Peer-Reviewed Article

Jurnal Keuangan dan Perbankan
Volume 26, Issue 4 October 2022, page. 735-747
ISSN: 1410-8089 (Print), 2443-2687 (Online)
DOI : 10.26905/jkdp.v26i4.7891

The Determinants of Financial Distress in Emerging Country: Empirical Evidence from Indonesia

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Abstract

This research strives to foresee corporate financial distress by applying three different perspectives that cover firms' internal and external conditions namely accounting-based, market-based and macroeconomic models. Financially distressed and non-distressed corporations are analyzed using binomial logistic regression. Seven different models are employed to observe the effects of ten independent variables on financial distress, as well as to predict more accurately the possibility of firms defaulting. By exploring 257 public corporations listed on the Indonesia Stock Exchange over 10 years and utilizing 2,570 observations, the main finding suggests that when the accounting, market, and macroeconomic models are combined, it provides a better understanding of corporate failure than either model. Moreover, the results also indicate five factors that significantly determine the likelihood of a company's financial distress: liquidity, profitability, asset productivity, market capitalization, and leverage. Accordingly, companies should keep a close watch on their accounting ratios and market indicators carefully to avoid bankruptcy. This research contributes to the finance and economic literature by paving the way for the development of an alternative perspective for predicting corporate failure in emerging markets.

Keywords : bankruptcy, logistic regression, corporate failure, financial distress
JEL Classification : G30, G33

1. INTRODUCTION

The severe Asian Financial Crises of 1997/1998 that engulfed many developing countries in Southeast Asia were considered as the biggest, least-anticipated crises since the International Debt Crisis in 1982 that caused a prolonged downturn for the economies (Radeletet, al, 1998). A decade later, the Global Financial Crisis in 2008, extended the episode of financial difficulties for developing countries. Therefore, the average GDP growth in these countries fell by around 7 percent in 2009 which was the lowest level since 2007 (Gu, et al., 2021). The global illiquidity resulting in the capital outflows from these emerging countries put intense pressure on most economies, including Indonesia. This crisis forced companies into increasingly fierce competition resulting in financial difficulties for a lot of firms.

As shown in Figure 1, between 2011 and 2020, 44 public companies were delisted from the Indonesia Stock Exchange. Almost half of these firms (48%) experienced poor business performance and were delisted due to doubt over going concern and bankruptcy (IDX, 2022). In 2013 and 2018, there were 2 and 1 companies went bankrupt respectively.

Figure 1. Public Companies Delisted from the Indonesia Stock Exchange (IDX)
Source: IDX Annual Report, 2022

Corporate bankruptcy starts from the weakening of a firm's financial performance. When the company is unable to manage the hardship and then fails to meet its obligations, this company enters financial distress or insolvency phase which is commonly followed by filing for bankruptcy. Finally, once the respective court officially declares bankruptcy, the company is required to sell all of its assets to pay off its obligations. Previous studies state that direct and indirect costs of bankruptcy are very costly and more expensive before the bankruptcy than after the bankruptcy occurs (Andrade & Kaplan, 2002).

The fact that being financially distressed is extremely expensive might drive companies to realize the importance of anticipating their financial condition. Even though not all distressed companies will proceed to bankruptcy, it is not easy for the firms to get out of the difficulties and avoid bankruptcy without appropriate and solemn handling. Unlike bankruptcy which is a one-time event, financial distress might happen over and over again in the same company for a fairly long period (Zhou, et al., 2022). Therefore, detecting the signs of corporate failure is important to get prompt alerts of bankruptcy. The sooner these signs are detected, the easier it is for management to take corrective action (Pham Vo Ninh, et al., 2018).

Many scholars around the world have investigated how to predict the financial distress of corporations for decades. Formerly, a company's financial distress can be detected by applying univariate analysis using selected accounting-based ratios from companies' financial data (Beaver, 1966). A few years later, a study suggests that this analysis was not sufficient to predict corporate bankruptcy hence a set of financial ratios was deemed capable of overcoming these limitations (Altman, 1968).

Later, another approach called a market-based model was constructed based on a model used to solve for options prices called the Black-Scholes-Merton (Hillegeist, et al., 2004). The result of their research indicates that this model explains corporate failure more

comprehensively than the old-fashioned accounting-based model. Therefore, the market model might indicate the risk of a company defaulting.

However, the collapse of many companies due to the financial crisis of 2007-2008 shows that firm-level observations are not adequate for anticipating the risk of corporate bankruptcy. This supports the fact that corporate failure is not only determined by the internal conditions of companies but also by external situations that are beyond the firm's control (Fadrul & Ridawati, 2020). A study shows that macroeconomic factors offer more insights into firm financial distress in the UK and the US (Khoja, et al., 2019). More recently, the combination of accounting ratios, market data, and macroeconomic indicators have proven to be the most robust predictors of financial distress and bankruptcy among firms (Tinoco & Wilson, 2013; Pham Vo Ninh, et al., 2018; Tinoco, et al., 2018; Sehgal, et al., 2021).

In Indonesia, many studies about financial distress mostly scrutinize corporate bankruptcy in one particular sector such as manufacturing, pulp and paper, utilities, transportation, cement, mining, or banking sector by utilizing financial ratios (Mas'ud & Srengga, 2015; Permana, et al, 2017; Pertiwi, 2018; Yulitasari & Yulistina, 2019; Fadrul & Ridawati, 2020; Wahyuni, et al., 2020; Mashudi, et al., 2021). Moreover, these studies focus mainly on internal factors to explain firm failure in Indonesian companies (e.g., Kristanti, et al., 2016; Agustia, et al., 2020). However, studies that identify the default risk of Indonesian companies across sectors based on internal and external factors are considerably limited. The purpose of this research is therefore to find out the determinants of financial distress of public companies in Indonesia from the perspective of accounting, market, and macroeconomic.

2. HYPOTHESES DEVELOPMENT

Financial distress is a situation when a company fails to pay interest on its borrowing or bonds, overdraws money from its bank account, loses to pay preferred stock dividends, or is declared bankrupt by the court (Beaver, 1966). In general, corporate bankruptcy occurs in four phases. In the first stage, firms start to encounter financial difficulties caused by the declining financial performance of business operations, shrinking demand from customers, intense rivalry, high fixed costs, and others. As the company's management recognizes that the company is financially troubled and takes some necessary actions, the company is already in the second phase. Then, when the firms are unable to pay their obligations, they are in the next phase called the insolvency phase. Finally, when the court legally confirms insolvency, the firms will be categorized as bankrupt (Pham Vo Ninh, et al., 2018).

A large body of literature addresses corporate failure throughout the world using various methods. One of the most popular approaches to predicting financial failure was developed by Beaver (1966) who applies a financial ratio from accounting data. In his research, he conducted univariate analysis by applying a single ratio at a time as the failure predictor. Afterward, (Altman, 1968) created a multivariate discriminant analysis (MDA) or Z-Score, which comprises five financial ratios to predict firms' financial distress. A few years later, he revealed another approach for credit-risk modeling called ZETA for particular sectors (Altman, et al., 1977). Later, the 1986 Z-Score model was revised into a modified Z-Score model that consists of only four financial ratios (Altman, 2000). Another approach is called S-Score which was a development of Altman's first work then also developed (Springate, 1978). Another method, X-Score, also uses financial ratios to assess the financial performance, leverage, and liquidity of companies in an attempt to predict their risk of failure (Zmijewski, 1984).

Based on many previous studies, Altman's Z-Score has proved as one of the most important indicators in predicting a company's financial condition, due to its ability to minimize errors in the classification process, such as misplacing company classifications known as "Type I Errors'' (Gunathilaka, 2014). In addition, this model focuses on all assets owned by the company and has ratios that simultaneously influence bankruptcy predictions (Patunrui & Yati, 2017).

On the other hand, Hillegeist, et al. (2004) find that the market-based model can identify firms' failures more comprehensively than the accounting-based model. This model applies market insights that take into account financial statement performance and, in fact, contains information that is not reflected in the accounting report. In addition, the volatility of firms' market variables depends on their performance compared to the overall market, which allows for a more accurate prediction of a firm's risk of default. In another study, Agarwal & Taffler (2008). suggest that market variables indicate the real and upright financial performance of a company in the stock market as it adjusts to market assumptions.

Despite the significant effect of firm-specific data on insolvency, many researchers have found that when non-firm-specific factors are taken into account, the predictions of bankruptcy are more plausible (Allen & Powell, 2012; Tinoco & Wilson, 2013; Agarwal & Maheswari, 2016; Pham Vo Ninh, et al., 2018; Tinoco et al., 2018; Khoja, et al., 2019). As macroeconomic data express statistics representing the whole condition of a country, they may illustrate whether the macroeconomic situation will be favorable or not and how it affects the company in the future. Hence, macroeconomic parameters are appropriate for investors exploring possible factors that may lead certain companies to experience financial distress.

According to the previous explanations, the hypotheses to be tested in this research are factors from the accounting, market, and macroeconomic models that affect the likelihood of corporate bankruptcy in Indonesia.

3. METHODS

A firm experiencing a financial illness usually are not able to settle its huge obligations. Andrade & Kaplan (2002) specified that a company in difficult times struggles to restructure its obligations. They also characterized a company having income before interest, depreciation, and taxes less than the prevailing interest payment as a financial distress company. Correspondingly, Pham Vo Ninh, et al. (2018) explained that companies with insufficient revenue to pay their liabilities are highly exposed to default risk so they classify firms as default when their income before interest and tax expenses is lower than their financing expenses. In line with the previous studies (e.g., Dinh, et al., 2021; Pham Vo Ninh, et al., 2018) this study will utilize the interest coverage ratio as the determinant, calculated by dividing EBIT by interest expense, in estimating a firm's failure. Therefore, a financially distressed company is indicated by owning an interest coverage ratio below one, meaning the company has a higher interest expense than its EBIT, and vice versa.

This study applies the modified Altman Z-Score (Altman, 2000), which consists of four comparable accounting-based indicators, namely financial liquidity, profitability, asset productivity, and solvency. The first variable is the working capital to total asset ratio (WCTA) which assesses the liquidity level of assets relative to the company's size. Second, the profitability ratio is well-represented by retained earnings over the total asset ratio (RETA) which determines the cumulative profitability of a company throughout its lifespan. Third, the asset productivity ratio is calculated by dividing income before interest and taxes with total assets (EBTA) as a measurement of operating efficiency or real

productivity at a company, aside from tax or leverage components. Lastly, the book value of equity over total liabilities (BVTL) is used to describe the capacity of the firm's assets to settle its financial obligations.

Other than four accounting variables, this study also employs four market ratios. The first ratio is the market value of equity (MVEQ) or market capitalization calculated by current stock price times total outstanding shares (Agarwal & Taffler, 2008). The second market ratio is the volatility of the firm's equity (VOEQ), which Zhang, et al. (2009) propose. Greater volatility of equity indicates greater variability of a firm's assets. The next market determinant is the price (PREQ), which refers to the closing stock price. This determinant can illustrate the future expectation of cash flow and earnings from investors as well as the level of the firm's liquidity (Rees, 1995). Finally, the fourth variable is leverage (LEVE), which is estimated by dividing total liabilities by the total market value of the firm's equity plus the book value of debt. A high leverage ratio means that most of the financing comes from the debt and it will raise the risk of default when it becomes uncontrollable (Bystorm, 2006).

Two prominent macroeconomic indicators of interest rate and inflation rate are also applied in this study. The underlying reason for using the inflation rate is because it could provoke problems in the firm's cash flow, as imperfect credit markets are unable to balance their leverage with the rise of the general price level. In this scenario, a company will face a high possibility of bankruptcy. Similarly, interest rates are proven to affect firm distress rates in many countries in the world, such as the US, UK, and other countries in the world due to their impact on a company's ability to pay the debt (Khoja, et al., 2019). In this study, a 7-day Reverse Repo Rate from the Central Bank of Indonesia is applied to represent the interest rate.

In this study, the firm's financial distress is treated as a dummy variable (1 for distressed, 0 for non-distressed). Because the dependent variable is nominal, this research applies binomial logistic regression with maximum likelihood. According to previous literature, the logistic model has a strong predictive accuracy to explain corporate failure before bankruptcy (Ugurlu & Aksoy, 2006; Pham Vo Ninh, et al., 2018). Furthermore, the significance of the logistics model is estimated using the Cox and Snell R-Square in addition to the Nagelkerke R-Square. Combining all the variables, the comprehensive logistic model is presented below.

$$Y = \beta_0 + \beta_1 WCTA + \beta_2 RETA + \beta_3 EBTA + \beta_4 BVTL + \beta_5 MVEQ + \beta_6 VOEQ +$$

$$\beta_7 PREQ + \beta_8 LEVE + \beta_9 BINT + \beta_{10} INFL + \epsilon$$

With these variables represent:

Y = dummy variable of non-failed (Y=0) and failed (Y=1)

β_0 = Constant

β_i = Regression coefficient variable i

$WCTA$ = Working capital/total assets ratio

$RETA$ = Retained earnings/total assets ratio

$EBTA$ = Earnings before interest and taxes/total assets ratio

$BVTL$ = Book value of equity/total liabilities ratio

$MVEQ$ = Market value of total equity

$VOEQ$ = Volatility of the market value of firm equity

$PREQ$ = Closing stock price

$LEVE$ = Leverage ratio

$BINT$ = Central Bank of Indonesia Rate

$INFL$ = Inflation rate

ϵ = Error term

A summary of the measurement of all variables applied is provided below.

Table 1. Measurement of the Variables

Variable Name	Variable Code	Measurement	Formula	Level of Measurement
Financial Distress	Y	Interest Coverage Ratio	Distressed: $EBITA\ (t)\ - int.exp\ (t)\ > 0$ Non-distressed: $EBITA\ (t)\ - int.exp\ (t)\ < 0$	Nominal
Liquidity	WCTA	Working Capital/ Total Assets ratio	$\frac{Working\ capital\ (t)}{Total\ asset\ (t)}$	Ratio
Profitability	RETA	Retained Earnings/Total Assets ratio	$\frac{Retained\ earnings\ (t)}{Total\ asset\ (t)}$	Ratio
Asset Productivity	EBTA	Earnings before interest and taxes/Total assets ratio	$\frac{EBIT\ (t)}{Total\ asset\ (t)}$	Ratio
Solvency	BVTL	Book Value of Equity/Total liabilities ratio	$\frac{Book\ value\ of\ equity\ (t)}{Total\ liabilities\ (t)}$	Ratio
Market Capitalization	MVEQ	Market value of equity	$Price\ x\ Total\ outstanding\ shares$	Ratio
Volatility of Equity	VOEQ	Volatility of market value of firm equity	$\sqrt{\frac{\sum_{i=1}^{N}\ (r_i\ -\ r)^2}{Number\ of\ observation\ -\ 1}}$	Ratio
Price of Equity	PREQ	Closing stock price	-	Ratio

Leverage	LEVE	Leverage ratio	$\frac{Total\ debt\ (t)}{MV\ of\ equity\ (t)\ +\ total\ debt\ (t)}$	Ratio
Interest Rate	BINT	Central Bank of Indonesia 7-day Reverse Repo Rate	-	Ratio
Inflation Rate	INFL	Inflation rate	-	Ratio

The sample used in this research is 257 non-financial public companies listed in the Indonesia Stock Exchange during 2011-2020. Therefore, the total observations used in this study are 2,570 data points. The company-level data is derived from the Bloomberg terminal, while the inflation and interest rate were gathered from the Central Bank of Indonesia website.

4. RESULTS

By using 257 public companies over 2011-2020 as the sample, it is shown in Table 2 that 73 percent of the sample companies are categorized as non-distressed while the remaining 27 percent are distressed.

***Table* 2.** Frequency of Distressed and Non-Distressed Companies

Category	Frequency	Percent	Cum.
0	1,875	73.0	73.0
1	675	27.0	100.0
Total	2,570	100.0	

Table 3 presents the summary statistics of all the independent variables. The first four variables (WCTA, RETA, EBTA, BVTL) are classified as accounting-based ratios, the next four variables (MVEQ, VOEQ, PREQ, LEVE) are market-based ratios and the last two variables (BINT, INFL) are macroeconomic indicators. It is observed that on average companies have negative WCTA and RETA. Moreover, RETA and BVTL have the most variability.

Table 3. Summary Statistics of Independent Variables

	Min	Max	Mean	Std. Dev
WCTA	-822.1674	0.9915	-0.3052	17.0760
RETA	-572.6613	1.1115	-3.1499	119.6130
EBTA	-3.5191	1.3734	0.0610	0.1553
BVTL	-0.9997	402.8090	9.8644	151.0476
MVEQ	9.5104	20.1258	14.1781	2.0989
VOEQ	0.0000	203.3150	51.8838	33.4461

PREQ	0.0000	83,800	1,943	5,104
LEVE	0.0001	0.9916	0.4617	0.2656
BINT	0.0375	0.0756	0.0577	0.0125
INFL	0.0168	0.0838	0.0422	0.0218

The correlation matrix for the ten independent variables can be observed in Table 4. Among those variables, BINT and INFL have the strongest correlation of 0.617 while WCTA and MVEQ have the lowest correlation of 0.000.

Table 4. Correlation Matrix of Independent Variables

	WCTA	**RETA**	**EBTA**	**BVTL**	**MVEQ**	**VOEQ**	**PREQ**	**LEVE**	**BINT**	**INFL**
WCTA	1									
RETA	0.606***	1								
EBTA	0.404***	0.517***	1							
BVTL	0.002	0.002	-0.023	1						
MVEQ	0.000	0.001	0.281***	0.001	1					
VOEQ	0.038*	0.036*	-0.091**	0.037*	-0.229***	1				
PREQ	0.011	0.011	0.205***	-0.011	0.421***	-0.100***	1			
LEVE	-0.050**	-0.042**	-0.312***	-0.101***	-0.430***	0.080***	-0.282***	1		
BINT	0.022	0.034*	0.119***	0.017	-0.038*	-0.071***	-0.013	-0.011	1	
INFL	0.022	0.026	0.110***	0.017	-0.015	-0.077***	-0.004	-0.024	0.617***	1

***. Significant at the 0.01 level (two-tailed).
**. Significant at the 0.05 level (two-tailed).
*. Significant at the 0.1 level (two-tailed).

Seven models comprised of ten independent variables are used in predicting corporate financial distress. Different models are constructed to observe the individual as well as compounding effects of the accounting, market, and macroeconomic factors on financial distress.

As shown in Table 5, the seven models are statistically significant and considered good fit models proven by the p-value of 0.0000 that is lower than the significance level. The best model to predict a firm's bankruptcy is Model 1, proven by the highest Cox & Snell and Nagelkerke Pseudo R-square. This result shows that approximately 83.64% of the variance in financial distress is explained by the independent variables while only 16.36% of the variations are determined by other factors. Not much different from model 1, model 4, model 5, and model 2 can also predict the variability of financial distress by 83.6%, 83.15%, and 83.10% respectively.

As we can observe from Table 5, WCTA, RETA, and EBTA are statistically significant in all models that apply accounting variables (Model 1, 2, 4, 5). Moreover, from the market perspective, it is shown that MVEQ and LEVE are significant in all models that involve

market-based indicators (Model 1, 3, 4, 6). Meanwhile, the significance of the other two market ratios, VOEQ and PREQ, is not consistent. Finally, BINT and INFL are proven to be significant only in Models 6 and 7, but statistically insignificant in Models 1 and 5.

Table 5. Binomial Logistic Results of the Seven Different Models

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
WCTA	-0.956 (0.015)**	-1.581 (0.000)***		-0.960 (0.015)**	-1.558 (0.000)***		
RETA	-0.694 (0.000)***	-0.537 (0.000)***		-0.690 (0.000)***	-0.546 (0.000)***		
EBTA	-94.042 (0.000)***	-90.939 (0.000)***		-94.076 (0.000)***	-90.970 (0.000)***		
BVTL	0.014 (0.247)	0.004 (0.419)		0.013 (0.254)	0.004 (0.417)		
MVEQ	0.185 (0.003)***		0.084 (0.005)***	0.190 (0.002)***		0.099 (0.001)***	
VOEQ	0.002 (0.555)		0.006 (0.000)***	0.002 (0.549)		0.006 (0.000)***	
PREQ	0.000 (0.958)		0.000 (0.000)***	0.000 (0.946)		0.000 (0.000)***	
LEVE	1.582 (0.000)***		1.228 (0.000)***	1.580 (0.000)***		1.208 (0.000)***	
BINT	-11.087 (0.221)				-12.742 (0.153)	-19.080 (0.000)***	-15.579 (0.001)***
INFL	5.924 (0.279)				6.480 (0.229)	-5.367 (0.065)*	-6.028 (0.031)**
Cons.	-1.674 (0.121)	1.463 (0.000)***	-0.512 (0.262)	-2.133 (0.026)**	1.925 (0.000)***	1.043 (0.048)**	0.140 (0.511)
-2 Log Likelihood	794.138	816.904	2,718.763	795.824	814.680	2,673.276	2,958.166
Prob > LR	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cox & Snell R Sq.	0.5761	0.5724	0.1037	0.5759	0.5727	0.1194	0.0162
Nagelkerke R Sq.	0.8364	0.8310	0.1506	0.8360	0.8315	0.1734	0.0235

Model 1: Accounting, market, macroeconomic variables
Model 2: Accounting variables
Model 3: Market variables
Model 4: Accounting, market variables
Model 5: Accounting, macroeconomic variables
Model 6: Market, macroeconomic variables
Model 7: Macroeconomic variables
P-values are in parentheses

*** Variable is significant at the 0.01 level (two-tailed).

** Variable is significant at the 0.05 level (two-tailed).

* Variable is significant at the 0.1 level (two-tailed).

5. DISCUSSIONS

According to the results, we can see that models that apply accounting variables can explain more than 80% of the variability of company financial distress. Although accounting ratios are employed alone or combined with other market or macroeconomic variables, they can explain most of the variance in financial distress. Model 1 which includes accounting, market, and macroeconomic factors show 83.64% Nagelkerke R-Sq, indicating a high ability of the combination of the three models in predicting bankruptcy. This result strengthens previous studies stating that when company-level data is combined with market and macroeconomic data, it can provide a more comprehensive view of company financial distress (Allen & Powell, 2012; Tinoco & Wilson, 2013; Agarwal & Maheswari, 2016; Pham Vo Ninh, et al., 2018; Tinoco et al., 2018; Khoja, et al., 2019).

Furthermore, five determinants are considered effective indicators in estimating corporate failure: WCTA (liquidity), RETA (profitability), EBTA (asset productivity), MVEQ (market capitalization), and LEVE (leverage). The results suggest that the significant accounting-based indicators (WCTA, RETA, and EBTA) have negative coefficients, indicating that the probability of default is higher when the company's liquidity, profitability, and asset productivity are lower. The significant market variables of MVEQ and LEVE suggest that financial distress is more likely to occur when the company's market capitalization and leverage increase. On the other hand, VOEQ and PREQ which represent the company's equity volatility and stock price have an inconsistent effect on financial distress. Similarly, two macroeconomic variables of BINT and INFL that represents interest and inflation rate are found to not consistently affect the probability of corporate default.

6. CONCLUSIONS

The research results show that the accounting-based model has a high ability to predict the variability of corporate failure in Indonesia. Furthermore, when accounting, market, and macroeconomic models are employed, it is proven to explain the highest variability in the bankruptcy likelihood. Moreover, five indicators are proven to be the most appropriate predictors of company financial distress. They are liquidity, profitability, asset productivity, market capitalization, and leverage.

This study might contribute to the finance and economic literature by compounding the alternative of predicting corporate bankruptcy in a developing country which might differ from that in developed economies. More importantly, this study applies a comprehensive model combining three different perspectives of accounting, market, and macroeconomic factors that have strong empirical grounds.

Suggestions

According to the results, companies in developing countries such as Indonesia should give a close watch on their accounting ratio and market variables as early signs to avoid a financial default. The companies must maintain their liquidity, profitability, and asset productivity performance to avoid being distressed. They also need to be aware that the higher market capitalization and leverage might lead to a higher probability of going bankrupt. Lastly, related authorities or the government should also consider these determinants when undertaking company-level supervision.

Limitations

In terms of limitation, this study only applies a single indicator, which is the interest coverage ratio, to determine whether a company is categorized as financially distressed or not. Moreover, this study limits its analysis to industrial variations because there is no classification of different companies based on the sector which might be beneficial to observe the impact of sectors on the likelihood of distress.

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