INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN ACCOUNTING, FINANCE AND MANAGEMENT SCIENCES

OPEN ACCESS JOURNAL

Vol 14, Issue 4, (2024) E-ISSN: 2225-8329

Capital Structure and Financial Distress Risk: Evidence from China

Ying Zhou

School of Management, Universiti Sains Malaysia, 11800 USM, Penang, Malaysia

Email: zhouying@student.usm.my

Char-Lee Lok

School of Management, Universiti Sains Malaysia, 11800 USM, Penang, Malaysia

Corresponding Author Email: lokcl@usm.my

To Link this Article: http://dx.doi.org/10.6007/IJARAFMS/v14-i4/23147 DOI:10.6007/IJARAFMS/v14-i4/23147

Published Online: 23 November 2024

Abstract

Some of Chinese companies exhibit the risk of financial distress due to high leverage, leading to a series of social problems. This study seeks to investigate the effect of capital structure on the risk of financial distress. This study took a modified Z-score model as the measurement of the financial distress, while the independent variable capital structure included, debt to total assets ratio, debt to equity ratio, long-term debt to total assets ratio. The sample includes 18,630 firm-years from China's Shanghai and Shenzhen A-share listed companies between 2012 and 2021. To test the hypothesis of multivariate regression analysis using panel data. The pooled ordinary least squares (POLS), fixed effect (FE), random effect (RE) methods of regression were employed in carrying out this analysis. The results show a positive effect of capital structure on financial distress risk among Chinese listed firms supported by trade-off theory. Thus, policymakers should pay attention to leverage to prevent the risk of financial distress caused by over-leverage.

Keywords: Financial Distress, Capital Structure, Leverage, Modified-Z

Introduction

Financial distress, a condition where firms struggle to generate sufficient income to meet their obligations, has become a significant issue (Antunes et al., 2023). For decades, the issue of financial distress risk has been a significant concern in corporate finance. The global economic turmoil and massive economic slowdown have led to a more complex economic environment, increasing the financial distress risk. China, a crucial emerging market, is now significantly influencing the international investment market (Zhao et al., 2023). Financial distress has escalated significantly, necessitating measures to mitigate this risk (Balasubramanian et al., 2019). As the second-largest stock market in the world, the Chinese security market has certain peculiarities that make it particularly attractive for academic research (Leippold et al., 2021). Over the past three decades, China's A-share listed companies have exceeded 5,000

with total assets of more than 38 trillion yuan and total market value of more than 85 trillion yuan, accounting for 70 to 80 percent of GDP. China's stock market has provided more than 16 trillion yuan of financing for more than 5,000 listed companies, greatly supporting the development of listed companies. The rapid growth of China's market economy has led to an increase in corporate debt and default risk among Chinese corporations in the past decade (Jiang & Jones, 2018).

In 2020, a series of notable default events occurred among Chinese state-owned enterprises, highlighting the importance of studying corporate financial distress (Zhang et al., 2022). Understanding financial distress is crucial for investors, policymakers, and business leaders as it can trigger economic downfall, as seen in the 2008 financial crisis (Meng et al., 2024).

China is grappling with the impact of high leverage and prioritizing preventing significant financial risks in recent decades (Dong et al., 2021; Wang et al., 2022). One of the objectives of China's supply-side structural reform is to decrease the leverage of non-financial firms (Wang et al., 2022). Debt within a certain limit can stimulate economic growth while exceeding this limit can significantly harm the economy (Shen et al., 2018). In the long period before 2008, the leverage level of China's real economy sector had been stable at around 150%, but this turned a corner after the financial crisis and showed a rapid upward trend, reaching 254% by the end of 2018, higher than the overall level of emerging market, which contains a large systemic financial risk hidden danger. From the international standards perspective, China's leverage ratio far exceeds the alarm value, and systemic financial risks cannot be ignored.

Financial distress is a continuous and dynamic process (Zhou et al., 2022), often starting with a shortage of funds, which leads to liquidity risks. Due to the lack of funds, enterprises will default on their debts, trigger a deep financial crisis, and finally lead to business failure. Financial distress is a significant topic in the financial sector, serving as a crucial indicator for users interested in understanding company performance (Pernamasari et al., 2019). Companies that cannot manage their risk well will adversely impact their financial performance, which may cause financial distress. Every company does not want to experience financial distress, so the risk must be managed well to avoid financial distress (Luthfiyanti & Dahlia, 2020). Enterprises in financial distress are usually unable to pay their debts on time, which affects the normal operation and cash inflow of creditors and even causes creditors' financial distress and affects the security of creditors' rights. As for the loan bank, one of the creditors, financial distress will lead to a high non-performing rate of the bank, which may lead to the loan risk of the banking system. If an enterprise is in financial distress, it will take longer to settle the payment for goods with the supplier. In addition, financial distress will lead to a decrease in the purchase volume and affect the supplier's profit. The financial distress of enterprises can significantly impact investors' confidence in the financial market, trigger a series of chain reactions, and cause investors to re-judge the value of corporate assets, which will cause sharp fluctuations in stock prices in the capital market. If the financial distress cannot be solved in time, it may lead to the liquidation of the enterprise (Cui & Lin, 2023). Financial distress can be temporary and not so severe, but if left untreated, it can develop into problems that are not solvable (Hanafi & Halim, 2016). Poor management, poor operational performance, and high leverage are the main internal sources of financial distress (Outecheva, 2007).

Financial distress means an enterprise is in a state of continuous loss, insolvency, debt default, lack of liquidity, etc. Three factors cause financial distress: allocation resources, capital structure, and governance (Lizal, 2002). Financial distress refers to the decline stage of the financial conditions that occur before bankruptcy or liquidation (Platt & Platt, 2002; Susanti,2020). Companies frequently experience financial distress before bankruptcy (Zhou et al., 2022). The study of financial distress originates from the study of financial risk, financial crisis, financial deterioration, insolvency, business failure, bankruptcy, etc. Financial distress occurs before the financial crisis, and debt default occurs with the deepening of the financial crisis. If the debt crisis cannot be eliminated in time, the risk of bankruptcy will be faced, and the bankruptcy of enterprises can be confirmed as a business failure. Therefore, the research on enterprise bankruptcy risk, financial deterioration, debt default, and other issues can be classified as financial distress research (Zhang & Wang, 2020).

The study of financial distress risk has a long history dating back to Beaver (1966). Early scholars viewed financial distress as a straightforward financial issue and established financial distress models using financial indicators, such as Altman (1968), Altman et al., (1977), Beaver (1966), Ohlson (1980), etc. Although the correlation between capital structure and the likelihood of financial distress has been studied, research in China is limited. It is against this background that an investigation of the effect of leverage on the financial distress of Chinese listed firms is necessary. Taking into consideration the above issues, this study focuses on analyzing the impact of the company's capital structure on the firm’s financial distress risk. This study attempts to provide valuable information on the variables influencing a company's financial distress risk.

Literature Review and Hypotheses Development

Trade-off Theory

The trade-off theory, propounded by Myers (1977), arguing that while debt offers tax-shield cash flows, the benefits are not indefinite. Debt, in addition to agency costs, also increases the likelihood of financial distress because of the potential for default on debt repayment (Muigai, 2016). Myers (1977), demonstrates that debt can decrease a firm's present market value by reducing its incentive to make good future investments, theorizing that increasing a firm's debt leads to increased financial risk and decreased motivation from equity-holders to provide more capital. The trade-off theory suggests that moderate gearing levels are recommended (Muigai, 2016), a firm should not attempt to borrow as much as possible (Myers 1977).

More and more scholars have found that with the increase of corporate debt scale, the probability of corporate debt default may also increase gradually, which leads to the rise of financing costs. The debt default will eventually force the company into financial distress or even bankruptcy. The trade-off theory holds that management weighs the possible cost of bankruptcy against the size of the benefit of the debt tax shield before making capital structure decisions. The trade-off theory shows that a company with higher debt must bear interest and risk bankruptcy if it cannot pay the debt (Pradana & Imelda, 2023).

This theory is relevant to the study as it introduces the concept of financial distress costs, demonstrating how leverage can positively increase the risk by increasing borrowing. The

trade-off theory suggests that leverage increases the likelihood of financial distress and bankruptcy costs (Kalash, 2023).

Capital Structure and Financial Distress

Capital structure refers to the combination of various financing methods used by a company to finance its operations (Muigai, 2016; Abor, 2005). Capital structure can be measured by various factors and key determinants such as total debt ratio, debt to equity ratio, long-term leverage ratio, and so on (Ahmed et al., 2024). Researchers have used various leverage ratios, including total liabilities to total assets, EBIT to interest expenses, and total equity to total liabilities, to predict financial distress (Waqas & Md-Rus, 2018). The majority of studies show that an increase in leverage is linked to a higher hazard level (Tinoco & Wilson, 2013; Ugur et al., 2022).

Companies with higher leverage are at a higher likelihood of financial distress. Based on trade-off theory, the risk of failure increases monotonically with the increase in leverage (Fitzpatrick & Ogden, 2011), the debt adjustment relationship with Z-score is found to be significantly negative, debt increases the risk of financial distress, leverage is calculated by dividing total debt by total assets (Abdullah et al., 2023). The use of debt often leads to financial distress for non-financial companies (Muigai, 2016).

Kalash (2023), reveals that a firm's higher debt ratio decreases performance measures, particularly for those with high risk. This decrease is exacerbated by distress risk, supporting the trade-off theory that firm performance decreases with leverage. Companies with a high debt utilization rate face significant financial risks, particularly when they cannot pay their obligations on time, increasing the likelihood of financial distress (Karugu et al., 2018). Empirical studies by Kisman & Krisandi (2019), Moch et al. (2019), Utami et al. (2021), Yazdanfar & Öhman (2020) also suggest that a firm's dependence on debt significantly impacts financial distress. High-leveraged companies are more likely to default due to persistent financial strain, potentially affecting their production and operation (Dong et al., 2021). The capital structure is significantly influenced by its long-term financing methods and the debt-to-equity ratio in its financing choice (Serghiescu & Văidean, 2014).

Previous studies have examined leverage's impact on financial distress and financial performance, but many focus on its direct effect and report inconsistent results, including negative, positive, or no significant relations. Leverage decisions are a widely discussed topic in corporate finance (Abdullah et al., 2023). The unclear empirical relationship between leverage and financial distress complicates the debate among finance scholars (Muigai, 2016). Given this discussion, the hypothesis is on the effect of capital structure on financial distress risk.

Hypothesis 1 (H1): The total debt-to-total assets ratio (DTA) positively impacts the financial distress risk.

Hypothesis 2 (H2): The total debt-to-equity ratio (TDE) positively impacts the financial distress risk.

Hypothesis 3 (H3): The long-term debt-to-total assets ratio (LTDTA) positively impacts the financial distress risk.

Data and Methodology

Sample and Data Collection

The study analyzed A-share listed companies on the Shanghai and Shenzhen Stock Exchanges from 2012 to 2021. To ensure accuracy, the samples were processed as follows: delisted companies were deleted; financial listed enterprises were excluded as their financial statements were significantly different from those of other industries; and samples with missing data of main variables were removed. This study's financial data were sourced from the China Stock Market and Accounting Research Database (CSMAR). A total of 18,630 samples were included.

Dependent Variable

The dependent variable of the study is the financial distress risk, as determined by modified Z-scores (Graham et al., 1998; Lee et al., 2011; Mackie-Mason, 1990). The original Altman's Z-score is a calculation that uses coefficients and variables of the equation. The Z-Score model by Altman is used to identify companies experiencing financial distress and at risk of bankruptcy, identifying the root cause of their declining performance (Abdullah et al., 2023).

Altman (1968), first used multivariate discriminant analysis to establish a Z-score model to study financial distress. Altman suggests that financial ratios can predict the occurrence of financial distress (Oktasari, 2020). A higher Z-score indicates a firm's financial health, indicating less distress than a lower Z-score. Mackie-Mason (1990) modified the Z-score by excluding the market value of equity and book value of total liabilities to examine a firm's capital structure and identify debt ratio as a separate variable. The modified version is:
Modified-Z = 1.2 (Working Capital/Total assets) +1.4 (Retained Earnings/Total assets) + 3.3 (Earnings before interest and taxes/Total assets) + (Sales/Total assets) (Burak Güner et al., 2008; Graham et al., 1998; Koh & Jang, 2009; Lee et al., 2011)

The modified Z-score method was used to eliminate factors that contained similar information to other variables in the Z-score model, specifically total debt information with leverage. The inclusion of the market value of equity and book value of total debt in the model could establish a systematic relationship with other variables, potentially leading to a significant relationship between Z-score and related variables rather than a true relationship (Lee et al., 2011).

Independent Variable

Leverage, a measure of capital structure, is utilized to analyze the dependent variable and can be calculated in various ways (Abdullah et al., 2023). Financial leverage refers to a company's utilization of debt and equity as primary forms of corporate financing. Researchers have used various leverage ratios, including total liabilities to total assets, EBIT to interest expenses, and total equity to total liabilities, to predict financial distress (Waqas & Md-Rus, 2018) .

The study utilizes leverage as a measure of capital structure following previous research (Chow et al., 2018; Wang et al., 2023). This study uses three leverage values to represent the capital structure. First, DTA is calculated by the ratio of total debt to total assets (Abdullah et al., 2023). Second, TDE is calculated by the ratio of total debt to equity, which represents the ratio of liabilities to equity (Diyanto, 2020). Third, LTDTA is measured by the ratio of long-term debt to total assets (Al-Taani, 2013; Chandra & Juliawati, 2020).

Control Variables

Five control variables that may affect financial distress are covered in this study. Firm size (Size), calculated as the natural log of total assets, accounts for variations in economies of scale due to resource availability , competition, and so on (Chatterjee et al., 2023a). Darrat et al., (2016), Magee (2013), Oktasari (2020), and Shumway (2001) suggest that larger firms are believed to be less vulnerable to get into financial distress due to their superior resource capabilities compared to smaller firms.

The age of the firms (Age) may have a significant influence on financial distress. Hence, it was introduced as the number of years since the inception of the firm to the observation date (Rao et al., 2007). The Board of Commissioners (BSize) is responsible for managing and representing a company (Kalbuana et al., 2022). This study measured board size based on the number of boards.

Additionally, earlier studies revealed that ROA (Net profits/Total assets) influence negatively on financial distress (Luthfiyanti & Dahlia, 2020). According to Kordestani et al., (2011), the initial stage of bankruptcy occurs when the company's ROA decreases. A high return on assets indicates that a company has effectively utilized its assets to generate profit, these benefits reduce the likelihood of financial instability for companies (Luthfiyanti & Dahlia, 2020).

Furthermore, this analysis uses Tobin's q (TOBIN) as a control variable, which is a market-based method that provides a more accurate measure of performance and growth opportunities. It combines fair market value and total liabilities, is predicted to decrease financial distress risk, as better performance leads to greater stability (Atif & Ali, 2021). Tobin's q measures a firm's performance that exceeds stakeholder expectations. The formula is: market value/total assets.

Empirical Methodology

This study begins by examining whether capital structure significantly affects financial distress risk. Continuous variables are wonorized at the 1st and 99th percentiles to reduce the risk of outliers affecting the results (Chatterjee et al., 2023).

The three methods for estimating panel data regression models are POLS, FE, RE (Zhou et al., 2023). In this study, all the three methods will be used to test the hypothesis.
Model 1 explains the association between DTA and Modified-Z. Model 2 explains the association between TDE and Modified-Z. Model 3 explains the association between LTDTA and Modified-Z. The models are as follows:

$$FDit = \beta0 + \beta1DTAit + \beta2Sizeit + \beta3Ageit + \beta4BSizeit + \beta5ROAit + \beta6TOBINit + \varepsilon it \quad \text{(Model 1)}$$

$$FDit = \beta0 + \beta1TDEit + \beta2Sizeit + \beta3Ageit + \beta4\ BSizeit + \beta5ROAit + \beta6TOBINit + \varepsilon it \quad \text{(Model 2)}$$

$$FDit = \beta0 + \beta1LTDTAit + \beta2Sizeit + \beta3Ageit + \beta4\ BSizeit + \beta5ROAit + \beta6TOBINit + \varepsilon it \quad \text{(Model 3)}$$

Where:
FD represents a firm's risk of financial distress, measured by Modified Z-score model;
DTA represents a capital structure or firm's leverage, measured by total debt to total assets;
TDE represents a capital structure or firm's leverage, measured by total debt to equity;

LTDTA represents a capital structure or firm's leverage, measured by long-time debt to total assets;
Size represents a firm's size, measured by the natural log of firm's assets;
Age is firm age computed by the period from the activity start to the current year;
BSize is measured based on the number of boards of commissioners in the company;
ROA is measured by net income divided by total assets, indicates a firm's return on assets.
TOBIN (Tobin's q) is measured by market value/total assets, refer to the ratio of market capitalization, liabilities, preferred equity, and minority interest to total assets.
i = refer to firm-year observations in the sample;
t = financial years 2012–2021;
β0 is a constant; βi represents the regression coefficient; εi is the random error term are known by the Gaussian noises or errors (Habib, 2022).

Empirical Results and Discussion

Descriptive Statistics

Table 1 presents the descriptive statistics. The dependent variable Modified-Z has a maximum value of positive, while its minimum value is negative. This indicates that some of the key financial indicators of some Chinese listed companies are negative. The DTA has an average level of 0.471, suggesting that the leverage of listed Chinese companies is generally at a high level. The standard deviation is 0.206, the maximum value is 0.924, and the minimum is 0.068, indicating that there is a large gap in the level of leverage between different companies. The maximum and minimum values of TDE are 12.08 and 0.073, respectively, and the average is 1.420. The maximum and minimum values of LTDTA are 0.473 and nil, respectively, and the average is 0.100, indicating significant variation in the long-term leverage among the companies.

Table 1
Descriptive statistics

Variable	Obs	Mean	Std. dev.	Min	Max
Modified-Z	18,630	1.161	0.823	-1.816	3.393
DTA	18,630	0.471	0.206	0.068	0.924
TDE	18,630	1.420	1.762	0.073	12.080
LDTDA	18,630	0.100	0.107	0.000	0.473
Size	18,630	22.590	1.337	19.780	26.500
Age	18,630	19.450	5.641	6.000	33.000
BSize	18,630	8.744	1.728	5.000	15.000
ROA	18,630	0.029	0.062	-0.265	0.192
Tobin	18,630	1.959	1.374	0.828	9.206

Correlation Analysis

Table 2 displays the Pearson correlation matrix for variables. It can be observed that leverage (DTA, TDE, LTDTA) have a significant negative impact on Modified-Z, that is the higher the leverage, the greater the likelihood of financial distress, which is consistent with the original hypothesis. Further regression tests should be conducted to delve deeper into this relationship. Furthermore, there is a positive relationship between firm size (Size) and Modified-Z, and also a positive relationship between ROA and Modified-Z, indicating that the more the firm size or ROA, the less likely of financial distress. The variable of firm age (Age)

shows a significant negative correlation with Modified-Z, and also a negative relationship between Tobin's q (TOBIN) and Modified-Z, indicating that an increase in firm size or Tobin's q is not beneficial for reducing the likelihood of financial distress. As for the relationship between board size (BSize) and Modified-Z, there is no clear linear correlation.

Table 2
Pearson Correlation Matrix

	Modified-Z	DTA	TDE	LDTDE	Size	Age	BSize	ROA	Tobin
Modified-Z	1								
DTA	-0.396***	1							
TDE	-0.394***	0.770***	1						
LDTDE	-0.320***	0.493***	0.341***	1					
Size	0.041***	0.428***	0.245***	0.425***	1				
Age	-0.113***	0.135***	0.114***	0.109***	0.115***	1			
BSize	-0.011	0.116***	0.059***	0.150***	0.237***	-0.002	1		
ROA	0.653***	-0.335***	-0.325***	-0.151***	0.074***	-0.072***	0.037***	1	
Tobin	-0.029***	-0.243***	-0.099***	-0.233***	-0.459***	-0.012	-0.134***	0.110***	1

Notes: ***significant at 1% level. **significant at 5% level. *significant at 10% level. Modified-Z = financial distress risk. DTA = total debt-to-total assets ratio. TDE = total debt-to-equity ratio. LTDTA = long-term debts-to-total assets ratio. Size = firm size, the natural logarithm of assets. Age = firm age, computed by the period from the activity start to the current year. BSize = board size, the number of boards of commissioners in the company. ROA = net income divided by total assets. TOBIN (Tobin's q) = market value/total assets

Empirical Tests and Discussion of the Effect of Capital Structure on Financial Distress Risk
Table 3 shows the regression results of DTA on financial distress risk using POLS, FE or RE estimations. The total debt-to-total assets ratio (DTA) has a negative and significant impact on Modified-Z at a 1% significance level, with the coefficients of -0.994 (POLS), -1.158 (FE), -1.162 (RE). This suggests that higher DTA is associated with lower levels of Modified-Z, thus confirming hypothesis H1, DTA increases the risk of financial distress.

Table 4 shows the regression results of TDE on financial distress risk using POLS, FE or RE estimations. The total debt-to-equity ratio (TDE) has a negative and significant impact on

Modified-Z at a 1% significance level, with the coefficients of -0.0963 (POLS), -0.0763 (FE), -0.0801 (RE). All three estimations come to the same trend of conclusion: higher TDE is associated with lower levels of Modified-Z, thus confirming hypothesis H2, TDE increases the risk of financial distress.

Table 5 shows the regression results of LTDTA on financial distress risk using POLS, FE or RE estimations. The LTDTA has a negative and significant impact on Modified-Z at a 1% significance level, with coefficients of -2.126 (POLS), -0.677 (FE), and -0.896 (RE). The results of the three estimations show that higher LTDTA is associated with lower levels of Modified-Z, thus confirming hypothesis H3: LTDTA increases the risk of financial distress.

The empirical findings show that leverage negatively correlates with Modified-Z, and increases the risk of financial distress, supporting trade-off theory.
Regarding the control variables in Table 3, firm size (Size) positively and significantly affects Modified-Z at a 1% significance level, indicating that larger companies are less likely to engage in financial distress (Dirman, 2020; Zeitun & Refai, 2017). ROA also exhibits a positive and significant impact on Modified-Z, signifying that higher ROA reduces the risk of financial distress, which is consistent with the previous findings of Atif & Ali (2021) and Hidayah (2014). Board size and Tobin's q (TOBIN) have a negative and significant effect on Modified-Z.

Table 3
The Effect of DTA on Financial Distress Risk

	POLS	FE	RE
VARIABLES	Modified-Z	Modified-Z	Modified-Z
DTA	-0.994***	-1.158***	-1.162***
	(0.025)	(0.025)	(0.024)
Size	0.0358***	0.111***	0.101***
	(0.004)	(0.006)	(0.005)
Age	-0.007***	0.022**	-0.003
	(0.001)	(0.009)	(0.002)
BSize	-0.017***	-0.007**	-0.009***
	(0.003)	(0.003)	(0.003)
ROA	7.671***	5.567***	5.692***
	(0.077)	(0.050)	(0.050)
Tobin	-0.079***	-0.032***	-0.036***
	(0.004)	(0.003)	(0.003)
Constant	1.027***	-1.030***	-0.422***
	(0.091)	(0.194)	(0.124)
Observations	18,630	18,630	18,630
Number of code		1,918	1,918
R-squared	0.488	0.567	
Firm FE	NO	YES	YES
Year FE	NO	YES	YES

Notes: ***significant at 1% level. **significant at 5% level. *significant at 10% level.

Table 4
The Effect of TDE on Financial Distress Risk

VARIABLES	POLS Modified-Z	FE Modified-Z	RE Modified-Z
TDE	-0.096***	-0.076***	-0.080***
	(0.003)	(0.002)	(0.002)
Size	0.005	0.056***	0.046***
	(0.004)	(0.006)	(0.005)
Age	-0.007***	0.025***	-0.006**
	(0.001)	(0.009)	(0.002)
BSize	-0.019***	-0.007**	-0.009***
	(0.003)	(0.003)	(0.003)
ROA	7.913***	5.851***	5.989***
	(0.077)	(0.051)	(0.051)
Tobin	-0.070***	-0.035***	-0.039***
	(0.004)	(0.0031)	(0.003)
Constant	1.383***	-0.291	0.400***
	(0.090)	(0.198)	(0.124)
Observations	18,630	18,630	18,630
Number of code		1,918	1,918
R-squared	0.481	0.543	
Firm FE	NO	YES	YES
Year FE	NO	YES	YES

Table 5
The Effect of LTDTA on Financial Distress Risk

VARIABLES	POLS Modified-Z	FE Modified-Z	RE Modified-Z
LTDTA	-2.126***	-0.677***	-0.896***
	(0.045)	(0.041)	(0.040)
Size	0.037***	0.051***	0.045***
	(0.004)	(0.007)	(0.006)
Age	-0.007***	0.020**	-0.007***
	(0.001)	(0.010)	(0.002)
BSize	-0.012***	-0.007**	-0.009***
	(0.003)	(0.003)	(0.003)
ROA	8.227***	6.242***	6.413***
	(0.071)	(0.050)	(0.050)
Tobin	-0.083***	-0.040***	-0.045***
	(0.004)	(0.003)	(0.003)
Constant	0.691***	-0.163	0.420***
	(0.090)	(0.203)	(0.126)
Observations	18,630	18,630	18,630
		1,918	1,918
R-squared	0.506	0.520	
Firm FE	NO	YES	YES
Year FE	NO	YES	YES

Robustness Test

This study uses modified-variable measurement of the dependent variable to assess the robustness of the empirical analysis. The dependent variable, Modified-Z, is replaced by the Merton DD model to measure the risk of financial distress.

The Merton DD model, also known as the Distance to Default (DD) model, is an option pricing theory developed by Black & Scholes (1973) and Merton (1974) for determining financial distress risk. The model focuses on how a market-based approach predicts firms' default, where default occurs when asset volatilities cause asset market values to decline below debt value, highlighting the importance of asset volatility. The DD model is a market-based prediction model that incorporates volatility in the market values of firms' assets to predict corporate financial distress (Dinh et al., 2021). Merton DD models are widely used to predict potential credit defaults in firms (Dinh et al., 2021). The Merton DD model represents the standard deviation of a firm's value from its default point. The firm's lower values indicate a closer proximity to the default point, indicating a higher likelihood of default. The model is also explained by Dinh et al. (2021), Kang et al. (2022).

Table 6 employs an FE estimation and shows that leverage (DTA, TDE, LTDTA) negatively correlates with Merton DD. This indicates that capital structure exacerbates the risk of financial distress, thus validating hypotheses H1, H2, and H3.

Table 6
Robustness Test

VARIABLES	Model 1(FE) Merton DD	Model 2(FE) Merton DD	Model 3(FE) Merton DD
DTA	-6.431***		
	(0.324)		
TDE		-0.256***	
		(0.029)	
LTDTA			-3.093***
			(0.508)
Size	0.0150	-0.356***	-0.344***
	(0.081)	(0.079)	(0.080)
Age	-0.123	-0.110	-0.128
	(0.117)	(0.118)	(0.118)
BSize	0.104***	0.108***	0.105***
	(0.035)	(0.035)	(0.035)
ROA	-1.457**	1.246*	2.408***
	(0.641)	(0.637)	(0.614)
Tobin	0.393***	0.362***	0.346***
	(0.039)	(0.039)	(0.039)
Constant	13.400***	18.670***	18.610***
	(2.479)	(2.485)	(2.498)
Observations	18,630	18,630	18,630
Number of code	1,918	1,918	1,918
R-squared	0.221	0.207	0.205
Firm FE	YES	YES	YES
Year FE	YES	YES	YES

Conclusion

High leverage is present in a huge number of Chinese listed companies, which can have a considerable impact on financial distress. This study tests how capital structure affects financial distress in China. The effect of the leverage of Chinese-listed firms on financial distress is analyzed in this empirical study. Additionally, to enrich the literature beyond the narrow perspective, this study uses three leverage measures on the association between capital structure and financial distress risk. The study's analyses reveal that trade-off theory arguments effectively explain the significant influence of capital structure on financial distress risk.

This study has two primary contributions. Firstly, in this study, three variables are used to measure the capital structure, and three estimations are used for regression analysis, and the results are completely consistent. This study offers evidence on the impact of capital structure on financial distress risk, revealing that high leverage is highly correlated with financial distress, aligning with the trade-off theory. The number of Chinese enterprises facing financial distress is increasing rapidly, necessitating improving their risk-resistance capabilities. Financial distress is a crucial indicator of potential bankruptcy or default, and its prediction can provide early warning of potential losses to investors and creditors (Zhou et al., 2022). Recent corporate scandals and significant failures have highlighted the need for extensive research on financial distress, particularly the accelerated impairment of value in the final stages before default when distress risk is highest (Outecheva, 2007). Historical evidence indicates that financial distress is not a quick issue but rather a long incubation period, making the study of it crucial. This study suggests that firms must pay attention to leverage; if a company's leverage is consistently increasing, it is a sign that it may be at risk of financial distress. Secondly, this study uses the LTDTA as one of the variables; this study suggests managers focus on the internal structure of liabilities, with particular attention to the impact of long-term liabilities on financial distress. At the same time, this study also reminds investors, creditors, and other stakeholders to pay attention to the total leverage of enterprises and the internal debt structure, especially long-term debt.

The study provides crucial insights into the role of capital structure in corporate financial distress, laying the groundwork for future research. The main motivation of this study is to remind managers and stakeholders to pay attention to the company's capital structure, predict potential financial distress risks early, and reduce losses. This study emphasizes the importance of maintaining the optimal capital structure to protect firms from financial distress, thereby boosting shareholder wealth and investor confidence in the Chinese capital market. The findings also aid regulators and policymakers in creating mechanisms to monitor and evaluate corporate financing continuously.

References

Abdullah, M., Gulzar, I., Chaudhary, A., Tabash, M. I., Rashid, U., Naaz, I., & Ali, A. (2023). Dynamics of speed of leverage adjustment and financial distress in the Indian steel industry. Journal of Open Innovation: Technology, Market, and Complexity, 9(4), 100152. https://doi.org/10.1016/j.joitmc.2023.100152

Abor, J. (2005). The effect of capital structure on profitability: an empirical analysis of listed firms in Ghana. Journal of Risk Finance, 6(5), 438–445. https://doi.org/10.1108/15265940510633505

Ahmed, R., Abweny, M., Benjasak, C., & Nguyen, D. T. K. (2024). Financial sanctions and environmental, social, and governance (ESG) performance: A comparative study of ownership responses in the Chinese context. Journal of Environmental Management, 351(November 2023), 119718. https://doi.org/10.1016/j.jenvman.2023.119718

Altman, E. I. (1968). Financial Ratios, Discriminant Analysis And The Prediction Of Corpporate Bankruptcy. The Journal Of Finance, 23(4), 589–609. https://doi.org/https://doi.org/10.1111/j.1540-6261.1968.tb00843.x

Altman, E. I., Haldeman, R. G., & Narayanan, P. (1977). ZETA Analysis: A New Model to Identify Bankruptcy Risk of Corporations. Journal of Banking and Finance, 1, 29-54. https://doi.org/10.1016/0378-4266(77)90017-6

Al-Taani, K. (2013). The Relationship between Capital Structure and Firm Performance: Evidence from Jordan. Journal of Finance and Accounting, 1(3), 41. https://doi.org/10.11648/j.jfa.20130103.11

Antunes, J., Wanke, P., Fonseca, T., & Tan, Y. (2023). Do ESG Risk Scores Influence Financial Distress? Evidence from a Dynamic NDEA Approach. Sustainability (Switzerland), 15(9). https://doi.org/10.3390/su15097560

Atif, M., & Ali, S. (2021). Environmental, social and governance disclosure and default risk. Business Strategy and the Environment, 30(8), 3937–3959. https://doi.org/10.1002/bse.2850

Balasubramanian, S. A., Radhakrishna, G. S., Sridevi, P., & Natarajan, T. (2019). Modeling corporate financial distress using financial and non-financial variables: The case of Indian listed companies. International Journal of Law and Management, 61(3–4), 457–484. https://doi.org/10.1108/IJLMA-04-2018-0078

Beaver, W. H. (1966). Financial Ratios As Predictors of Failure. Journal of Accounting Research, 4(1966), 71–111. https://doi.org/https://doi.org/10.2307/2490171

Black, F., & Scholes, M. (1973). The pricing of options and corporate liabilities. Journal of Political Economy, 81(3), 637–657. https://doi.org/10.1086/260062

Burak Güner, A., Malmendier, U., & Tate, G. (2008). Financial expertise of directors. Journal of Financial Economics, 88(2), 323–354. https://doi.org/10.1016/j.jfineco.2007.05.009

Chandra, S., & Juliawati, C. (2020). Effects of Long-term Debt to Total Assets, Short Term Debt to Total Assets, Total Asset Turnover, and Inventory Turnover on Profitability of Manufacturing Companies in Consumer Goods Subsector Listed on IDX. Journal of Applied Business and Technology, 1(3), 212–222. https://doi.org/10.35145/jabt.v1i3.47

Chatterjee, B., Jia, J., Nguyen, M., Taylor, G., & Duong, L. (2023). CEO remuneration, financial distress and firm life cycle. Pacific Basin Finance Journal, 80, 102050. https://doi.org/10.1016/j.pacfin.2023.102050

Chow, Y. P., Muhammad, J., Bany-Ariffin, A. N., & Cheng, F. F. (2018). Macroeconomic uncertainty, corporate governance and corporate capital structure. International

Journal of Managerial Finance, 14(3), 301–321. https://doi.org/10.1108/IJMF-08-2017-0156

Chu Wang, Lian Kee Phua, Char Lee Lok (2022). The Moderating Effect of Labor Market Development on the Relationship between Ownership Structure and Capital Structure: Evidence from Chinese Listed Companies. International Journal of Academic Research in Accounting Finance and Management Sciences, 11(2), 136–152. https://doi.org/10.6007/IJARAFMS

Darrat, A. F., Gray, S., Park, J. C., & Wu, Y. (2016). Corporate Governance and Bankruptcy Risk. Journal of Accounting, Auditing and Finance, 31(2), 163–202. https://doi.org/10.1177/0148558X14560898

Dinh, D. V., Powell, R. J., & Vo, D. H. (2021). Forecasting corporate financial distress in the Southeast Asian countries: A market-based approach. Journal of Asian Economics, 74, 101293. https://doi.org/10.1016/j.asieco.2021.101293

Dirman, A. (2020). Financial Distress: The Impacts of Profitability, Liquidity, Leverage, Firm Size, and Free Cash Flow. International Journal of Business, Economics and Law, 22(1), 1.

Diyanto, V. (2020). The Effect of Liquidity, Leverage and Profitability on Financial Distress. Indonesian Journal of Economics, Social, and Humanities, 2(2), 127–133. https://doi.org/10.31258/ijesh.2.2.127-133

Dong, F., Shen, G., & Jiao, Y. (2021). Firm debt and labor share: The distribution effect of de-leverage. China Economic Quarterly International, 1(1), 59–71. https://doi.org/10.1016/j.ceqi.2021.01.003

Fitzpatrick, J., & Ogden, J. P. (2011). The detection and dynamics of financial distress. International Review of Finance, 11(1), 87–121. https://doi.org/10.1111/j.1468-2443.2010.01119.x

Graham, J. R., Lemmon, M. L., & Schallheim, J. S. (1998). Debt, leases, taxes, and the endogeneity of corporate tax status. Journal of Finance, 53(1), 131–162. https://doi.org/10.1111/0022-1082.55404

Habib, A. M. (2023). Do business strategies and environmental, social, and governance (ESG) performance mitigate the likelihood of financial distress? A multiple mediation model. Heliyon, 9(7). https://doi.org/10.1016/j.heliyon.2023.e17847

Hernandez Tinoco, M., & Wilson, N. (2013). Financial distress and bankruptcy prediction among listed companies using accounting, market and macroeconomic variables. International Review of Financial Analysis, 30, 394–419. https://doi.org/10.1016/j.irfa.2013.02.013

Hidayah, H. (2014). Leverage Dan Rasio Aktivitas Dalam Leverage Dan Rasio Aktivitas Dalam.

Jiang, Y., & Jones, S. (2018). Corporate distress prediction in China: a machine learning approach. Accounting and Finance, 58(4), 1063–1109. https://doi.org/10.1111/acfi.12432

Kalash, I. (2023). The financial leverage–financial performance relationship in the emerging market of Turkey: the role of financial distress risk and currency crisis. EuroMed Journal of Business, 18(1), 1–20. https://doi.org/10.1108/EMJB-04-2021-0056

Kalbuana, N., Taqi, M., Uzliawati, L., & Ramdhani, D. (2022). The Effect of Profitability, Board Size, Woman on Boards, and Political Connection on Financial Distress Conditions. Cogent Business and Management, 9(1). https://doi.org/10.1080/23311975.2022.2142997

Kang, C. M., Wang, M. C., & Lin, L. (2022). Financial Distress Prediction of Cooperative Financial Institutions—Evidence for Taiwan Credit Unions. International Journal of Financial Studies, 10(2). https://doi.org/10.3390/ijfs10020030

Karugu, C., Achoki, G., & Kiriri, P. (2018). Capital Adequacy Ratios as Predictors of Financial Distress in Kenyan Commercial Banks. Journal of Financial Risk Management, 07(03), 278–289. https://doi.org/10.4236/jfrm.2018.73018

Kisman, Z., & Krisandi, D. (2019). How to Predict Financial Distress in the Wholesale Sector: Lesson from Indonesian Stock Exchange. Journal of Economics and Business, 2(3), 569–585. https://doi.org/10.31014/aior.1992.02.03.109

Koh, J. H., & Jang, S. C. (Shawn). (2009). Determinants of using operating lease in the hotel industry. International Journal of Hospitality Management, 28(4), 638–640. https://doi.org/10.1016/j.ijhm.2009.03.002

Kordestani, G., Biglari, V., & Bakhtiari, M. (2011). Ability of combinations of cash flow components to predict financial distress. Business: Theory and Practice, 12(3), 277–285. https://doi.org/10.3846/btp.2011.28

Lee, S., Koh, Y., & Kang, K. H. (2011). Moderating effect of capital intensity on the relationship between leverage and financial distress in the U.S. restaurant industry. International Journal of Hospitality Management, 30(2), 429–438. https://doi.org/10.1016/j.ijhm.2010.11.002

Leippold, M., Wang, Q., & Zhou, W. (2021). Machine learning in the Chinese stock market. Journal of Financial Economics, 145(2), 64–82. https://doi.org/10.1016/j.jfineco.2021.08.017

Lizal, L. (2002). Determinants of Financial Distress: What Drives Bankruptcy in a Transition Economy? The Czech Republic Case. SSRN Electronic Journal, 451. https://doi.org/10.2139/ssrn.307224

Luthfiyanti, N. K., & Dahlia, L. (2020). The Effect of Enterprise Risk Management on Financial Distress. Journal of Accounting Auditing and Business, 3(2), 30. https://doi.org/10.24198/jaab.v3i2.25910

Mackie-Mason,J.K., (1990). Do Taxes Affect Corporate Financing Decisions? The Journal of Finance, 45(5), 1471–1493.

Magee, S. (2013). The effect of foreign currency hedging on the probability of financial distress. Accounting and Finance, 53(4), 1107–1127. https://doi.org/10.1111/j.1467-629X.2012.00489.x

Meng, Q., Wang, S., & Zheng, X. (2024). Corporate governance and financial distress in China a multi-dimensional nonlinear study based on machine learning. Pacific-Basin Finance Journal, 102549. https://doi.org/10.1016/j.pacfin.2024.102549

Merton, R. C. (1974). American Finance Association On the Pricing of Corporate Debt : The Risk Structure of Interest Rates Author (s): Robert C . Merton Source : The Journal of Finance , Vol . 29 , No . 2 , Papers and Proceedings of the Thirty- Second Annual Meeting of the A. The Journal of Finance, 29(2), 449–470.

Moch, R., Prihatni, R., & Buchdadi, A. D. (2019). The effect of liquidity, profitability and solvability to the financial distress of manucatured companies listed on the Indonesia stock exchange (IDX) period of year 2015-2017. Academy of Accounting and Financial Studies Journal, 23(6), 1–16.

Muigai, R. (2016). Effect of Capital Structure on Financial Distress of Non-Financial Companies Listed in Nairobi Securities Exchange. Journal of Accounting and Business Education, 1–172. http://ir.jkuat.ac.ke/handle/123456789/2153

Myers, S. C. (1977). Determinants of corporate borrowing. Journal of Financial Economics, 5(2), 147–175. https://doi.org/10.1016/0304-405X(77)90015-0

Novita Sari., Achmad Hizazi., W. (2021). Effect of Good Corporate Governance and Leverage on Profitability-Mediated Tax Avoidance (Study on Mining Companies listed on the Indonesia Stock Exchange 2016 – 2019). International Journal of Academic Research in Accounting Finance and Management Sciences, 11(2), 202–221. https://doi.org/10.6007/IJARAFMS

Oktasari, Dian Primanita. (2020). The Effect of Liquidity, Leverage and Firm Size of Financial Distress. East African Scholars Multidisciplinary Bulletin, 3(9), 293–297. https://doi.org/10.36349/easmb.2020.v03i09.002

Ohlson, J. A. (1980). Financial Ratios and the Probabilistic Prediction of Bankruptcy. Journal of Accounting Research, 18(1), 109. https://doi.org/10.2307/2490395

Outecheva, N. (2007). Major Thermal Burns: A Mortality Appraisal and Review. Archives of Surgery, 87(6), 937–948. https://doi.org/10.1001/archsurg.1963.01310180053010

Pernamasari, R., Purwaningsih, S., Tanjung, J., & Rahayu, D. P. (2019). Good Corporate Governance and Prediction of Financial Distress to Stock Prices: Atman Z Score Approach. International Journal of Economics and Management Studies, 6(11), 56–62. https://doi.org/10.14445/23939125/ijems-v6i11p107

Platt, H. D., & Platt, M. B. (2002). Predicting corporate financial distress: Reflections on choice-based sample bias. Journal of Economics and Finance, 26(2), 184–199. https://doi.org/10.1007/bf02755985

Pradana, E. A., & Imelda, E. (2023). the Effect of Short-Term Debt, Long-Term Debt, Tangibility, Sales Growth, Firm Size, and Debt To Asset Ratio on the Performance of Manufacturing Companies. International Journal of Application on Economics and Business, 1(3), 1512–1525. https://doi.org/10.24912/ijaeb.v1i3.1512-1525

Rao, N. V, Hamed, K., Al-Yahyaee, M., & Syed, L. A. M. (2007). Capital Structure and Financial Performance: Evidence From Oman. Indian Journal of Economics & Business, 6(1), 1–14.

Shen, G., Zhang, Y., & Wang, R. (2018). Tax Reduction and De-leverage in China's Industrial Sector. Journal of Financial Research, 12, 105–122.

Shumway, T. (2001). Forecasting Bankruptcy More Accurately: A Simple Hazard Model. The Journal of Business, 74(1), 101–124. https://doi.org/10.1086/209665

Susanti, N., Latifa, I., & Sunarsi, D. (2020). The Effects of Profitability, Leverage, and Liquidity on Financial Distress on Retail Companies Listed on Indonesian Stock Exchange. Jurnal Ilmiah Ilmu Administrasi Publik, 10(1), 45. https://doi.org/10.26858/jiap.v10i1.13568

Ugur, M., Solomon, E., & Zeynalov, A. (2022). Leverage, competition and financial distress hazard: Implications for capital structure in the presence of agency costs. Economic Modelling, 108(May). https://doi.org/10.1016/j.econmod.2021.105740

Utami, D. W., Atmaja, H. E., & Hirawati, H. (2021). The Role of Financial Ratios on the Financial Distress Prediction. Kinerja, 25(2), 287–307. https://doi.org/10.24002/kinerja.v25i2.4661

Wang, C., Lok, C. L., & Phua, L. K. (2023). Ownership Structure and Capital Structure: Moderating Effect of Product Market Maturity. SAGE Open, 13(4), 1–15. https://doi.org/10.1177/21582440231218787

Waqas, H., & Md-Rus, R. (2018). Predicting financial distress: Importance of accounting and firm-specific market variables for Pakistan's listed firms. Cogent Economics and Finance, 6(1), 1–16. https://doi.org/10.1080/23322039.2018.1545739

Yazdanfar, D., & Öhman, P. (2020). Financial distress determinants among SMEs: empirical evidence from Sweden. Journal of Economic Studies, 47(3), 547–560. https://doi.org/10.1108/JES-01-2019-0030

Zeitun, R., & Refai, H. Al. (2017). Capital structure, tax effect, financial crisis and default risk: Evidence from emerging market. International Journal of Economics and Business Research, 14(1), 104–113. https://doi.org/10.1504/IJEBR.2017.085557

Zhang, J., & Wang D., (2020). Financial distress warning: conceptual definition and theoretical analysis. Collected Essays on Finance and Economics, 267(12), 61-69.

Zhang, X., Zhao, Y., & Yao, X. (2022). Forecasting corporate default risk in China. International Journal of Forecasting, 38(3), 1054–1070. https://doi.org/10.1016/j.ijforecast.2021.04.009

Zhao, Q., Xu, W., & Ji, Y. (2023). Predicting financial distress of Chinese listed companies using machine learning: To what extent does textual disclosure matter? International Review of Financial Analysis, 89(July), 102770. https://doi.org/10.1016/j.irfa.2023.102770

Zhao, Q., Xu, W., & Ji, Y. (2023). Predicting financial distress of Chinese listed companies using machine learning: To what extent does textual disclosure matter? International Review of Financial Analysis, 89(July), 102770. https://doi.org/10.1016/j.irfa.2023.102770

Zhou, C., Phua, L. K., & Lok, C.-L. (2023). Ownership Concentration, Corporate Social Responsibility, and Real Earnings Management: Evidence from China. International Journal of Academic Research in Accounting, Finance and Management Sciences, 13(4), 31–47. https://doi.org/10.6007/ijarafms/v13-i4/19905

Zhou, F., Fu, L., Li, Z., & Xu, J. (2022). The recurrence of financial distress : A survival analysis. International Journal of Forecasting, 38(3), 1100–1115. https://doi.org/10.1016/j.ijforecast.2021.12.005