

# USE Z-SCORE IN FORECASTING FINANCIAL DISTRESS FOR LISTED COMPANIES BY INDUSTRIAL GROUPS ON THE VIETNAM STOCK MARKET

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## Abstract

The purpose of this study is to examine the effects of cash flows from operating activities, profitability, and financial leverage on financial distress that may occur in listed companies in Vietnam. The sample of this study includes companies listed in the industry group on the Ho Chi Minh City Stock Exchange (HOSE) 2020. The sampling technique used is intentional sampling. Altman's (1968) Z-score model is used to determine whether a company is in financial distress. The data analysis technique used is logistic binary regression. The results of the regression analysis show that only profitability and financial leverage have an impact on the financial distress of the company. The operating cash flows have no effect on financial distress.

**Keywords:** Z-score, profitability, financial leverage, cash flows from operations, financial distress

## 1. Introduction

Plat and Plat (2002), define financial distress as a period of financial decline that occurs before bankruptcy or liquidation occurs. According to Ross and Waster field (1996), financial distress is a state in which a firm's operating cash flows cannot cover or meet its current liabilities, and financial distress can lead to bankruptcy.

A company's performance can be analyzed using financial ratios. Financial ratios can describe past, present, and future financial positions and is useful indicators that can be calculated from financial statements (Khaliq et al., 2014). Impaired financial performance may cause the company to experience financial difficulties in carrying out its business activities.

A company's financial distress can be minimized by monitoring its financial statements. Monitoring of financial statements should be done by a management team with two methods of financial statement analysis such as financial ratios analysis and cash flow analysis. In particular, the analysis of financial ratios helps to assess the financial position of the company to see the increase/decrease in financial position and operational efficiency throughout the life of the company. Therefore, this study will focus on using cash flow from operating activities as the focus of the study with the reason that if a company has high operating cash flow, then it has enough resources to do business. Operations (paying loans, maintaining operations) and implementing new investment projects without relying on external funding sources. According to Fatmawati (2017), only cash flow from operating activities can be reflected correctly about the company's financial status at every time.

Besides, analyzing the profitability and financial leverage of the company is equally important. Because, understanding the profitability ratios of the company, stakeholders can understand the ability of the company to generate profits from the sale of goods, assets, and shares. A company is said to be leveraged when it uses borrowed capital to increase its profitability (for example, the debt ratio is an indicator of how well a company uses the Leverage tool and this coefficient is often used to assess the level of financial independence, the level of financial leverage or the financial risk that the company may face. As a basis for making appropriate financial policy decisions or adjustments).

According to Ahmad Rodoni dan Herni Ali (2010), looking at the financial situation can help managers make predictions about three cases that can cause financial distress to the company such as lack of capital, debt and profit, and loss. These three cases are related, so the company must keep a good balance to avoid financial distress that can lead to bankruptcy.

However, it is difficult to objectively identify the early stages of financial distress of a company. Therefore, several researchers (Sprinate, Zmijewski, and Altman) have conducted several studies to help companies accurately identify the early stages of financial distress as well as understand the current state of financial distress. The financial position of the company at a particular point in time. The first study was done by Altman (1968), in this study, the author focused on measuring (predicting) the probability of bankruptcy with 95% confidence to predict bankruptcy (Z-score model). For this reason, this study uses the research model of Altman (1968) to measure the financial distress of listed companies.

In his research model, Altman (1968) used as financial indicators and analyzed by MDA technique, the linear equation is as follows:

$$\text{Z-score} = 1.2X_1 + 1.42X_2 + 3.3X_3 + 0.6X_4 + 0.999X_5$$

Where:

X1 = Working capital/Total assets

X2 = Retained earnings /Total assets

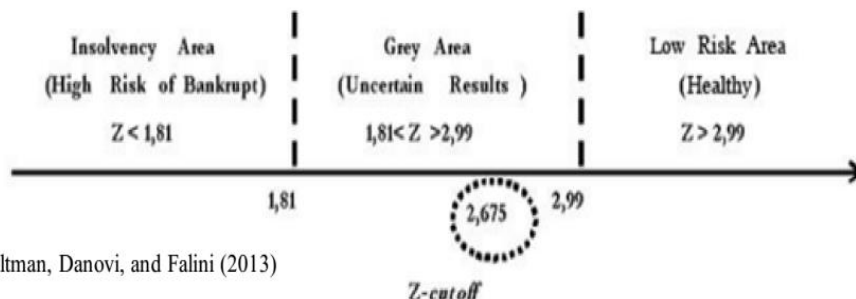
X3 = EBIT/Total assets

X4 = Book value of equity / Book value of total debt

X5 = Sales/Total assets

If the company has a Z-score < 1.81 it shows that the company has a high risk/potential of bankruptcy. On the other hand, if the company has a Z-score > 2.99, then the company is in a good and stable financial position (as shown in Figure 1). A company with a Z-score in the range 1.81 - 2.99 (gray area) is easy to be misclassified, because the gray area indicates that the company is having financial problems, so managers need to act immediately before the company goes bankrupt. The best critical value of Z-score is between 2.67 - 2.68, so Z-score = 2.675 is said to be the best midpoint to distinguish between bankrupt and non-bankrupt companies.

Figure 1: Classification of Z-score



Source: Altman, Danovi, and Falini (2013)

## 2. Research hypothesis

### Relationship between cash flow from operating activities (operating cash flow) and financial distress

The cash flow statement is a summary of a company's cash receipts and payments for a given period. The use of cash flow information is to capture the results of a company's business activities. If the company's cash flow is stable, it shows that the company's business is good. The higher a company's cash flow ratio from operating activities, the easier it is to get out of financial distress. If the company's cash flow ratio from operating activities is low, it can lead to the company having financial difficulties and difficulty getting out of financial distress. Based on the above explanation, this study hypothesizes as follows:

**Hypothesis 1:** there is a negative relationship between cash flows from operating activities (operating cash flows) and corporate financial distress.

### Relationship between profitability and financial distress

Any company in business always wants to make a profit. To know whether a company is profitable or not, managers often use profitability ratios to analyze and measure. The more profitable a company is, the easier it is to get out of financial trouble. In which, profitability is measured by ROA (Return on Assets). The higher the ROA, the lower the probability of financial distress in the company. On the other hand, low ROA indicates that the company is in an unstable financial position, or the company is not able to optimize its assets to generate profits; therefore, a decrease in profitability will increase the possibility of financial distress. According to Imam and Reva (2012), profitability has a negative effect on financial distress, this means that the company's greater profitability will reduce the risk of financial difficulties. Based on the above explanation, this study hypothesized the following:

**Hypothesis 2:** There is a negative relationship between profitability (ROA) and corporate financial distress.

### The relationship between financial leverage and financial distress

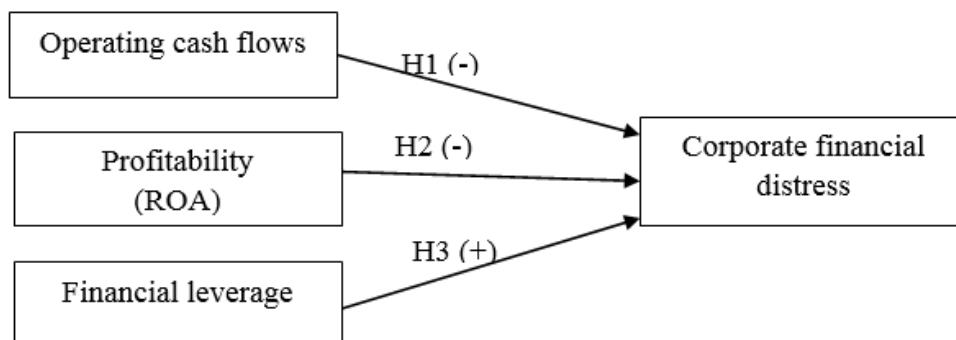
Financial leverage is also one of the important information channels to understand the financial position of a company. Because financial leverage gives the company many opportunities to

increase profit margin, it also contains many risks for the company. If the company often relies on debt to run its operations, the company is likely to find itself in financial difficulty, because a high degree of financial leverage means that the equity ratio is lower than liabilities, and conversely, companies with low levels of financial leverage (the company is not too leveraged), the company will not fall into financial distress. On the other hand, a high financial leverage ratio means that the company uses high financial leverage to finance its business activities. Using high leverage will increase ROE quickly and vice versa. According to Van Horne and Wachowicz (2001), a high debt ratio increases a firm's financial risk. Brigham and Houston (2011), argue that creditors will be less likely to lend the company more capital, which causes the company to have financial difficulties leading to bankruptcy. From the above arguments, there is a positive correlation between the financial leverage ratio and the level of financial distress. Therefore, this study hypothesized the following:

**Hypothesis 3:** There is a positive relationship between financial leverage and corporate financial distress.

From the above three hypotheses, this study form the following conceptual framework:

**Figure 2: Conceptual framework (Source: Author's team)**



### 3. Research Methods

This study is quantitative research based on secondary data sources. The sample of this study includes 109 companies in the industry group listed on the Ho Chi Minh City Stock Exchange (HOSE) in 2020.

#### Data collection techniques

The data used in this study is secondary data collected from HOSE in the form of financial statements of listed companies in 2020 and downloaded through the website <https://www.hsx.vn>. Next, this study used a purposeful sampling method to select companies that fit the research objective and as a result, 109 companies were included in the sample of this study. These 109 firms were then classified into two groups, namely, financially distressed, and non-financially distressed firms (based on Altman's Z-score, 1968). As a result, in 2020, 85 companies fell into financial distress and 24 companies did not fall into financial distress.

## Methods of data analysis

The study used two statistical methods to analyze and manage the collected data. The two statistical methods used are descriptive analysis and regression. Descriptive statistical analysis was used including sample size, mean, minimum, maximum, and standard deviation from each variable. The regression analysis model used is binary logistic because the dependent variable of this study has the characteristic that it contains two values of 0 and 1, that is, if the company falls into the group of financial distress, it has the value (1) and vice versa the company carries the value (0). The regression equation is as follows:

$$\text{Ln} (P/1 - P) = \beta_0 + \beta_1\text{OCF} + \beta_2\text{PRO} + \beta_3\text{FL} + \varepsilon$$

In which

Ln (P/1 – P): Probability of the company experiencing financial distress

$\beta_0$ : Constant

$\beta_1 \dots \beta_3$ : regression coefficient

OCF: Operating cash flow = Net cash flow from operating activities/Net revenue

PRO: Profitability = Profit before tax/Total assets

FL: Financial leverage = Total debt /Total capital

## 4. Research results

### 4.1. Research results

**Table 1: Descriptive Statistics**

	N	Minimum	Maximum	Mean	Std. Deviation
OCF	109	-31.0138	59.6392	.388700	6.4681829
PRO	109	-.1752	.5123	.050945	.0916355
FL	109	.0155	2.1871	.515448	.2873054
Valid N (listwise)	109				

(Source: Processed with SPSS by the author's team)

Table 1 presents the statistical description of the study, including the number of observations (N) of 109 companies listed on HOSE 2020. The PRO variable has the lowest value of -0.18 and the highest value is 0.51 with a mean of 0.051 and a standard deviation of 0.092, which means that the use of assets to benefit companies is not efficient (5%). Similarly, the FL variable has the lowest value of 0.016 and the highest value of 2.19 with a mean value of 0.52 and standard deviation of 0.29, these statistical results imply that most of the capital is used for the production and business activities of the companies in the study come from external loans (52%). Finally, the OCF variable has the lowest value of -31.01 and the highest value of 59.64 with a mean of 0.39 and a standard deviation of 6.47 which shows that the operating cash flows of the companies are relatively large (39%).

Besides descriptive statistical analysis, the study also used binary logistic regression analysis. The results are displayed as follows:

Table 2: Classification Table

Observed			Predicted		
			P/(1-P)		Percentage Correct
			0	1	
Step 1	P/(1-P)	0	16	8	66.7
		1	1	84	98.8
	Overall Percentage				

a. The cut value is .500

(Source: Processed with SPSS by the author's team)

Table 3: Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
								Lower	Upper
Step 1 <sup>a</sup>	OCF	-1.296	1.498	.749	1	.387	.274	.015	5.152
	PRO	-32.195	9.367	11.814	1	.001	.000	.000	.000
	FL	6.014	1.966	9.354	1	.002	408.997	8.670	19294.774
	Constant	1.122	1.068	1.104	1	.293	3.072		

a. Variable(s) entered on step 1: OCF, PRO, FL.

(Source: Processed with SPSS by the author's team)

Based on Table 3, shows the results of testing the specific hypothesis as follows: the beta value of OCF has a negative value of -1.296 and a p-value of 0.387, implying that the OCF variable has a negative effect on the financial distress of the company (consistent with the expected sign of hypothesis 1). However, because the OCF p-value of 0.387 is larger than the significance level  $\alpha = 0.05$ , hypothesis 1 is rejected because it is not statistically significant.

The beta value of PRO also has a negative value of -32.195 and a p-value of 0.001 which means that the PRO variable measured by ROA has a negative effect on financial distress (which is consistent with the expected sign of hypothesis 2). In which, the PRO p-value of 0.001 is less than the significance level  $\alpha = 0.05$ , so hypothesis 2 is accepted because the test results are statistically significant.

The beta value of FL has a positive value of 6.014 and a p-value of 0.002, implying that the FL variable has a positive effect on the firm's financial distress (in line with the expected sign of hypothesis 3). In which, the FL p-value of 0.002 is less than the significance level  $\alpha = 0.05$ , so hypothesis 3 is also accepted because the test results are also statistically significant.

## 4.2. Discussing research results

### \* Impact of operating cash flow on financial distress

Based on the results of the binary logistic regression of this study, it shows that the operating cash flow (OCF) of listed companies on HOSE in 2020 has a negative effect on financial distress, in other words, the larger the operating cash flow, the more the company will avoid the risk of falling into financial distress. However, the test results in this study showed that OCF was not statistically significant, so hypothesis 1 was rejected. The results of this study contrast with the studies of Almilia (2006), Imam and Reva (2012), and Finishtya (2019) because they all found a relationship exists between operating cash flow and financial distress position, or volatility in operating cash flows that could cause the company to enter financial distress.

### \* Impact of profitability on financial distress

The results of this study show that profitability (PRO) has a negative effect on predicting financial distress with a Wald test value of 11.814 and a p-value of  $0.001 < 0.05$ . The results of this study agree with the studies of Nurcahyono (2014), Vivi and Ikhsan (2017), and Finishtya (2019) because they suggest that the larger the profitability measured by ROA, the lower the risk of the company fell into financial distress.

### \* The effect of financial leverage on financial distress

The results of this study show that financial leverage (FL) has a positive effect on predicting financial distress with a Wald test value of 9,354 and a p-value of  $0.002 < 0.05$ . This result is contrary to the study of Imam and Reva (2012), which argues that financial leverage has no effect on the financial distress of the firm. But it is consistent with the study of Luciana and Kristijadi (2003), showing that financial leverage influences the financial distress of the company or in other words, the larger the financial leverage ratio, the more likely the firm is in a state of financial distress.

## 5. Conclusions and recommendations

This study was conducted with the aim of examining whether operating cash flow, profitability, and financial leverage in HOSE-listed companies can help these companies predict the likelihood of falling into financial distress or not.

The sample used in this study consists of 109 listed companies in the industry groups, which are then divided into 2 groups (classified according to the Altman Z-score measure): 85 companies fall into financial distress and 24 companies did not fall into financial distress. This implies that there are quite a few companies in this industry group in Vietnam's stock market in 2020 that are facing financial difficulties.

This study was conducted using the binary logistic regression method in 2020. The results of the study with the binary logistic regression method showed that the prediction accuracy was 91.7%.

The significance level of the OCF variable is  $0.387 > 0.05$  and has a negative effect, which means that the higher the company's operating cash flow, the less likely it is that the company will fall into financial distress. However, the first hypothesis in this study was rejected because it was not statistically significant.

The significance level of the PRO variable is  $0.001 < 0.05$  and has a negative effect, that is, profitability has a negative effect on the financial distress of the company. The larger a company's profits, the less likely it is to fall into financial distress. Thus, the second hypothesis in this study is accepted because it has statistical significance in terms of testing and satisfies the research's expectations.

The significance level of the FL variable is  $0.002 < 0.05$  and has a positive effect, meaning that financial leverage also influences financial distress. The more companies use debt leverage to finance their production and business activities, the more likely they are to fall into financial distress. The third hypothesis in this study is also accepted because it is statistically significant in terms of testing and satisfies the research expectations.

This study has a limitation on the sample group studied because the study only includes a sample of companies from the industry group listed on HOSE in 2020. Therefore, comparison with industry groups is lacking different fields and short observation time so that academic implications can be drawn in terms of forecasting as well as recommending policies more suitable to the characteristics of each object and field. Future studies can expand the study in terms of time, space, scope, and subjects to better understand the ability to predict the financial status of listed companies on the Vietnamese stock market.

## References

1. Ahmad Rodoni dan Herni Ali. (2010). *Manajemen Keuangan*. Jakarta: Mitra Wacana Media
2. Almilia, LS. (2006). Prediksi Kondisi Financial Distress Perusahaan Go Public Dengan Menggunakan Analisis Multinomial Logit. *Jurnal Ekonomi dan Bisnis*, 7(1).
3. Altman, E. I. (1968). Financial ratios, discriminant analysis, and the prediction of corporate bankruptcy. *The Journal of Finance (New York)*, 23(4), 589–609. <https://doi.org/10.1111/j.1540-6261.1968.tb00843.x>
4. Brigham, E. F., & Houston, J. F. (2011). *Manajemen Keuangan*. Edisi kedelapan. Buku II. Jakarta: Erlangga.
5. Edward I Altman, Alessandro Danovi, & Alberto Falini. (2013). Z-Score Models' Application to Italian Companies Subject to Extraordinary Administration. *Journal of Applied Finance: JAF*, 23(1), 128–.
6. Fatmawati, A. (2017). Faktor-Faktor yang mempengaruhi financial distress (Studi pada perusahaan manufaktur di BEI). *Jurnal Ilmu dan Riset Akuntansi*, 6(10), 1 - 17.
7. Finishtya, F. (2019). The role of cash flow of operational, profitability, and financial leverage in predicting financial distress on manufacturing company in Indonesia. *Jurnal Aplikasi Manajemen*, 17(1), 110–117. <http://dx.doi.org/10.21776/ub.jam.2019.017.01.12>
8. Imam and Reva. (2012). Analisis Rasio Keuangan untuk Memprediksi Kondisi Financial distress Perusahaan Manufaktur Yang Terdaftar Di Bursa Efek Indonesia. *Jurnal Akuntansi Universitas Jember*, 10(2).



9. Imam, M., & Reva, M. S. (2012). Analisis Rasio Keuangan untuk Memprediksi Kondisi Financial distress Perusahaan Manufaktur Yang Terdaftar Di Bursa Efek Indonesia. *Jurnal Akuntansi Universitas Jember*, 10(2), 139–154. <https://doi.org/10.19184/jauj.v10i2.1255>
10. Khaliq, A., Altarturi, B. H. M., Thaker, H. M. T., Harun, M. Y., & Nahar, N. (2014). Identifying Financial distress Firms: A Case Study of Malaysia's Government Linked Companies. *International Journal of Economics, Finance and Management*, 3(3), 141 – 150.
11. Luciana, Almilia and Kristijadi. (2003). Analisis Rasio Keuangan Untuk Memprediksi Kondisi Financial distress Perusahaan Manufaktur Terdaftar di Bursa Efek Jakarta. *JAAI*, 7(2).
12. Nurcahyono (2014). Analisis Pengaruh Struktur Kepemilikan, Ukuran Dean, Komisaris Independen, Likuiditas Dan Leverage Terhadap Terjadinya Kondisi Financial Distress (Studi Pada Perusahaan Manufaktur Yang Terdaftar Di Bursa Efek Indonesia Tahun 2008-2010). *Journal of Management*, 1(1), 1-14.
13. Platt, H. & Platt, M. (2002). Predicting Financial Distress. *Journal of Financial Service Professionals*, 56, 12-15.
14. Ross, S. A., Wasterfield, R. W., & Jaffe, J. (1996). *Corporate Finance* (6<sup>th</sup> ed). New York: McGrawHill Irwin.
15. Van Horne, J. C., & Wachowicz, J. M. (2001). *Fundamentals of financial management* (11<sup>th</sup> ed.). Prentice Hall.
16. Vivi, Fatmawati & Ikhsan Budi. (2017). Pengaruh Likuiditas, Leverage, Aktivitas dan Profitabilitas Dalam Memprediksi Financial Distress. *Jurnal Ilmu dan Riset Akuntansi*, 6(10).