Linear Discriminant Analysis dalam Memprediksi Financial Distress pada Bank Muamalat KCP Sukaramai Periode 2018-2022 *(Linear Discriminant Analysis in Predicting Financial Distress at Bank Muamalat KCP Sukaramai Period 2018-2022)*

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Abstract
Purpose: This study aims to determine the variables that can predict the financial distress of Islamic banks in Indonesia for the period to 2018-2022.
Methodology: This research is quantitative with secondary data types. This study uses the variable (Return On Equity) ROE, (Cash To Deposits) CTD, (Loans To Assets) LTA as its independent variable, while the dependent variable is Financial Distress. The Financial Distress Indicator used in this study is the ROA categorized ratio (return on assets).
Results: The results of this study indicate that 2 Independent financial ratio variables can predict financial distress, namely, ROE and CTD. These results are shown from the linear discriminant analysis using the independent variables and from the formation of the discriminant function coefficient values.
Limitations: The Financial Distress Indicator used in this study is the ROA categorized ratio (return on assets). The analysis used in this study is a linear discriminant analysis that requires the dependent variable to be in the form of a category and is used to form the coefficient of the discriminant function.
Contribution: Purposive sampling was conducted with a total sample of 14 Islamic Commercial Banks. This study is quantitative research with secondary data types.
Keywords: *Linear Discriminant Analysis, Financial Distress, Financial Ratio*
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1. Introduction

Economic trends at the national and international levels are growing rapidly, in line with the increasing difficulties faced by the National Bank in fulfilling its commitments to the public. Since banks are the focal point of the nation's economy, they are regarded as intermediaries who take money from the public in the form of savings and return it to them as credit or financing. (Soemitra, 2017). Since Sharia banking is the best option given the country's economic situation, it is one of the financial institutions that is gaining popularity in Indonesia. (Mardani, 2018). During the financial crisis, sharia banks seemed more accommodative with the structure of their earnings. When the country's economy improves, bank profits will increase; otherwise, when the economy deteriorates, sharia banks will not be profitable (Musthafa, 2018).

The method of earnings used by a sharia bank is also called a margin, which is one of the sharia financial institutions that includes sharia banks and sharia enterprise units. The size of the margin is determined

at the time of the risk based on the probability of profit and loss (Musthafa, 2018). Financial difficulty is a broad concept that covers a variety of situations in which a company may have financial difficulties. For example, if a company shows an inadequate financial position, it can cause stakeholders, including creditors, to lose confidence in the organization. (Musthafa, 2018). Not only the company's creditors, but also stakeholders such as my stakeholder, will stop working with him. Shariah banks are deemed unable to maintain their health and to meet their debt obligations in the event of financial difficulties. (Amaliah, 2016). This is due to increased costs incurred by companies as a result of increasing competition among entrepreneurs, which can have a negative impact on company performance. A corporation will suffer losses if it is unable to compete. (D. Putri & Ardini, 2020).

According to Bank of Indonesia Governor Agus Martowardojo, the financial development of sharia banks is fairly good, because the sharia bank performs better in dealing with crises and financial difficulties. compared to conventional banks (syariah.co.id). In fact, the sharia bank can't keep the bank's health, R is free software. Used to analyze data and images based on the S program, with R having Pros and Cons, the advantages of using Windows and Linux. MacOS (Ramadani, 2022). R is a programming language that allows users to create specialized software in a particular industry. (Putra, 2020). R is therefore supported by a user community that creates sustainable and sustainable statistical packages. R software can visualize for free, and the accuracy of the results is higher than other software. Besides its advantages, R also has some drawbacks. Since R is an interpreter-based programming language, it has limited computational power, making it difficult to execute applications or functions written in R without a large amount of program code. (Setyawan & Pratiwi, 2020).

2. Literature review

The ROA ratio, one of the profitability ratios used to measure a company's capacity to generate profits from managed assets, can be used to assess a company's profitability. (Musthafa, 2018). As for the ratio to be used in this study, i.e. the ROE ratio, this ratio was chosen because it is one of the ratios to measure the ability of a company to generate a profit from its shareholders' investments. (Musthafa, 2018). Ratio (Cash to Deposits) CTD using this ratio as a predictor variable because it does not include turnover and interbank deposits and includes third-party funds. (Musthafa, 2018). An example of a third party is a bank that is not directly involved in a transaction between its clients, but provides services or facilities necessary to carry out the transaction, such as money transfers or payments. Ratio (Equity to Assets) When a high equity ratio is expected to reduce the likelihood of financial distress because the greater the equity indicates the smaller the portion of debt in the bank, then the probability of financial stress will be smaller. (Musthafa, 2018). By choosing this ratio as a predictor variable, it is possible to assess the level of liquidity of a bank in relation to its ability to repay loans to customers or provide credit to the general public, taking into account all bank assets. If there's a lot of cash in the bank, the bank's operations won't run efficiently. (Musthafa, 2018).

Table 1. Financial Distress Results

Variable	2018	2019	2020	2021	2022
ROE	0,575	0,312	0,410	0,791	0,997
CTD	0,886	0,560	0,644	0,350	0,613
LTA	0,364	0,785	0,389	0,465	0,872
Financial Distess	0,857	1,183	0,985	1,041	1,191

From the table above, it can be described as follows:

Return on Equity (ROE) is a financial ratio that measures the rate of profitability of a company by comparing net profit with shareholder equity. 2018: ROE = 0.575. This shows that in 2018, the company generated net profit of 0.575 for each shareholder's equity unit. 2019: ROE=0.312. There was a significant decline from the previous year. This can be caused by various factors such as a decrease in net profit or an increase in shareholders' equities. There may be an attempt to improve the financial performance of the company. 2021: ROE = 0.791. There has been a significant increase from the previous year. This may be due to an increase in net profit or more efficient equity management. 2022: ROe = 0.997. There has also been a greater increase. If this increase is due to increased net profit, the company's efficiency in generating profits from shareholders' equities has increased.

Cash to Deposit describes how much cash an entity holds compared to the amount of deposits it holds. This ratio can give an idea of how liquid or liquid an asset is. 2018: Cash to Deposit = 0.886. This ratio shows that in 2018, the entity had a relatively large amount of cash compared to the amount of deposits. There may be a policy to keep the level of liquidity high. 2019: Cash to Deposit = 0.56 This ratio has decreased significantly from the previous year. This may indicate a change in the asset structure, where the ratio of deposits has increased compared to the amount of cash. 2020: Cash To Deposit is 0.644. This is a slight increase from the year before, but it is still lower than in 2018. There may be attempts to maintain a balance between liquidity and deposit investments. 2021: Cash to Deposit = 0.35. This ratio drops significantly, suggesting that by 2021, the amount of deposits is more predominant than the quantity of cash. This may be due to investment strategies that are more focused on deposit instruments. 2022: Cash to Deposit = 0.613. This ratio is rising back from the previous year, indicating the possibility of a change in financial policy or liquidity management by 2022.

The Loans to Assets ratio is used to measure the extent to which a bank or financial institution uses its assets to provide loans. 2018: Loans to Assets = 0.364. This ratio shows that in 2018, about 36.4% of total assets were used to provide loans. 2019: Loans to Assets = 0.785. A significant increase compared to the previous year. In 2019, approximately 78.5% of total assets were used to provide loans. It could indicate expansion or greater focus on lending activities. 2020: Loans to Assets = 0.389. A decrease from the previous year. By 2020, approximately 38.9% of total assets are used for lending. There may be a change in strategy or economic conditions affecting the use of assets for lending. 2021: Loans to Assets = 0.465. An increase compared to 2020. By 2021, approximately 46.5% of total assets were used to provide loans. There may be a change in strategy or economic recovery that affects the re-focus on lending activities. 2022: Loans to Assets = 0.872. There was a drastic increase from the previous year. By 2022, about 87.2% of total assets were used for lending. It could indicate a significant increase in lending or a change in business strategy that places more assets to support these activities. Financial distress is a method used to assess the financial sustainability of a company and predict the potential for bankruptcy. These scores are based on some financial ratios that reflect the corporate financial health. Low Financial distress values tend to indicate a higher risk of bankruptcy, while higher values indicate financial stability. In 2018 (Financial Distress: 0.857): Scores below 1.8 indicate a high risk of bankruptcy. With this score, the company may face serious financial difficulties. 2019 (Finacial distress: 1.183): Despite rising from the previous year, the score is still below 1.8. The company may still be at risk of bankruptcy, but slightly better than the previous year.

2020 (Financial Distress: 0.985): Score again falls and is below 1.8. This can be considered as a potential signal for more serious financial problems. 2021 (Financing distress: 1.041): A slight increase from the previous year, but still below the threshold of 1.8. Companies may still face financial challenges. 2022 (Finance distress : 1.191): Score returns to rise, but remains below 1.8 despite an increase, further surveillance is needed to ensure financial stability.

3. Methodology Research

This research is quantitative. (Musthafa, 2018). Numerically explored phenomena are highlighted by quantitative research. Using data, statistical management, organization, and controlled trials can help this study strategy reach its goal. The entire Indonesian sharia bank, in particular 14 banks registered with the Financial Services Authority (OJK), were included in the population and sample research. The sample used is the sharia banks whose financial reports were issued by the financial services authority between 2018 and 2022.

4. Result and Disscussion

In this study, the financial variables ROE, CTD, and LTA are used to help predict the financial difficulties of Indonesian sharia banking. Figure 1 below provides statistical details of four variables that can be used to predict the financial difficulties of sharia banking in Indonesia so that people can have a general picture of the situation:
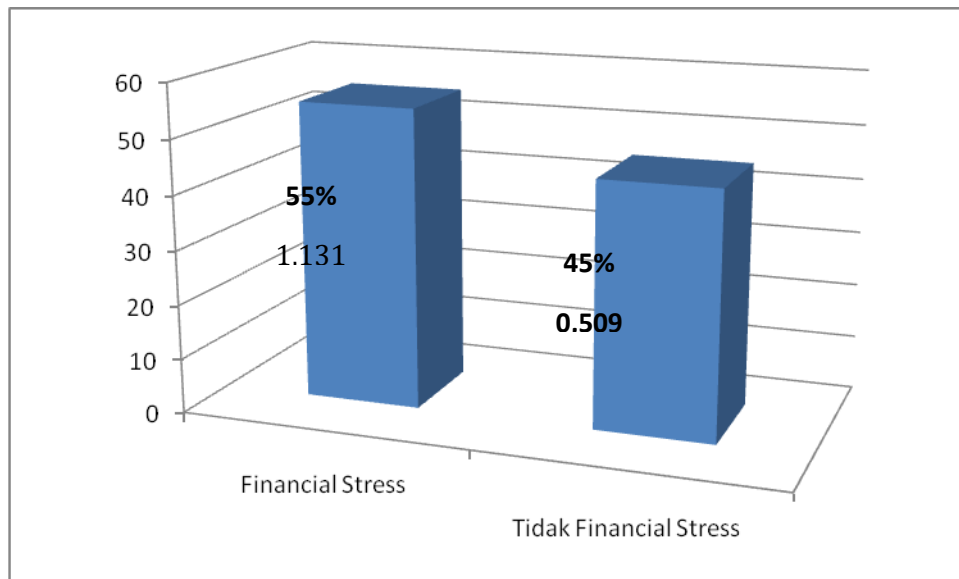
Figure 1. Description Financial Distress Sharia Banking in Indonesia

Figure 1 above explains that on the picture of financial distress Bank Muamalat KCP Sukaramai in Indonesia based on ROA category in the year 2018-2022. Based on the sample used in this study used 45% of Bank KCP sukaramai who did not experience financial distresses, while who suffered financial disasters of 55%.

ROE (Return On Equity) is a ratio as an important indicator for shareholders and prospective investors to measure the ability of banks in obtaining net profits associated with dividend payments (Purwanti, 2021) As well as this ratio is used to study the extent to which a company uses its own resources to be able to provide profit on equity. Can be seen in table 1 below about the characteristics of financial distress based on ROE.

Table 1 Description of ROE by Category Financial Distress

Kategori	Mean	Varians	Minimum	Maximum
Tidak Financial Distress	0,06	0,03	-0,29	0,54
Financial Distress	0,06	0,02	-0,94	0,37

In Table 1 it is shown that the category of financial distress using the variable ROE, banks that do not experience an average financial stress have a ROE of 0.061 with a minimum value of -0.29 and a maximum value of 0.54 and have a variance of 0.04. Whereas the shariah banks experiencing a financial stress average have an ROE value of 0.061, with the minimum value -0.94 and the maximum value 0.37 and have the variance value of 0,02. Variance itself is a number that shows how much data will spread from the average (mean) The higher the value of the variance, the farther the data will be spreading from the mean. ROE is a common tool used by investors and corporate leaders to measure how much profit a company gets from its own capital. (Yulianingtyas, 2016). The higher the ROE, the greater the rate of profit the bank achieves, so the likelihood that the bank is safe and less in trouble. When a bank has a low ROE then the likelihood of a bank in trouble increases. (R. Putri, 2021).

This is reinforced by Fatmawati and Rihardjo (2017) research which states that ROE has a significant relationship and can predict financial distress, but there is a difference in the study (Machmudah, 2017) that states that the ROE does not influence the prediction of financial distresses, as there is an increase or decrease in the company's ROE and does not affect the ability of the company in avoiding the likelihood of the occurrence of financial stresses. If the bank does not manage third-party funds as bank

cash, then the bank is said to be inefficient in carrying out its activities or operations. (Aulia, 2019). Can be seen in table 2 below about the characteristics of financial distress based on CTD.

Table 2. Description of CTD by Category Financial Distress

Category	Mean	Varians	Minimum	Maximum
Not Financial Distress	0,11	0,05	0,00	0,83
Financial Distress	0,97	0,02	0,00	0,08

In Table 2 it is shown that the category of financial distress using the variable CTD, the non-financial distress shariah banks averaged a CTD of 0.11 with a minimum of 0.00 and a maximum of 0.83 and a variance of 0.05. Whereas the Shariah bank that has a financial distresses averaged the CTD value of 0.97 with the minimum value of 0,00 and the maximum value of 0.08 with a variation of 0.02.

LTA (Loans to Asset) is the ratio of existing liquid assets to the total assets owned by the bank (Nurfajrina, 2016). The higher the LTA ratio then the profitability is lower, because if the cash available at the bank is too large, indicates the bank's management is inefficient in carrying out its operational activities so will affect the low profitability (Nugraheni & Alam, 2014).

Table 3. Description of LTAs by Category Financial Distress

Category	Mean	Varians	Minimum	Maximum
Not Financial Distress	0,05	0,02	-0,08	0,67
Financial Distress	0,02	0,09	0,00	0,78

The financial distress sharia bank has an average LTA of 0.02 and has a minimum of 0.00 and a maximum of 0.78 and a variance of 0.09. A LTA is a measure of liquidity risk that shows the size of a smooth asset over the total assets held and LTA as one of the variables indicating the level of profitability of a company. It can be seen in table 3 that the average LTA of non-financial distress sharia banks is greater than 5% of the sharia bank that is financial distress, it can be understood that the rate of profitability and efficiency in carrying out the operational activities of the banks that are not financial distresses is much higher and better than the Sharia banking that is finance distress. From the test results using independent variables to predict financial distress, Indonesian shariah banks obtained a minimum rating of -0.097, an average value of -0.001 and a maximum value of 0.078. The above test results show that the ROE and CTD variables are significant variables against the financial distress forecast of Indonesian banking, because the variables have a smaller value than significant. Based on the results of the linear discrimination analysis using the variable ROE against financial distress, ROE has a value of 0.043 with a significantly smaller value ($<0,05$) and at the formation of the value of the discrimination coefficient this study obtained a ROE of 0.051 less than (<0.05). It can be understood that ROE had a significant positive influence on the prediction of financial distresses. From these results, this study can be used as an indication in the prediction of financial distress, which this study describes that sharia banks who are experiencing financial distresses have a greater chance than non-financial distresses, because the sharia bank is considered unable to make a profit by using its equity efficiently.

This supports the Ismawati and Istria (2015) study which states that the ROE ratio has a significant positive impact and can predict the financial distress of a company or a bank. However, this study differs from the study carried out which stated that the ratio of ROE has a non-significant negative influence on the prediction of financial distresses When the percentage ROE is high then the bank is said to be far from making a profit by using its equity efficiently. And the higher the profits that have been obtained it will allow the existence of funds that are unemployed or not used according to the needs of the company, when such can not be used properly then results in the sharia banking has decreased

profitability and suffer financial distress (Panjaitan, 2018) Therefore, the profitability of the sharial bank is determined by the size of profits in order to obtain a large income for its company, the better the company in using the company's assets, then the better also the company ability in generating profits and vulnerable in experiencing financial distresses. (Mailinda, 2018).

From the results of the test of the significant variable CTD against the financial distress prediction because it has a value of -0.521 with a significant value smaller ($<0,05$) and this variable has a discriminatory coefficient value of -1.107 less than (<0.05), it can be understood that CTD has a significant negative influence on the prediction of financial distresses. From these results, this study can be used as an indication in the prediction of financial distress, which describes that non-financial distress sharia banks are less expensive than financial distresses, because sharia bank has great ability in managing third-party funds to become bank cash, then the bank is considered efficient in carrying out its operational activities.

The results of the above test show that the LTA variable is not significant in the financial distress prediction because it has a value of 1.059 with a significant value greater than ($>0,05$) and at the formation of the discriminatory coefficient function having a value 3.188 greater Than (>0.05), it can be understood that the lTA has a positive influence not significantly in predicting financial distresses of banking schariah in Indonesia.

From these results, the research cannot be used as an indication for the prediction of financial distress, because the significant value obtained by this variable is greater than ($>0,05$) which indicates that a sharia bank has a chance to experience financial distresses, because a sharial bank cannot provide financing to the customer on the total assets that the bank owns which will make the bank inefficient in carrying out its operational activities. Loan to Assets (LTA) is a variable used to measure the existing liquid assets of the total assets or related ability of the bank in meeting customer credit or distribution of financing to the public against the total of assets owned by the bank. (Rahmi, 2014). The bigger the bank's cash, the less efficient it is in carrying out its operations. (Fernos, 2017).

5. Conclussion

The analysis conducted in accordance with the objectives of this research yielded the following results:

1) The ROE variable significantly influences the prediction of financial distress. Return on equity has a value of 0.043, which is much smaller (<0.05), and the characteristic function coefficient value is $0.051 < 0.05$, indicating that return on equity has a significant positive effect on the prediction of financial distress.

2) The CTD variable can have an impact and is important in predicting financial difficulties. Since CTD has a much lower value of -0.521 (<0.05) and because CTD has a characteristic function coefficient value of $-1.017 < 0.05$, it indicates that CTD has a significant negative effect on the prediction of financial distress in Islamic banking in Indonesia.

3) The LTA variable has an effect but is not significant in predicting financial distress. This is because LTA has a value of 1.059 with a significance level greater than (>0.05), and because LTA has a characteristic function value of .

References

Amaliah, I. (2016). Analisis Rasio Keuangan Dengan Model Zmijewski (X-Score) Dalam Memprediksi Kebangkrutan Pada Perbankan Syariah Di Indonesia Periode 2012-2015.

Aulia, D. (2019). *Pengaruh Profitabilitas, Kecukupan Permodalan, Risiko Likuiditas, Risiko Kredit Dan Risiko Sistematis Terhadap Return Saham Perbankan Yang Terdaftar Di Bursa Efek Indonesia (Periode 2012 Sd 2017.* Sekolah Tinggi Ilmu Ekonomi Indonesia.

Fatmawati, V., & Rihardjo, I. B. (2017). Pengaruh likuiditas, leverage, aktivitas dan profitabilitas dalam memprediksi financial distress. *Jurnal Ilmu dan Riset Akuntansi (JIRA), 6*(10).

Fernos, J. (2017). Analisis Rasio Profitabilitas Untuk Mengukur Kinerja (Studi Kasus Pada PT. Bank Pembangunan Daerah Provinsi Sumatera Barat). *Jurnal Pundi, 1*(2).

Ismawati, K., & Istria, P. C. (2015). Detektor financial distress perusahaan perbankan indonesia. *Jurnal Ekonomi Bisnis dan Kewirausahaan, 4*(1).

Mailinda, R. (2018). *Pengaruh Leverage, Likuiditas, dan Ukuran Perusahaan terhadap Profitabilitas pada BNI Syariah di Indonesia Periode 2015-2017.* UIN Ar-Raniry Banda Aceh.

Mardani, D. A. (2018). Peran perbankan syariah dalam mengimplementasikan keuangan inklusif di indonesia. *Al-Afkar, Journal For Islamic Studies*, 105-120.

Musthafa, I. (2018). Metodologi penelitian Bahasa Arab : Konsep dasar strategi metode teknik

Nugraheni, P., & Alam, W. F. I. (2014). Pengaruh Risiko Likuiditas Terhadap Profitabilitas Pada Perbankan Syariah dan Konvensional Di Indonesia. *Journal of Accounting and Investment, 15*(1), 1-16.

Nurfajrina, A. (2016). Analisis Financial Distress pada Perusahaan Agribisnis di Bursa Efek Indonesia. *Jurnal Keuangan dan Perbankan, 20*(3), 448-457.

Panjaitan, R. Y. (2018). Pengaruh Current Ratio, Debt to Equity Ratio, Net Profit Margin dan Return On Asset terhadap pertumbuhan laba pada perusahaan consumer goods yang terdaftar di bursa efek indonesia periode 2013-2016. *Jurnal Manajemen, 4*(1), 61-72.

Purwanti, E. (2021). Analisis Perbedaan Kinerja Keuangan Bank Umum Pemerintah Dan Bank Swasta Nasional Yang Terdaftar Di Bursa Efek Indonesia Periode 2013-2017. *Among Makarti, 13*(2).

Putra, R. A. (2020). *Pengembangan Aplikasi Rekomendasi Outfit Of The Day Berdasarkan Lokasi Event Dan Dress Code Berbasis Android.* Universitas Komputer Indonesia.

Putri, D., & Ardini, L. (2020). Pengaruh kinerja keuangan dan ukuran perusahaan terhadap financial distress. *Jurnal Ilmu dan Riset Akuntansi (JIRA), 9*(6).

Putri, R. (2021). Pengaruh Rasio Keuangan Dalam Memprediksi Financial Distress Pada Bank Umum Syariah. *Fidusia: Jurnal Keuangan Dan Perbankan, 4*(2).

Rahmi, C. L. (2014). Pengaruh Risiko Kredit, Risiko Likuiditas Dan Risiko Tingkat Bunga Terhadap Profitabilitas (Studi Empiris pada Perusahaan Perbankan Terdaftar di Bursa Efek Indonesia). *Jurnal Akuntansi, 2*(3).

Ramadani, T. (2022). Analisis Perilaku Milenial Terhadap Keputusan Investasi Pada Cryptocurrency (Studi Kasus Indodax Community)(Doctoral Dissertation, UIN Prof. Kh. Saifudin Zuhri Purwokerto).

Setyawan, M. Y. H., & Pratiwi, D. A. (2020). *Membuat sistem informasi gadai online menggunakan codeigniter serta kelola proses pemberitahuannya*: Kreatif Industri Nusantara.

Soemitra, A. (2017). *Bank & Lembaga Keuangan Syariah: Edisi Kedua.*

Yulianingtyas, D. (2016). Pengaruh corporate social responsibility dan good corporate governance Terhadap Kinerja Keuangan. *Jurnal Ilmu dan Riset Manajemen (JIRM), 5*(10).