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Using Zmijewski Model in the Prediction of Financial Distress State-Owned Banking

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Abstract

State-owned banking has a negative outlook due to asset quality challenges and difficulties in increasing revenue without taking additional risks due to the challenges of business models and difficult external conditions. The study aims to predict the financial health of state-owned banks with the Zmijewski model. This research is an analysis of secondary data based on the balance sheet of state-owned banks, namely: Bank Rakyat Indonesia, Bank Negara Indonesia, Bank Mandiri, and Bank Tabungan Negara, for the period 2017-2021 for financial distress predictions as measured by return on asset, debt ratio, and current ratio. Sampling method with saturated sampling. From the results of calculations with the Zmijewski model. It is known that the four state-owned banks are predicted to have financial difficulties and are at high risk of bankruptcy. Management must increase its current assets lest current debt exceeds the value of current assets owned. Increased liquidity in improving financial performance will improve the bank's performance.

Keywords
Zmijewski; return on asset; debt ratio; current ratio

I. Introduction

Financial Distress is the stage before bankruptcy. Financial Distress is the late stage of corporate decline where a firm faces a lack of liquidity. Financial distress prediction has been the area of research of many researchers. There are various financial distress prediction models have been researched so far.

State-Owned Enterprises are business entities whose entire or most of the capital is owned by the state through direct participation originating from separated state assets (Kementerian BUMN, 2016). State-owned enterprises totaling 98 companies in 12 industrial clusters, one of which is Financial Services which consists of 7 companies, namely: PT Pegadaian, PT Permodalan Nasional Madani, PT Bank Mandiri (Persero) Tbk, PT Bank Rakyat Indonesia (Persero) Tbk, PT Bank Negara Indonesia (Persero) Tbk, PT Bank Tabungan Negara (Persero) Tbk, and Perum Percetakan Uang Republik Indonesia.

In-Law Number 10 of 1998 concerning Banking, Banks are business entities that collect public funds in savings and distribute them to the public in credit. Other conditions improve people's living standards (OJK, 2022).

Fitch Ratings said that the banking industry in Indonesia has a negative outlook because it is faced with asset quality challenges. The same condition also occurs in China and India. Both countries are under pressure to boost income and capital to support growth. Japan also has a negative outlook. This is because it is increasingly difficult for banks to increase their income without taking additional risks due to the challenges of the business model and difficult external conditions.

On the other hand, Australia, Hong Kong, and Singapore face an increased risk of losses with slowing economic growth, low-interest rates, and intense competition. Growth in banking assets was supported by selectively reducing guarantee standards, especially for consumer and small and medium business financing with lower borrowing costs or lower collateral. The banking sector will also increase its exposure to the property sector, either directly or indirectly, by providing loan facilities to non-bank financial entities. The risk of impairment to rating downgrade may increase if the banking industry does not strengthen its reserves in line with the behavior of risk-takers. Even though the implications will not be proven if the company's operating conditions are good (Ayuningtyas, 2019).

The results of previous studies indicate that PT. BRI (Persero) Tbk in a healthy condition or not in financial Distress from 2015 to 2016. A gray area from 2017 to 2019. PT. BNI 46 (Persero) Tbk, in a healthy condition or not in financial Distress in 2015. A gray area from 2016 to 2019. PT. Bank Mandiri (Persero) Tbk, a gray area from 2015 to 2019. PT. BTN (Persero) Tbk gray area in 2015. Financial distress conditions from 2016 to 2019 (Herlin, Effendi, & Ayu, 2021).

The results of the research by Cattleyana et al. (2020), which measures the level of financial health in state-owned enterprises with various models, it is known that with the Springate model, financial distress conditions. The company with the highest average score is PTBA, while the lowest is BBTN. The financially healthy Grover model from 2009-to 2018, except for JSMR, experienced financial Distress in 2018. with the financially healthy Taffler model. The highest average score is PTBA, and the lowest is BMRI (Cattleyana, Iqbal, & Asyriana, 2020).

Meanwhile, capital ratios, interest income compared to interest expenses, non-interest income compared to non-interest expenses, return on equity, and provisions for loan losses have significantly negative correlations with bank failure. However, loan ratios, non-performing loans, and fixed assets correlate significantly positively with bank failure. In addition, the accuracy of the logistic model for banks from NAFTA countries provides the best prediction accuracy regarding bank failure (Liu, 2015).

The financial performance of state-owned banks listed on the Indonesia Stock Exchange (IDX) in 2014-2017 obtained a Z-Score value between 1.1 and 2.6. The assessment categorizes state-owned banks as an unspecified financial condition or a gray area (Korry, Dewi, & Ningsih, 2019).

II. Review of Literature

Banks are the most promising sector and contribute to the country's development. Banks deal with other money depending mostly on deposits. For this reason, banks must pay attention to financial health. Banks are the backbone of the economy. Collect temporary cash from the community and lend it to others as needed. Financial performance is a measuring instrument to know the process of implementing the company's financial resources (Ichsan, R. et al. 2021).

The banking industry is the prime player in the financial system of any country—this financial health of the banking industry in Bangladesh, especially in state-owned. The findings reveal a huge difference between the Z scores of state-owned banks and private commercial banks. In the case of the soundness of financial health, the state-owned banks are gradually improved over the governments. On the contrary, the trend for private banks has been consistent over the years but has not improved. The government influence and assistance may be the asset-liability difference (Parvin, Rahman, & Nitu, 2016).

Prediction of bankruptcy of four State-Owned Enterprises (BRI, BNI, Bank Mandiri, and BTN) in 2015-2019 using the Altman Z-Score model, obtained Z-Score values between 1.42-1.88 or at cut-off $Z < 1.81$ potentially bankrupt and $1.81 < Z < 2.99$ gray area. The Springate model's overall value is 1.95 -44.08 and is at the cut-off $S > 0.862$, which means it is in good health. Meanwhile, the Grover model has a G-Score of 1.71 - 2.15 and is in the G criteria of 0.01 or has no potential for bankruptcy. The results show that the Altman Z Score model has a better value than Springate and Grover because the number of ratios is higher, so it can predict bankruptcy better (Salman & Wulandari, 2021).

This study is intended to review the literature on corporate financial distress prediction, factors influencing financial Distress, and financial management principles for avoiding financial distress situations. The findings also suggest that some of the key principles to be kept in mind to avoid financial Distress situation include an optimum level of debt in the financial structure of firms; continuous monitoring of certain key financial ratios, namely cash flow to total debt, the net income to total assets, total debt to total assets; following good management practices; preventing bank asset quality deterioration and monitoring of Non-Performing Assets (NPAs) of banks (Baisag & Patjoshi, 2020).

The six SOCBs published annual reports for 2010-2018 were collected for secondary data and financially analyzed through Altman Z-score Model to predict financial Distress. Findings: The study found that with only one exception, the financial health of the SOCBs is unsatisfactory. One exception is only Bangladesh Development Bank which fell into the grey zone among the six SOCBs as it secured an average 1.52 score. However, the remaining others are found in the Distress zone as they are secured on an average (Nath, Biswas, Rashid, & Biswas, 2020).

The study observed that SCBs in Bangladesh are financially distressed and are characterized by a low capital adequacy ratio, high loan loss provision, liquidity problems, poor earning quality, and management inefficiency. The regression results of PCSE indicate that management efficiency, earning ability, and lending risk are the significant factors in determining financial Distress in SCBs of Bangladesh. In contrast, capital adequacy, asset quality, and macroeconomic variables have appeared to be insignificant. This study suggests that improvement of governance in the activities of SCBs and their compliance as recommended by the regulatory frameworks will help to address the problems identified and bring a positive change in the banking sector in the years to come (Jahan, 2018)

In addition to the Altman Z-Score, Springate, and Grover methods, the CAMELS ratio can be used to predict bank bankruptcy. Research conducted by Kristen (2014) using seven ratios that represent the CAMELS ratio with Logic Regression shows that the fit model and prediction accuracy are 81.2%. CAR has a negative and significant effect on the prediction of bank bankruptcy. Meanwhile, NPL, ROA, NIM, LDR, Price/Earning, and size have no significant effect on predicting bank bankruptcy (Kristanti, 2014).

III. Research Method

The research method used is a descriptive study with a case study on state-owned banking. The variable used is the ratio of the Zmijewski model, including return on assets, debt ratio, and current ratio. The operational definition of each variable is as follows:

Table 1. Variable Operational Definition

No	Variable	concept	Measurement	scale
1	*Return on Asset (ROA)*	A ratio that shows how much profit is obtained from the company's entire wealth (Kasmir, 2019)	$ROA = \frac{net\ profit}{Total\ Assets}$	Ratio
2	*Debt Ratio (DR)*	debt ratio is used to measure the percentage of funds provided by creditors (Brigham & Houston, 2014)	$DR = \frac{Total\ debt}{Total\ Assets}$	Ratio
3	*Current Ratio (CR)*	Ratio to measure the company's ability to pay short-term obligations or debts that are due immediately when billed in their entirety (Kasmir, 2019)	$CR = \frac{current\ assets}{current\ debt}$	Ratio

The sample collection method is the saturated sampling method where the entire population is BRI, BNI, Mandiri, and BTN. This study uses secondary data in the form of financial balance sheets for 2017-2021 through the official website https://sahamee.com/

Table 2. Total Assets, Current Assets, Total Debt, Current Debt, and Net Profit (in Billion Rp.)

Bank	Year	Total Assets	Current Assets	Total debt	Current debt	Net profit
BRI	2017	1.126.248.442	223.484.008	958.900.948	895.711.870	28.997.141
BRI	2018	1.296.898.292	248.321.832	1.111.622.961	1.011.268.460	32.351.133
BRI	2019	1.416.758.840	283.532.132	1.207.974.504	1.099.893.475	34.372.609
BRI	2020	1.511.804.628	248.039.092	1.314.427.061	1.236.896.249	18.654.753
BRI	2021	1.678.097.734	239.501.504	1.389.362.751	1.269.940.609	31.066.592
BNI	2017	709.330.084	125.260.175	608.426.780	550.451.014	13.616.476
BNI	2018	808.572.011	138.594.468	698.198.222	641.277.098	15.015.118
BNI	2019	845.605.208	148.743.932	720.601.260	660.240.630	15.384.476
BNI	2020	891.337.425	172.575.056	783.401.904	709.208.114	3.280.403
BNI	2021	964.837.692	229.201.642	841.099.320	776.483.934	10.898.518
MANDIRI	2017	1.124.700.847	216.367.870	954.694.715	830.012.583	20.639.683
MANDIRI	2018	1.202.252.094	185.548.213	1.017.291.789	883.383.252	25.015.021
MANDIRI	2019	1.318.246.335	187.110.873	1.109.211.810	963.924.084	27.482.133
MANDIRI	2020	1.429.334.484	308.752.693	1.240.191.532	1.122.886.099	17.119.253
MANDIRI	2021	1.725.611.128	289.479.489	1.503.499.846	1.278.754.834	28.028.155
BTN	2017	261.365.267	44.030.676	239.701.833	196.791.839	3.027.466
BTN	2018	306.436.194	53.397.185	282.595.746	235.825.630	2.807.923
BTN	2019	311.776.828	40.609.231	287.940.633	232.316.831	209.263
BTN	2020	361.208.406	64.403.016	341.220.561	287.774.363	1.602.358
BTN	2021	371.868.311	68.803.090	350.461.664	289.626.523	2.376.227

Source: https://sahamee.com/saham/BBRI/neraca-keuangan,
https://sahamee.com/saham/BBNI/neraca-keuangan,
https://sahamee.com/saham/BMRI/neraca-keuangan,
https://sahamee.com/saham/BBTN/neraca-keuangan.

Data analysis technique by calculating financial ratios and predicting financial Distress with the Zmijewski model to measure the performance of leverage, profitability, and company liquidity (Zmijewski, 1984):

$X\text{-Score} = -4{,}3 - 4{,}5X_1 + 5{,}7X_2 - 0{,}004X_3$

Description:

X_1 = return on asset

X_2 = debt ratio

X_3 = current ratio

The company is considered distressed if the probability is greater than 0.

Table 3. *Zmijewski model Cut-Off*

Score	Description
X < 0	The company's finances are healthy and not at risk of going bankrupt
X ≥ 0	The company's finances are not healthy, and its risk of going bankrupt

If the result of the X-score is negative or less than 0 (X-Score < 0), then it is in a healthy condition or not bankrupt. Conversely, if the X-score is positive or more than equal to 0 (X-Score 0), it is unhealthy or tends to lead to bankruptcy.

IV. Results and Discussion

The results of calculating the ratios in the Zmijewski model are shown in Table 4 and Table 5.

Table 4. ROA, DR, dan CR calculations results

BANK	Year	ROA	DR	CR
BRI	2017	0,0257	0,8514	0,2495
BRI	2018	0,0249	0,8571	0,2456
BRI	2019	0,0243	0,8526	0,2578
BRI	2020	0,0123	0,8694	0,2005
BRI	2021	0,0185	0,8279	0,1886
BNI	2017	0,0192	0,8577	0,2276
BNI	2018	0,0186	0,8635	0,2161
BNI	2019	0,0182	0,8522	0,2253
BNI	2020	0,0037	0,8789	0,2433
BNI	2021	0,0113	0,8718	0,2952
MANDIRI	2017	0,0184	0,8488	0,2607
MANDIRI	2018	0,0208	0,8462	0,2100
MANDIRI	2019	0,0208	0,8414	0,1941
MANDIRI	2020	0,0120	0,8677	0,2750
MANDIRI	2021	0,0162	0,8713	0,2264
BTN	2017	0,0116	0,9171	0,2237
BTN	2018	0,0092	0,9222	0,2264
BTN	2019	0,0007	0,9235	0,1748
BTN	2020	0,0044	0,9447	0,2238
BTN	2021	0,0064	0,9424	0,2376

Source: Research data in 2022 processed

Table 5. Financial Distress Calculation Results with the Zmijewski Model

Bank	X-Score calculations					Average	Description
	2017	2018	2019	2020	2021		
BRI	0,4362	0,4725	0,4498	0,5995	0,3352	0,4586	Predicted financial difficulties and high risk of bankruptcy
BNI	0,5019	0,5375	0,4746	0,6922	0,6170	0,5646	Predicted financial difficulties and high risk of bankruptcy
MANDIRI	0,4548	0,4286	0,4016	0,5907	0,5923	0,4936	Predicted financial difficulties and high risk of bankruptcy
BTN	0,8745	0,9144	0,9605	1,0637	1,0422	0,9711	Predicted financial difficulties and high risk of bankruptcy

Source: Research data in 2022 processed

Table 5 above shows the average X-Score in state-owned banks for the 2017-2021 observation period, which is predicted to have financial difficulties and a high risk of bankruptcy. This is in line with the research results by Cattleyana et al. (2020) that state-owned banks experience financial Distress. This is because current debt exceeds the value of current assets owned, as shown in Figures 1 to 4. State-owned banks have current debts exceeding their current assets; it is predicted that They will experience difficulties in fulfilling their short-term obligations.

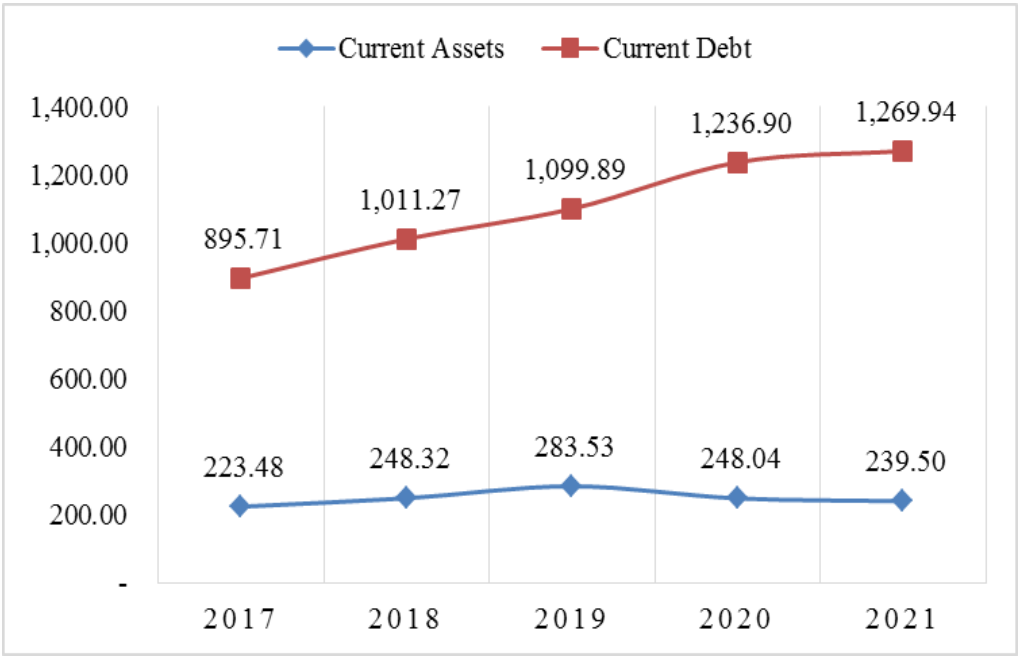

Figure 1. *Current Assets vs Current Debt of Bank BRI in 2017-2021 (in IDR Trillion)*

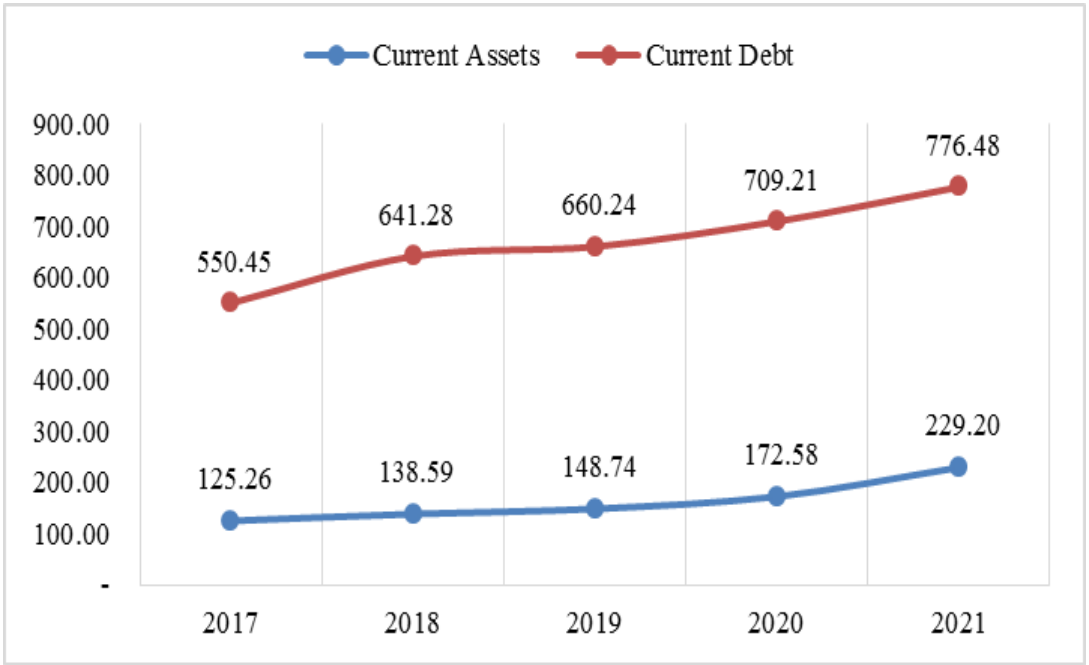

Figure 2. *Current Assets vs Current Debt of Bank BNI in 2017-2021 (in IDR Trillion)*

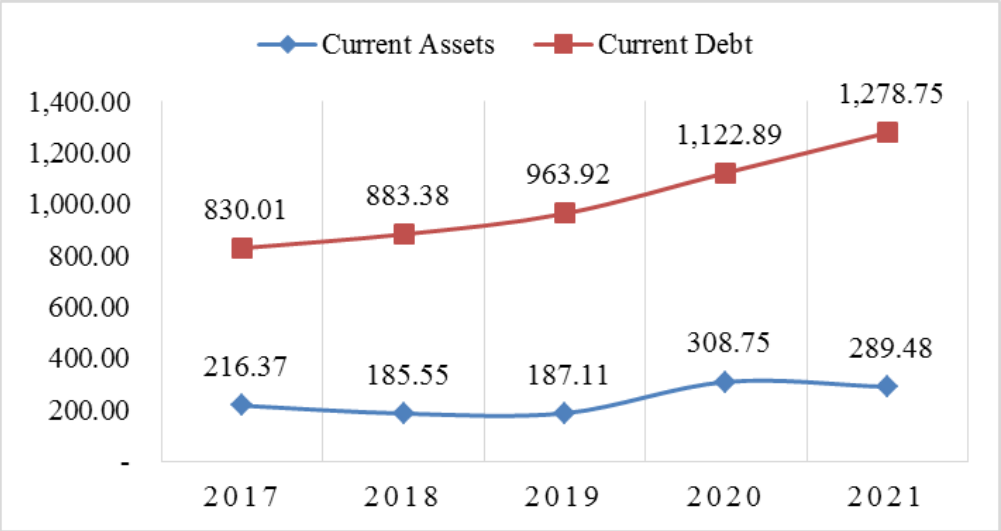

Figure 3. *Current Assets vs Current Debt of Bank Mandiri in 2017-2021 (in IDR Trillion)*

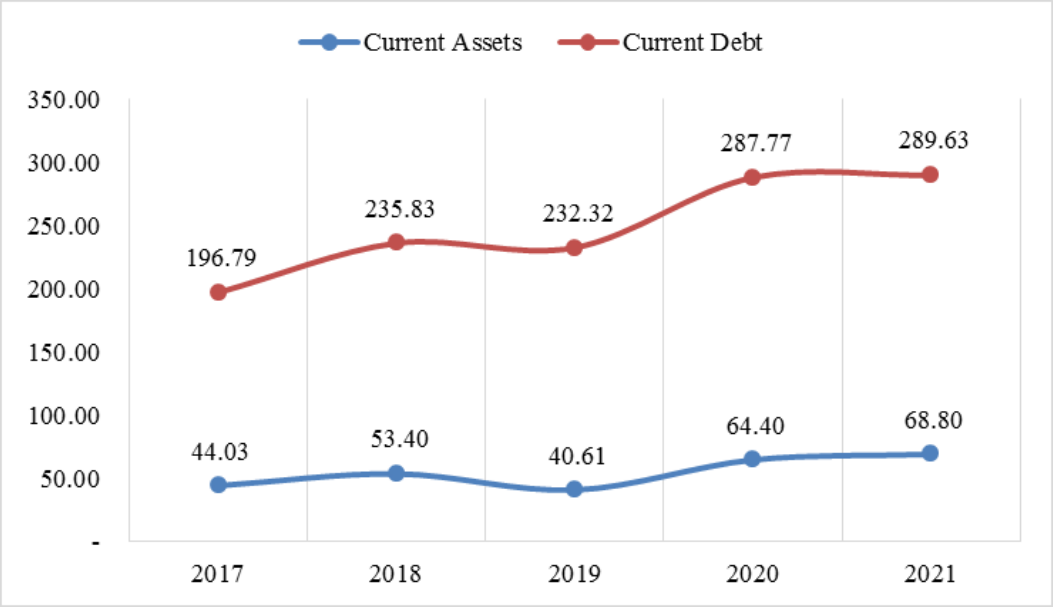

Figure 3. *Current Assets vs Current Debt of Bank BTN in 2017-2021 (in IDR Trillion)*

V. Conclusion

For the 2017-2021 observation period, state-owned banks are predicted to experience financial difficulties and a high risk of bankruptcy. The results of this study can be used as input and reference for predicting bank conditions. This prediction is used as an early warning system by management to immediately anticipate or prevent problems if they are predicted to be in trouble so as not to experience a worse financial condition. Management is expected to improve financial performance by increasing current assets immediately; fewer current liabilities exceed the value of current assets owned.

This study is limited to using the Zmijewski model to predict financial Distress with an observation period of 5 years. Further research is expected to use other models, such as the Grover model, Springate model, and Taffler model, and an observation period of more than five years.

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