount of credit disbursed}}{\text{Total Capital+Third party funds}}$
2	Interest Rate	IR_{it}	BI Rate
3	Capital Adequacy Ratio	CAR_{it}	$\frac{\text{Total Capital}_{it}}{\text{Total Risk Weighted Assets}_{it}}$
4	Return On Assets	ROA it	$\frac{\text{Earnings After Tax}}{\text{Total Assets}}$

Panel Data Multiple Regression Estimation

When estimating multiple regression on panel data, it is first ensured that there is a combination of time series data and cross section data.

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The approach that can be taken in carrying out the analysis between time series data and cross section data can be using analysis:

1. Common Effect Model (CEM)
2. Fixed Effect Model (FEM)
3. Random Effect Model (REM)

Model Selection Test

After the three basic analyzes mentioned above are used, you can further carry out three model suitability testing procedures to select the best panel data multiple regression model as follows:

Chow Test

This test uses F-statistics to determine the choice between the Common Effect Model (CEM) or the Fixed Effect Model (FEM). Rejection or acceptance of the hypothesis is based on the level $\alpha = 5\%$ in the null hypothesis (H_0) and alternative hypothesis (H_a). Between these two models, technically it can be determined that if the test results have a probability level of >5% then acceptance can be made of the null hypothesis (H_0) and conversely rejection can be made of the alternative hypothesis (H_a), thus the appropriate model to use is the Common Effect Model (CEM), if the result is the opposite, that the test result has a probability level of <5%, then it will reject the null hypothesis (H_0) and accept the alternative hypothesis (H_a), so that the appropriate model that can be used is the Fixed Effect Model (FEM).

Test Criteria:

Probability level test results >5% = H_0 be accepted (CEM)
Probability level test results <5% = H_0 rejected (FEM)

Hausman Test

Hausman testing will determine the choice between the Fixed Effect Model (FEM) or the Random Effect Model (REM). This Hausman test uses the Chi-Square statistical distribution with k degrees of freedom as the number of exogenous variables. Or use a probability level based on the level $\alpha = 5\%$. Test the hypothesis using the Hausman test if you accept the null hypothesis (H_0) and reject the alternative hypothesis (H_a) then the fit model that will be used is the Random Effect Model (REM), but if the results are the opposite, reject the null hypothesis (H_0) and accept the alternative hypothesis (H_a) then the fit model that will be used is the Fixed Effect Model (FEM).

Test Criteria:

Probability level test results >5% = H_0 be accepted (REM)
Probability level test results <5% = H_0 rejected (FEM)

Lagrange Multiplier Test **(LM)**

Testing the Lagrange Multiplier (LM) is intended to determine the fit model between the Common Effect Model (CEM) or Random Effect Model (REM). The basis used in this LM test

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is the Chi-Squares distribution with a degree of freedom equal to the number of exogenous variables. This test needs to be carried out if the test results between the Chow Test and the Hausman Test produce different decisions.

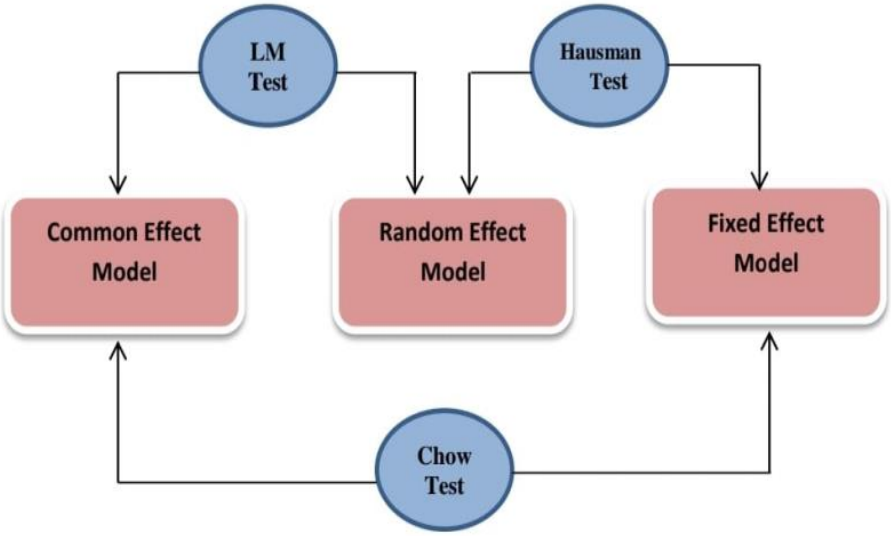
If the LM statistical value is greater than the critical value of the Chi-Squares statistic, it will reject the null hypothesis (H_0) and accept the alternative hypothesis (H_a), this result means that the fit estimate is using the Random Effect Model. On the other hand, if the LM statistic value is smaller than the critical value of the Chi-Squares statistic, it will accept the null hypothesis (H_0) and reject the alternative hypothesis (H_a), this means that the use of the Common Effect Model is more appropriate. Or use a probability level based on the level $\alpha = 5\%$.

Test Criteria:

Probability level test results >5% = H_0 be accepted (CEM)
Probability level test results <5% = H_0 rejected (REM)

Carrying out the model suitability test as explained above can be simplified by looking at Figure 2 below.

Figure 2: Model Fit Test



Panel Data Regression Model.

First Research Model Structural Equation,

$$CAR_{it} = \alpha + \beta_1 LDR_{it} + \beta_2 IR_{it} + \varepsilon_{it}; \quad \ldots\ldots\ldots\ldots\ldots (1)$$

i = 1,2,.,.,., N ; t = 1,2,.,.,.,T

Second Research Model Structural Equation,

$$ROA_{it} = \alpha + \beta_1 LDR_{it} + \beta_2 IR_{it} + \beta_3 CAR_{it} + \varepsilon_{it}; \quad \ldots. (2)$$

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i = 1,2,.,.,., N ; t = 1,2,.,.,.,T

Where:

LDR	=	Loan to Deposit Ratio	β	=	Slope
IR	=	Interest Rate	α	=	Intercept
CAR	=	Capital Adequacy Ratio	N	=	Number of Observations
ROA	=	Return on Assets	T	=	Lots of time
ε	=	Error component	NxT	=	Number of Panel Data

RESEARCH RESULTS

A. Descriptive Statistics

Table 2: Statistics Descriptive

	CAR	IFL	LDR	ROA
Mean	0.244650	0.839420	0.039790	0.054110
Median	0.210500	0.871000	0.038000	0.052500
Maximum	1.203000	1.135000	0.064000	0.095000
Minimum	0.132000	0.242000	0.020000	0.011000
Std. Dev.	0.155537	0.147762	0.014845	0.017535
Observations	100	100	100	100

Source: Data processed

B. Return On Assets and Capital Adequacy Ratio as Endogenous Variables in Testing the Suitability of Research Models.

Structural Equation (1&2) Research Model

Table 3: Chow Test

Research Model 1 Chow Test: Common Effect Vs **Fixed Effect** Endogenous Variable: **CAR**				**Research Model 2** Chow Test: Common Effect Vs **Fixed Effect** Endogenous Variable: **ROA**			
Effects Test	**Statistic**	**d.f.**	**Prob.**	**Effects Test**	**Statistic**	**d.f.**	**Prob.**
Cross-section F	6.977958	(19,78)	0.0000	Cross-section F	6.351372	(19,77)	0.0000
Cross-section Chi-square	99.316251	19	0.0000	Cross-section Chi-square	94.282429	19	0.0000

Source: Data processed

The results of testing the Chow-test in Research Model 1 and Research Model 2 show that using the F test and chi-square test statistics produces statistical hypotheses: rejecting the null hypothesis (H_0) and accepting the alternative hypothesis (H_a) at the level of α = 5%. This can be interpreted as saying that the **Fixed Effect Model** is better to use than the Common Effect Model. (Table-3)

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Table 4: Hausman Test

Research Model 1 Hausman Test: Fixed Effect Vs **Random Effect** Endogenous Variable: **CAR**				**Research Model 2** Hausman Test: **Fixed Effect** Vs Random Effect Endogenous Variable: **ROA**			
Test Summary	**Chi-Sq. Statistic**	**Chi-Sq. d.f.**	**Prob.**	**Test Summary**	**Chi-Sq. Statistic**	**Chi-Sq. d.f.**	**Prob.**
Cross-section random	1.596889	2	0.4500	Cross-section random	16.495809	3	0.0009

Source: Data processed

The results of testing the Hausman-test in Research Model-1, produced a statistical hypothesis: accepting the null hypothesis (H_0) and rejecting the alternative hypothesis (H_a) at the α= 5% level so that the use of the **Random Effect Model** is better than the Fixed Effect Model (Table-4). Seeing that there are different results between the Chow Test and the Hausman Test, it is necessary to continue testing the Lagrange Multiplier Tests (LM-Test). In the results of the Hausman-test in Research Model-2, it produces a statistical hypothesis: rejecting the null hypothesis (H_0) and accepting the alternative hypothesis (H_a) at the α= 5% level. This can be interpreted as saying that the **Fixed Effect Model** is better to use than the Random Effect Model (Table-4). Seeing that there are similar results between the Chow Test and the Hausman Test, there is no need for Lagrange Multiplier Tests (LM-Test).

Table 5: Lagrange Multiplier Tests (LM-Test)

Research Model 1 **LM Test**: Common Effect Vs Random Effect Endogenous Variable: **CAR**			
Test Hypothesis			
	Cross-section	**Tim**	**Both**
Breusch-Pagan	55.32265 (0.0000)	1.497303 (0.2211)	56.81995 (0.0000)

Source: Data processed

The results of testing the Lagrange Multiplier Tests in Research Model 1 show that the Breusch-Pagan produces a statistical hypothesis: rejecting the null hypothesis (H_0) and accepting the alternative hypothesis (H_a) at the level of α = 5%. This can be interpreted as saying that the Random Effect Model is better to use than the Common Effect Model. (Table-5).

Table 6

Endogenous Variable: CAR				
Total pool (balanced) observations: 100				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	0.756541	0.042334	17.87080	0.0000
LDR	-0.012516	0.069886	-0.179099	0.8582
IR	**2.159862**	**0.681452**	**3.169501**	**0.0020**
Adjusted R-squared	0.076808			
F-statistic	5.118343			
Prob(F-statistic)	0.007705			

Source: Data processed

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Table 7

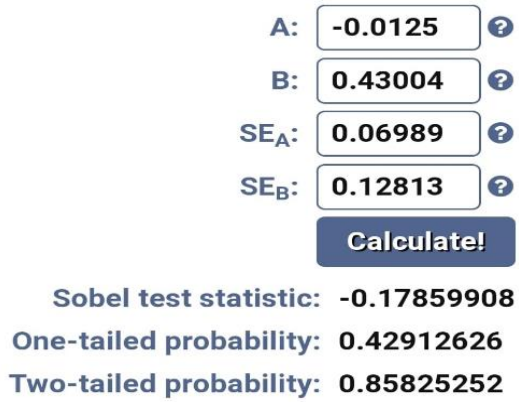
Endogenous Variable: ROA				
Total pool (balanced) observations: 100				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-0.016166	0.013983	-1.156150	0.2512
LDR	-0.003781	0.010404	-0.363417	0.7173
IR	**0.040042**	**0.016058**	**2.493616**	**0.0148**
CAR	**0.430042**	**0.128134**	**3.356184**	**0.0012**
Adjusted R-squared	0.531768			
F-statistic	6.110621			
Prob(F-statistic)	0.000000			

Source: Data processed

C. Testing the Intervening Variable CAR Function

- At the level of α = 5%, the Intervening Variable CAR cannot function to mediate the influence of the Loan to Deposit Ratio (LDR) on Return on Assets (0.85825252 > 0.05), (Table 8)

Table 8: Indirect Effect of LDR on ROA



Where:

A: LDR Regression Coefficient on CAR

B: CAR Regression Coefficient on ROA

SE_A: Std. IR error against CAR

SE_B: Std. CAR error against ROA

- At the α = 5% level, the Intervening Variable CAR can function to mediate the effect of Interest Rate (IR) on Return on Assets (0.02120133 < 0.05), (Table 9)

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Table 9: Indirect Influence of IR on ROA

A:	2.15986
B:	0.43004
SE_A:	0.68145
SE_B:	0.12813
	Calculate!
Sobel test statistic:	2.30437985
One-tailed probability:	0.01060067
Two-tailed probability:	0.02120133

Where:

A: IR Regression Coefficient on CAR

B: CAR Regression Coefficient on ROA

SE_A: Std. IR error against CAR

SE_B: Std. CAR error against ROA

1) Loan to Deposit Ratio (LDR) has an insignificant effect on Capital Adequacy Ratio (CAR), (table 6).
2) Interest Rate (IR) has a significant effect on and is positively correlated (table 6).
3) Loan to Deposit Ratio (LDR) has an insignificant effect on Return on Assets (ROA), (table 7).
4) Interest Rate (IR) has a significant effect and is positively correlated with Return on Assets (ROA), (table 7).
5) Capital Adequacy Ratio (CAR) has a significant effect and is positively correlated with Return on Assets (ROA), (table 7).
6) Capital Adequacy Ratio (CAR) as an intervening variable does not function to mediate the indirect influence between Loan to Deposit Ratio (LDR) on Return On Assets (ROA), (table8). The different result in Interest Rate (IR) is that CAR functions to mediate the indirect influence between IR on ROA. (Table 9).

DISCUSSION

Loan to deposit ratio (LDR) is an indicator of the level of a bank's ability to channel funds from third parties that it collects to debtors. LDR is also a ratio used to measure the level of liquidity of a bank, where a high LDR at a bank will indicate that the bank is disbursing or lending relatively large amounts of funds, or it can be said that the bank is relatively illiquid and vice versa. The results of this research are that LDR cannot explain the effect on CAR, not because

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the distributed funds are illiquid, but on the contrary, because the banking sector has problems with credit distribution. This can be explained from the results of the influence of interest rates which can explain the effect on CAR. High interest rates will result in disruption of credit distribution and will result in decreased profitability of the banking sector.

The Capital Adequacy Ratio (CAR) is a ratio that shows how much of the bank's risk-bearing assets are financed from its own capital. This can be simplified in other words that CAR is a bank's performance ratio to measure the adequacy of capital it has to support assets that contain or produce risk. The results of this research show that the more established capital adequacy, the greater the profitability. High interest rates will have a positive impact or provide a level of security towards an increase in CAR and subsequently lead to an increase in the level of profitability, ROA.

Capital Adequacy Ratio (CAR) as an intervening variable, functions to mediate the influence of the interest rate on ROA profitability, but does not function to mediate the variable Loan to deposit ratio (LDR).

CONCLUTIONS

Findings: This research produces and concludes that the interest rate (IR) variable, either directly or indirectly through the Capital Adequacy Ratio (CAR), can explain its effect on ROA Profitability, but the opposite does not happen with the Loan to Deposits Ratio (LDR) which is unable to explain its effect. Either directly or indirectly.

Acknowledgments

Thanks to colleagues who have helped in conducting this research. Hopefully in the future we can conduct research with the ideas needed by the people in need.

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