



CAMEL Ratio as an Indicator of Financial Distress Altman Z-Score Model with Company Size as a Moderating Variable

T W Erdi^{*}, W Agustin, S A G Pradana, and Theresia T

Accounting Department, Sekolah Tinggi Ilmu Ekonomi YKPN

Jalan Seturan Raya, Caturtunggal, Depok, Sleman, Yogyakarta, 55281, Indonesia

^{*}) E-mail to: tiowaskitoe@gmail.com

Abstract. The CAMEL ratio is one of the analytical tools to predict bankruptcy in a bank or what is commonly referred to as financial distress. The condition of financial distress is influenced by many factors, one of which is the size of the firm. This study examines the effect of the three components in the CAMEL ratio, namely capital adequacy, profitability, and asset quality on financial distress. Firm size will be used as a variable that moderates the relationship between the three components in the CAMEL ratio to financial distress. The method used is Moderated Regression Analysis (MRA) with the object of research being banks listed on the Indonesia Stock Exchange from 2016 to 2020. The results of this study prove that capital adequacy and profitability have a negative effect on financial distress, while asset quality has no effect. to financial distress. Firm size is able to moderate the relationship between capital adequacy and profitability with financial distress, but is unable to moderate the relationship between asset quality and financial distress.

Keywords: capital adequacy, profitability, asset quality, financial distress, firm size

1. Introduction

Bank is one of the industrial sectors engaged in finance and has an important role in the economy of a country. Bank with good financial reports will be easily trusted by the public so that they can avoid financial distress conditions. Financial distress is a decline in the financial condition of banks that occurred before bankruptcy or liquidation. One way to see if a bank is in financial distress is to analyze its financial statements. One of the analytical tools commonly used to assess the soundness of a bank is the CAMEL ratio.

The CAMEL ratio consists of several components, namely capital, asset quality, management, earnings, and liquidity. This research will explore the three components is it capital, asset quality, and earnings. The capital component is used to assess the bank's capital level, the asset quality component is used to assess the condition of bank assets and the risk of default, and the earnings component is used to assess the bank's ability to generate bank profits. On the other hand, there are many other factors that also influence the financial distress conditions that occur in banks, one of which is the size of the firm. Firm size can be judged from how many assets a bank has. When the size of a bank is large, it can be said that this bank can avoid financial distress. This is because banks certainly have the trust of stakeholders, and have sufficient resources to survive in the midst of a crisis.

This study will later analyze how the influence of the level of capital adequacy, profitability, and asset quality on financial distress in banks listed on the IDX in 2016-2020. In addition, researchers also want to analyze whether firm size can moderate the relationship between the components in the CAMEL ratio to financial distress. This research is expected to be able to assist banks in seeing the factors that may have an influence on financial distress, and to avoid bankruptcy. Because, through the CAMEL analysis carried out, it can help banks measure their capital capacity, assess how banks perform in a certain period, and assess how current and non-performing loans are in a bank. In addition, it is also hoped that this research can be a tool for evaluating banking performance that can be useful for stakeholders.

2. Literature Review

Signaling theory states that a signal can provide a signal given by management to investors [1]. The signal that has been given will then be responded to by the investor according to the interpretation of the signal receiver. Brigham and Houston [2] added that signaling theory is a guide for investors about banking prospects in the future. Signaling theory also explains one of the reasons managements provides information, namely to reduce information asymmetry.

Information asymmetry because managers are bank managers so they know more about banking conditions than investors. Ross [3] explains that managers who have better information than investors are encouraged to convey information that can increase the value of the company's shares. In addition, it is important to disclose information from companies in order to convince investors that banks have good prospects. Investors can assess banking prospects through information in the form of financial reports. Information asymmetry that occurs can be reduced through the issuance of financial statements [4]. The financial report is a representation of the financial condition of the bank at a certain period. Financial reports can be used as a communication picture for outsiders in order to know the financial performance and reputation of banks. Banking financial performance can be assessed through financial ratios.

The company's financial ratios can be seen by comparing the information in the financial statements to assess the financial performance of banks. The ratios that can be used can be in the form of capital adequacy ratios, profitability, and asset quality. Capital Adequacy Ratio (CAR) is a bank's ability regarding capital to cover losses on credit or traded securities. CAR shows that the banking position in terms of the amount of capital has been able to meet the needs of the bank itself and is able to carry out the continuation of future prospects [5]. Return on Assets (ROA) is the projected aspect of the Earning aspect. This ratio is used to measure the ability of banks to earn profits. Non-Performing Loan (NPL) is an evaluation of banking financial performance in terms of asset quality. Non-Performing Loan (NPL) shows ability in managing non-performing loans.

Financial performance can be used to describe the financial condition of a bank so that it can show the level of banking soundness [6]. Banks must have a good level of health so that in providing services to their customers they do not disappoint. The soundness level of a bank is defined as the capacity of a bank to carry out all activities properly and to be able to complete banking obligations based on banking laws in force in Indonesia.

Banks that have poor health are usually in financial distress. Financial distress is a state of financial difficulty to cover the company's obligations. This situation begins with liquidity difficulties from a mild stage to serious financial difficulties, namely in conditions of debt that are greater than assets [7]. Ramadhani and Lukviarman [8] describe financial failure as a different insolvency between cash flow and stock basis. The insolvency between the two is divided into two. Technical insolvency is a condition where the company cannot fulfill its obligations. Bankruptcy insolvency is a measure of the present value of cash flows less than the company's liabilities.

Bank insolvency differs based on the size of the bank. Large-scale banks are usually easier to carry out their obligations. This bank will also have more cash flow compared to small-scale banks. The size of the firm can be based on total assets. Indrajaya, Herlina [9] mentions that the size of a firm used to determine the level of the company can be in the form of sales, labor, total assets, and total debt.

3. Hypothesis

Achmad and Kusumo [10], Herdinigtyas and Almilia [11] found that capital adequacy has a negative effect on the probability of financial distress. This is because companies that have sufficient capital assets compared to assets that contain risks will be able to survive in the face of difficult conditions. Based on the explanation above, the first hypothesis is formulated as follows:

H1: Capital adequacy has a negative effect on financial distress experienced by banks.

Achmad and Kusumo [10], Ananto, Mustika [12], Ariesco [13], Curry and Banjarnahor [14], Haryati [15], Sumantri and Jurnal [16] found that profitability had a negative effect on the probability of financial distress. The high profitability describes the level of success of the company in carrying out its operational activities. The higher the profitability, the less likely the company is to experience financial distress [17]. Based on this explanation, the following hypotheses can be formulated:

H2: Profitability has a negative effect on financial distress experienced by banks.

Aryati and Balafif [18], Prasetyo and Pangestuti [19] which show that asset quality has a positive effect on the probability of financial distress. This is because banks that have loans that exceed the time limit mean that managers cannot manage non-performing loans properly. This will affect the soundness of the bank so as to increase the probability of the bank experiencing financial distress. Through these explanations, the following hypothesis is formulated:

H3: Asset quality has a positive effect on financial distress experienced by banks.

Handayani [20] found that firm size can moderate the effect of the components in the CAMEL analysis. The larger the size of the bank, the better the bank's ability to bear risk. This will make the bank more trustworthy and able to face risks so as to avoid financial distress. So, the hypothesis that fits the explanation above is:

H4: Firm size is able to significantly moderate the effect of capital adequacy on financial distress.

Handayani [20] showed that firm size can moderate the effect of the components in the CAMEL analysis. Banks that have many assets will be better at generating profits. A bank with a larger size will be considered to have a high level of profitability and be able to avoid financial distress better than a bank with a smaller size. The fifth hypothesis of the study is:

H5: Firm size is able to significantly moderate the effect of profitability on financial distress.

Handayani [20] explains that firm size can moderate the effect of the components in the CAMEL analysis. NPL can show how many non-performing loans can be overcome by banks. Of course, the higher the value of NPL can indicate poor performance of banks and can lead banks to financial distress. The hypotheses that can be formulated from the explanation above are:

H6: Firm size is able to significantly moderate the effect of asset quality on financial distress.

This, from the explanation of the formulation of the hypothesis above, a research framework is designed as follows:

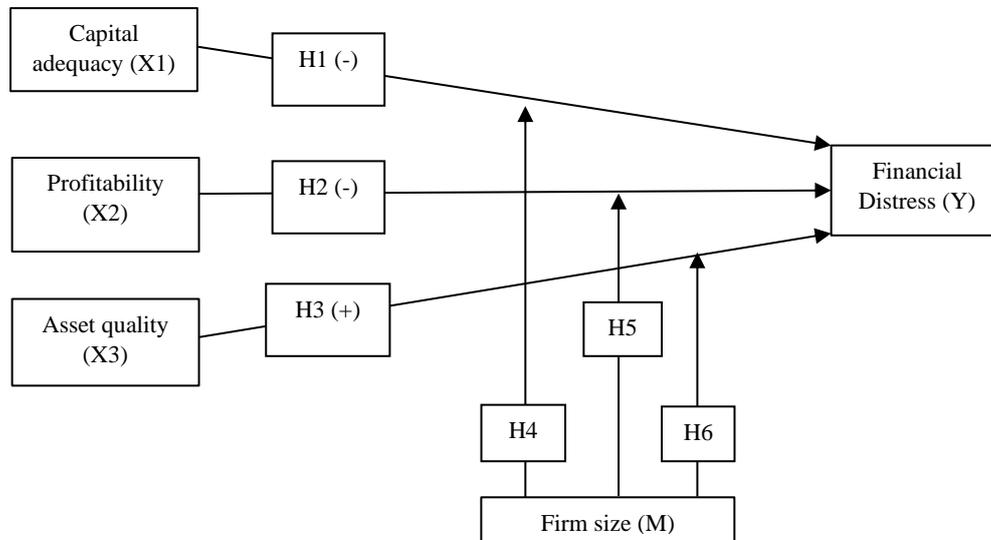


Figure 1. Research Framework

4. Research Method

This research uses purposive sampling method. The criteria for the sample to be studied are banks in Indonesia which publish their complete financial statements for five consecutive years in 2016-2020 and submit them to Bank Indonesia. Banks that are the object of banking research that are not problematic and are not in a special supervision program in the 2016-2020 period. This bank is still actively operating until December 31, 2020.

The independent variables in this study relate to the measurement of the level of capital adequacy, profitability, and quality of banking assets which are part of the CAMEL analysis. The level of capital adequacy in this study is proxied by the Capital Adequacy Ratio (CAR). CAR shows that the banking position in terms of the amount of capital has been able to meet the needs of the bank itself and is able to carry out the continuation of future prospects [5]. The CAR value is obtained by dividing the bank's capital by risk-weighted assets. To assess the health of banks with CAR, measurements from PBI are used where when the CAR is greater than or equal to 12%, the bank is declared very healthy. CAR value greater than or equal to 9%, and less than 12%, banks are considered healthy. When the CAR is greater than or equal to 8%, and less than 9%, the banking system is said to be quite healthy. Unsound banks have a CAR value of more than or equal to 6%, and less than 8%. Banks with a CAR value of less than or equal to 6% are declared unhealthy.

Furthermore, profitability in this study is proxied by Return on Assets (ROA). This ratio is used to measure the ability of banks to earn profits. Return on Assets (ROA) is obtained by dividing profit before tax by total assets. To assess the soundness of banks, PBI is used as a reference. When the ROA is more than 1.5%, the bank is said to be very healthy. Banks with ROA of more than 1.25% and less than or equal to 1.5% are declared healthy. A fairly healthy bank has an ROA of more than or equal to 0.5% and less than or equal to 1.25%. Unsound banks have an ROA of more than 0 and less than or equal to 0.5%. An unhealthy bank has an ROA less than or equal to 0.

Asset quality is proxied by Non-Performing Loan (NPL). Non-Performing Loan (NPL) shows ability in managing non-performing loans. The value of Non-Performing Loan (NPL) is obtained by dividing non-performing loans by total loans. The assessment of the soundness of a bank according to

NPL, uses PBI as a reference, namely when the NPL is less than or equal to 5%, the bank is declared healthy, while when the NPL is more than 5%, it is declared unhealthy.

Financial distress in this study is the dependent variable. Financial distress is proxied using the Altman Z-Score model. According to Hanafi and Halim [21] the value of financial distress is obtained by the formula:

$$Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 1.0X_5$$

X₁ in the above equation is working capital to total assets, X₂ is retained earnings to total assets, X₃ is earnings before interest and taxes to total assets, X₄ is market value of equity to book value of debt, and X₅ is sales to total assets. If the Z value is less than 1.81, the bank is categorized as unhealthy or bankrupt. When the Z value is greater than 1.81 and less than 2.99, the banking industry is included in the grey criteria. If the Z value is more than 2.99, the bank is in a healthy position or has not experienced bankruptcy. This study uses firm size as a moderating variable. The size of the company is obtained by multiplying Ln by the total assets owned.

Descriptive statistics in this study were used to determine the mean, median, maximum, minimum, and standard deviation values of the research data. Furthermore, the classical assumption test was carried out to determine the feasibility of the research data. The classical assumption test that will be carried out is the normality test, multilinerity test, and heteroscedasticity test. Hypothesis testing will be carried out using Moderated Regression Analysis (MRA) or interaction test. In this study, MRA will be carried out with the help of SPSS software, with the following equation:

$$Y = a + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_1 X_4 + \beta_6 X_2 X_4 + \beta_7 X_3 X_4 + e_1$$

In the above equation Y is a symbol of financial distress, a is a constant symbol, β_1 to β_7 is a symbol of the coefficient of each variable. The research variables are symbolized by X₁ (capital adequacy), X₂ (profitability), X₃ (asset quality), X₄ (firm size). Finally, the error is symbolized by e₁.

Data Analysis

Table 1. Statistika Descriptive Analysis

Variabel	N	Minimum	Maximum	Mean	Std. Deviation
Capital adequacy	80	10,52	35,77	21,012	4,46244
Profitability	80	-7,47	5,7	1,5925	1,8714
Asset quality	80	0,3	6,37	1,6708	1,27198
Firm size	80	29,58	34,95	32,5535	1,54637
Financial distress	80	-1,7	2,77	-0,1454	0,6481

Statistika descriptive test shows that the capital adequacy variable has a minimum value of 10.52, a maximum value of 35.77, and an average value of 21.012. This can be interpreted that if you look at the adequacy of capital, the average banking sector in Indonesia is very healthy. The standard deviation of the capital adequacy variable is 4.46244 which is smaller than the average value, indicating that this variable from the entire sample has a small variation. The profitability variable has a minimum value of -7.47, a maximum value of 5.7, and an average value of 1.5925. So if you look at this level of profitability, the average banking sector in Indonesia is very healthy. The standard deviation of the profitability variable is 1.8714 which is greater than the average, which means that this variable has a varied distribution of data. The third independent variable, namely asset quality, has a minimum value of 0.3, a maximum value of 6.37, and an average value of 1.6708. Looking at the results of this asset quality, the average banking sector in Indonesia is quite healthy. The asset quality variable has a standard deviation of 1.27198 which is smaller than the average value, so this variable has a small variation. Financial distress as the dependent variable has a minimum value of -1.7, and a maximum value of 2.77.

The average value of this dependent variable is -0.1454, where this result indicates that Indonesian banks are generally in a state of financial distress. Furthermore, the standard deviation of the financial distress variable is 0.64810, which is greater than the average value, indicating that this variable has a varied distribution of data. The moderator variable, namely firm size, has a minimum value of 29.58, a maximum value of 34.95, and an average value of 32.5535. Meanwhile, the standard deviation of the firm size variable is 1.54637 which is smaller than the average value, indicating a small data distribution.

The normality test using the Kolmogorov-Smirnov test shows that the significance level is 0.334 which is greater than 0.05. The results of the heteroscedasticity test carried out by the Glejser test showed that the significance value of all variables was above 0.05. The last classical assumption test is the multicollinearity test which shows the results of the tolerance value of all independent variables exceeding 0.10, and the VIF value is less than 10. From these three classical assumption tests, it can be concluded that the research data is feasible for further testing.

Table 2. MRA Test Result

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Description
	B	Std. Error	Beta			
(Constant)	0,368	0,235		1,564	0,122	-
Capital adequacy	-0,420	0,153	-0,223	-2,752	0,007	Accepted
Profitability	-0,182	0,083	-0,189	-2,191	0,032	Accepted
Asset quality	0,139	0,115	0,102	1,203	0,233	Rejected
Firm size	-0,062	0,161	0,053	-0,383	0,703	-
X1X4	-0,160	0,065	0,344	-2,468	0,016	Accepted
X2X4	-0,226	0,083	0,324	-2,737	0,008	Accepted
X3X4	0,127	0,080	0,153	1,593	0,116	Rejected
Adjusted R Square						0,520
F value						13,206
Sig. F value						0,000

From the table above, the following equation can be determined:

$$Y = 0,368 - 0,420X_1 - 0,182X_2 + 0,139X_3 - 0,062X_4 - 0,160X_1X_4 - 0,226X_2X_4 + 0,127X_3X_4 + e_1$$

This equation indicates that the variables of capital adequacy, profitability, asset quality, and firm size do not have a constant contribution to the financial distress variable, so this variable will be worth 0.368%. The regression coefficient value of the capital adequacy variable is -0.420, so if the capital adequacy level increases by one point and the values of other variables are considered the same, the financial distress variable will decrease by 0.420%. The profitability variable has a regression transformation coefficient value of -0.182, so that when the value of this variable increases by one point, the financial distress variable will decrease by 0.182% (the values of other variables are considered the same). The regression transformation coefficient of the asset quality variable is 0.139, so when the value of this variable increases by one point, the value of the financial distress variable will increase by 0.139 (the values of other variables are considered the same). For the firm size variable which has a transformation coefficient value of -0.062, it will cause the financial distress variable to decrease by 0.062% if the firm size variable increases by one point assuming the values of other variables are considered the same. The interaction between the capital adequacy variable and firm size produces a regression transformation coefficient value of -0.160. The regression transformation coefficient for profitability and firm size variables is -0.226 which is the interaction of these two variables. For the

interaction of asset quality and firm size variables, the regression transformation coefficient value is 0.127.

Table 2 also shows the results of the analysis of the coefficient of determination used to assess how much the independent variable is able to explain changes in the dependent variable. As a result, the value of Adjusted R Square in this study was 0.520 (52%). So that the independent variables in this study, namely capital adequacy, profitability, and asset quality are able to explain changes in the dependent variable, namely financial distress by 52%. While the other 48%, influenced by other variables that are not included in this research model.

The next test is the F statistical test which is used to see how the influence of the independent variable on the dependent variable simultaneously. The results show that the F value is 13.206 with a probability of 0.000. The significance value should not be more than 0.05, it can be said that the independent variables, namely capital adequacy, profitability, and asset quality simultaneously affect financial distress.

Statistical t test was conducted to determine the simultaneous effect of the independent variable on the dependent variable. From the results of data processing, it is known that capital adequacy has a t-value of -2.752 and a significance level of 0.007 which is smaller than a significance level of 0.05. So this value proves that capital adequacy has a negative effect on financial distress. The profitability variable has a t value of -2.191 and a significance of 0.032. This significance value is smaller than the 0.05 significance level, so it can be said that profitability has a negative effect on financial distress. The third independent variable, namely asset quality, has a t value of 1.203 and a significance value should be 0.233 This variable has a significance value greater than 0.05, which means that there is no significant effect of asset quality on financial distress.

The interaction variable between capital adequacy and firm size has a t value of -2.468 and a significance level of 0.016 which is smaller than the significance level of 0.05. So it can be said that company size has a significant effect on financial distress, or company size can moderate the relationship between capital adequacy and financial distress. The next interaction between profitability and firm size with a t value of -2.737 and a significance of 0.008 which is smaller than a significance level of 0.05, indicating that the firm size variable has a significant effect on the financial distress variable. Firm size variable can also moderate the relationship between profitability and financial distress. The interaction variable between asset quality and firm size has a t value of 1.593 and a significance of 0.116. This significance value is greater than the significance level of 0.05, so that the size of the firm has no significant effect on financial distress and cannot moderate the relationship between asset quality and financial distress.

5. Result and Discussion

The results of the study indicate that capital adequacy has a negative effect on financial distress. This is because companies that have sufficient capital will have better performance in dealing with difficult financial conditions. Sufficient capital owned by the bank will more easily overcome the credit default problems experienced by customers. The results of this study are in line with Achmad and Kusumo [10], Herdiniatyas and Almilia [11] which state that the lower the capital adequacy of a bank, the greater the possibility of problematic conditions in the bank. Adequate bank capital not only makes banks more resilient in facing difficult conditions, but can also support bank growth. Banks can develop their business by adding branches, transforming digitalization, and building various service facilities such as ATMs that will make it easier for customers to make transactions. The convenience obtained by the customer will further strengthen the bank's financial condition because the customer will prefer to use the bank.

The results of the second study indicate that profitability has a negative effect on financial distress. Banks with high profitability show that the company can carry out its operational activities well [14, 17]. Profitability has become an indicator used by investors, creditors, customers, and various other parties related to banks as a level of success. The more successful a bank is, the more confident investors

and customers will be in investing or lending to the bank. This will further facilitate bank operations because banks have flexibility in funds and have good income from loans by customers.

The results of the third study stated that there was no significant effect of asset quality on financial distress. This is because the quality of assets owned by banks is still at the normal threshold. Asset quality indicates the ability to manage non-performing loans by bank managers. Bank Indonesia has determined a reasonable threshold for asset quality that must be met by a bank in carrying out its operations. This threshold is a limit that shows if a bank has not exceeded that limit, then the company still has good asset quality, but if the bank has exceeded this threshold, then the bank can be said to have poor asset quality.

The fourth result of the study is that firm size is able to moderate the relationship between capital adequacy and financial distress. The bigger the bank, the more capital it has. This will make big banks stronger in facing financial difficulties.

The fifth result of the study is that the size of the relationship between profitability and financial distress can be moderated by company size. Large companies will find it easier to generate profits. Small companies will be more vulnerable in facing financial difficulties compared to large companies.

The sixth result of the study is that company size is not able to moderate the relationship between asset quality and financial distress. This happens because the size of the bank cannot determine the quality of the assets owned by a bank. Large banks do not always have good asset quality. Therefore, firm size is not able to moderate this relationship.

Implication

Implication is defined as a consequence or direct result of the research results. This study wants to know how the components in the CAMEL analysis affect the condition of financial distress with firm size as a moderating variable. The results show that capital adequacy and profitability have a negative effect on financial distress, while asset quality has no effect. Thus, banks must of course continue to maintain their capital adequacy in order to avoid financial distress. Efforts that can be made by banks if they have a low level of capital adequacy are to improve their capital position by making cash deposits, becoming a go public bank, or making long-term loans. In addition, banks also need to maintain their profitability. One of the efforts that can be done is to strengthen banking performance by developing fee-based income. With the help of the rapid development of technology and information, banking can certainly reach a wider audience. Thus, banks can earn income other than credit interest or income from the main banking activities.

6. Conclusion, Limitations, dan Suggestions

The results of the study prove that capital adequacy and profitability have a negative effect on financial distress. The next result is that there is no significant effect of asset quality on financial distress. Firm size is able to moderate the relationship between capital adequacy and profitability with financial distress. Firm size is not able to moderate the relationship between asset quality and financial distress.

Some of the limitations of this study are that the research focus is only on 16 banks in Indonesia, so this research is only correlated for the financial sector. On the other hand, the financial sector is a sector that must be separated from other industrial sectors in research. So, although the focus of this research is quite narrow, it can complement other research that separates the financial sector. The variables in this study that are estimated to affect financial distress are capital adequacy, profitability, and asset quality, so that further researchers can add other variables that affect financial distress. Further research can also add a research period, especially the latest year because this research is only from 2016 to 2020. In addition, this research has not been able to distinguish between go public banking and banking that has not gone public or distinguish private and government-owned banks. Future research can make this distinction to get more specific research results.

Appendix

Table 1. Normality Test Results

One-Sample Kolmogorov-Smirnov Test		
Unstandardized Residual		
N		80
Normal Parameters ^{a,b}	Mean	.0000000
	Std. Deviation	.41421340
Most Extreme Differences	Absolute	.106
	Positive	.106
	Negative	-.080
Kolmogorov-Smirnov Z		.944
Asymp. Sig. (2-tailed)		.334
a. Test distribution is Normal.		
b. Calculated from data.		

Table 2. Heteroskedasticity Test Results

Model	Coefficients ^a			T	Sig.	
	Unstandardized Coefficients		Standardized Coefficients			
	B	Std. Error	Beta			
	(Constant)	.322	.099		3.245	.002
1	Capital adequacy	-.031	.064	-.057	-.488	.627
	Profitability	.026	.035	.093	.751	.455
	Asset quality	-.078	.049	-.196	-1.615	.111
	Firm size	-.029	.068	-.087	-.434	.665
	X1*M	-.019	.027	-.140	-.702	.485
	X2*M	.014	.035	.066	.389	.699
	X3*M	.049	.034	.202	1.463	.148

a. Dependent Variable: ABS_RES

Tabel 3. Multicollinearity Test Results

Model	Coefficients ^a			t	Sig.	Collinearity Statistics		
	Unstandardized Coefficients		Standardized Coefficients			Tolerance	VIF	
	B	Std. Error	Beta					
	(Constant)	.368	.235	1.564	.122			
1	Capital adequacy	-.420	.153	-.223	-2.752	.007	.922	1.085
	Profitability	-.182	.083	-.189	-2.191	.032	.821	1.218
	Asset quality	.139	.115	.102	1.203	.233	.853	1.172
	Firm size	-.062	.161	-.053	-.383	.703	.315	3.175
	X1*M	-.160	.065	-.344	-2.468	.016	.313	3.190
	X2*M	-.226	.083	-.324	-2.737	.008	.433	2.310
	X3*M	.127	.080	.153	1.593	.116	.661	1.513

a. Dependent Variable: Financial Distress

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