

The Impact of Financial Ratios on the Financial Health of Companies Listed on the Stock Exchange

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Abstract

Organizational stability, insolvency, financial hardship, and accounting data quality are all connected to a company's financial health. Examining the financial health of companies is important from various aspects, especially in light of globalization and the expansion of communications. There are multiple methods to assess the financial health of companies and predict financial bankruptcy, among which statistical techniques are prominent. This study investigates the financial ratios impacting the Logit model-based financial stability of businesses listed on stock exchanges. The members of the statistical sample include 152 businesses that are listed on the Tebran Stock Exchange since 2011 to 2021. To test the hypotheses, regression analysis and Logit and Probit models were employed using EVIEWS software. The results indicated that profitability and agency costs have a significant impact on the financial health of companies. However, financial leverage, current ratio, cash holding level, and working capital to total assets did not significantly affect the financial health of the companies.

Keywords: *Financial Health, Bankruptcy, Financial Index.*

Introduction

A company's capacity to control revenues and costs, maintain a stable financial position, and manage debts is referred to as its financial health. (Alhassanko, 2024). According to Banne et al. (2019), a company's financial health is determined by evaluating its business outcomes over a given period using financial data. In this regard, an organization's financial standing is thought to be a sign of its capacity for long-term growth and success in a cutthroat market. (2020; Weida et al. Additionally, it highlights that an organization's financial health is a reflection of its ability to control expenses, be prepared to bounce back from unforeseen setbacks, turn a profit and expand, compete in the market, evaluate its position going forward, and steer clear of financial hazards. According to Guan et al. (2024), assessing a company's financial health is considered a top priority and is relevant to financial management, investors, and creditors. It indicates the company's financial standing, influences market value facilitates easy access to external financing, and identifies the company's strengths and weaknesses about its credit and liquidity policies.

The assessment of financial well-being is contingent upon the examination of financial information ascertained from financial accounts, including cash flow, income, and balance sheets (Statcan, 2018). Financial health metrics may be compared to those of competitors, providing information about the company's financial standing and possibly pointing to eventual bankruptcy. Consequently, an evaluation of a company's financial standing in terms of its ability to manage financial resources, profitability, prompt payment of debts, and preparedness to bounce back from setbacks to accomplish its strategic goals can be referred to as financial health (Toit et al., 2024).

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Many financial and non-financial indicators can impact a company's financial health and lead to financial distress costs (Kyirakou, 2020). Economic conditions in global markets, intense competition, and uncertainty in the business environment can sometimes lead to financial difficulty and eventual insolvency. Bankruptcy and financial difficulties are not the same thing. Financial distress describes a situation where a company cannot meet its obligations to stakeholders and investors or faces difficulties in doing so. However, if the total value of a company's debts exceeds the fair value of its total assets, meaning the company's net worth is negative, the company is considered bankrupt (Danilov, 2014). Thus, examining the indicators affecting financial health plays a crucial and increasing role in the economy, as it imposes significant costs on the company, shareholders, creditors, and, on a larger scale, the entire economy (Altman et al., 2015). Among the costs of declining The potential costs of missed sales, decreased profitability, and losses from losing market position, which deteriorates the company's capacity to pay back loans, are what make financial health. (Chiaramonte & Casu, 2017). In identifying signs of financial health or failure of companies, following pioneering studies in this field (Altman et al., 2015), this issue can be summarized into five categories or general terms:

Economic failure indicates that the anticipated return on investment, considering risk, is significantly and consistently lower than the actual return.

Business failure is characterized by the cessation of operations or bankruptcy, asset seizure, mergers, unpaid obligations, or legal actions.

Technical bankruptcy occurs when a business doesn't fulfill its existing obligations due to a lack of liquidity.

Distress is a critical situation where the total debts of the company exceed the total market value of its assets.

Bankruptcy refers to the formal declaration of bankruptcy through legal means, either for the dissolution of a company or to attempt a financial recovery plan and reduce the company's debts (Michalkovaa et al., 2018).

Determining a company's financial health, the influencing factors, and assessing the impact of these factors on financial health are significant from both micro (including small investors, private investors, and the company) and macro (economic and social conditions of society) perspectives (Chalaki et al., 2018). The issue of a company's financial distress has always been a subject of concern for accounting and finance scholars, who continuously seek methods and criteria to predict financial distress and bankruptcy of economic entities. Financial instability can have various consequences. Therefore, the social and economic costs of financial distress are deemed very important and fundamental, as creditors, managers, employees, and shareholders are the primary groups affected by the financial distress of companies. Thus, predicting financial instability is crucial from both social and private perspectives, as it indicates the misallocation of resources (Rahimian, 2019).

The rapid advancement of technology and extensive environmental changes have accelerated the economy, while increasing competition among economic entities has limited profitability and raised the likelihood of inability to meet obligations and halting operations. Recent unprecedented bankruptcies of major companies internationally and fluctuations in the stock market in Iran have raised concerns about financial crises in companies and important domestic industries and their impact on bankruptcy and the destruction of companies, which can be referred to as a terrifying financial tsunami. This highlights the need for tools to assess the capabilities and financial health of companies. The aim of this research, given the existing concerns, is to answer the question of whether the financial indicators examined affect the financial health or financial failure of companies listed on the Tehran Stock Exchange and the extent of the impact of each.

Theoretical Foundations and Research Background

The topics of operational continuity, insolvency, financial difficulty, and the qualitative aspects of accounting information are all connected to a company's financial health. (relevance and reliability).

Therefore, it is necessary to evaluate the performance of companies in operational, marketing, financial, and accounting areas. Since avoiding bankruptcy is now a fundamental strategy aimed at ensuring business activities, researchers have focused on forecasting profitability and assessing the continuity of companies' operations. Financial health, in terms of profitability and continuity of a business unit (International Monetary Fund, 2000), is crucial for all stakeholders and essentially. Having the right instruments to assess and forecast these units' profitability and longevity is of relevance to all parties involved in the economy. (Kiriakou, 2020). The economy has also picked up speed due to the swift advancement of technology and significant alterations in the environment. While increasing competition among economic entities has limited profitability and increased the likelihood of being unable to fulfill obligations and halting their activities (Kliestik et al., 2018). Recent unprecedented bankruptcies of major companies globally (like Enron) and stock market fluctuations in Iran have raised concerns about financial crises in companies and important domestic industries and their impact on company bankruptcies. This indicates the need for tools to assess the financial capabilities and health of companies considering environmental conditions. One of the tools for evaluating the financial capabilities of companies is the use of various financial and value-based components as predictor variables for the financial health of companies (Kliestik et al., 2018). The absence of financial health in a company can manifest in various forms and dimensions, affecting stakeholders differently. For instance, the emergence of bankruptcies among large companies is defined through various definitions and concepts. Over the past half-century, the topic of "predicting business bankruptcy" has developed into a major research area in corporate finance. The examination of companies' financial health and the prediction of bankruptcy through various models have garnered significant attention in recent years (Rezaei & Goldoz, 2011).

The topic of financial health or bankruptcy of an entity can be examined from three perspectives: first, the definition of bankruptcy and the establishment of indices; second, preventive measures to avoid bankruptcy in order to create financial health and assurance for stakeholders; and third, the situation after bankruptcy and how to recover from it. Besides the significant importance of this topic for the companies themselves, policymakers, investors, banks, and lending institutions, all financial systems are also highly interested in predicting bankruptcy, as they prefer to engage with financially healthy companies. Additionally, since bankruptcy has adverse effects on employment and the workforce, policymakers are also keen to identify companies entering the bankruptcy zone so they can timely implement supportive policies for those companies or industries (Mohammadzadeh et al., 2012).

The most important models introduced in the field of predicting bankruptcy are as follows (Asadi et al., 2020):

- *William Beaver Model*

kind of univariate analysis for business bankruptcy is this model. Beaver selected a set of 30 financial ratios in 1996 that he believed were the best for assessing a company's health. The ratios were categorized into six groups based on how organizations are evaluated: cash flow ratios, net income ratios, debt-to-total-income ratios, cash income-to-existing-debt ratios, and return on sales ratios. Beaver structured his model based on four principles:

A company's net cash income reduces its chance of going bankrupt.

A company's market operations generate high net cash flow, which also reduces the likelihood of bankruptcy.

Any firm that has a lot of debt is more likely to go bankrupt.

A high rate of cash income required for operating capital expenses raises the likelihood of bankruptcy.

He evaluated the ratios' capacity to forecast bankruptcy using these concepts. After choosing 79 bankrupt and 79 non-bankrupt businesses, Beaver assessed each of these 30 ratios in these businesses. He concluded that the predictive validity of each ratio varied. Additionally, bankrupt companies not only had lower cash

flows compared to non-bankrupt companies but also had a smaller cash income hold back in contrast to non-insolvent corporations, bankrupt companies typically borrow more money even if they have less cash to protect themselves.

At the end of his research, Beaver concluded that the value of each ratio is reflected in its classification accuracy for bankrupt and non-bankrupt companies, with a lower classification error indicating a higher value for each ratio. Based on this principle, Beaver introduced six ratios with the lowest classification error rates. These ratios included cash flows to total assets, net income to total assets, total debts to total assets, working capital to total assets, current ratio, and the uncertainty distance ratio. Beaver believed that the cash flow to total debts ratio had the greatest predictive power, as its classification error was about 13% one year before bankruptcy. Additionally, the second most important ratio was net income to total assets.

Beaver examined changes in the market value of stocks as a predictive factor in forecasting corporate bankruptcy. He found that the market predicts a company's bankruptcy approximately one year before the actual bankruptcy event occurs. One of his most surprising findings was that the current ratio ranked among the worst predictors of operational continuity, indicating the informational content of working capital in predicting bankruptcy.

De Keen Model

De Keen (1972) remembered Beaver's original ratio tests and chose successful firms by random sampling rather than matching. The resulting discriminant equation was efficient in distinguishing up to three years before bankruptcy. However, when matched with a valid sample, inconsistencies were observed in the results, indicating significant instability in the estimated model.

Spring gate Model

The initial idea for this model was first proposed at Simon Fraser University by Gordon and Spring gate. Like Altman, he used discriminant analysis to select four suitable financial ratios from among 19 that were deemed the best for identifying healthy and bankrupt companies. The model is defined as follows:

$$Z = 1.3A + 3.07B + 0.66C + 0.4D$$

$$A = \text{Total Assets} / \text{Working Capital}$$

$$B = \text{Total Assets} / \text{Earnings Before Interest and Taxes}$$

$$C = \text{Current Liabilities} / \text{Earnings Before Tax}$$

$$D = \text{Total Assets} \setminus \text{Sales}$$

When $Z < 0.862$, the company is considered bankrupt.

Spring gate tested this model using a sample of 40 companies and achieved an impressive accuracy of 92.5%. In 1979, Batra used the Spring gate model for 50 companies and attained 95% accuracy. In 1980, Sanderson examined the model using 24 companies and confirmed an accuracy of 89% (Bahrami and Khoshnavis, 2019).

Toffler Model

In 1983, Toffler conducted research in the UK regarding bankruptcy prediction. He collected data from 46 bankrupt companies between 1969 and 1976 and matched it with data from successful companies. He then proposed a predictive model as follows:

$$Z = C0 + C1R + C2W + C3FR + C4L$$

R = Rate of Return on Investments

W = Working Capital

FR = Financial Risk, Debt to equity ratio

L = Liquidity

Toffler assessed the contribution of each variable in the model as 53%, 13%, 18%, and 16%, respectively. After presenting this model, he selected a sample of risky companies and evaluated them using the aforementioned model. The model classified 115 out of 825 industrial companies in the database as being at dangerous risk. Over four years, 35% of these companies either went bankrupt or faced economic inability to repay debts, and over 27% remained at dangerous risk. It is evident that the model shows some predictive capabilities, but whether it is valuable remains unclear, as 44 of the 115 companies classified as at risk continued to operate for four more years, and one of the risky companies went bankrupt. This model also posed practical issues for credit institutions, as it classified 11% to 21% of their potential customers as at risk during the years 1973-1980.

Zemijowski Model

Zemijowski used financial ratios that measure liquidity, performance, and financial leverage to create his model. These ratios were not selected solely based on theoretical perspectives but were chosen based on Zemijowski's previous studies on financial ratios. Additionally, he used probit analysis to develop his model:

$$Z = (-4.3)(-4.5)X_1 + 5.7 X_2 + 0.004 X_3$$

X_1 = Total Assets \ Net Income

X_2 = Total Assets \ Total Liabilities

X_3 = Current Liabilities \ Current Income

When $Z < 0$, the company is considered bankrupt.

Zemijowski tested his model on 40 bankrupt companies and 800 non-bankrupt companies, achieving an accuracy rate of about 78% for one year prior to bankruptcy. This model is among the simplest bankruptcy models, adhering well to the principle of having a minimal number of independent variables (Pirazeh and colleagues, 2017).

In recent studies, Pindado and colleagues developed a model to measure the likelihood of financial distress using profitability ratios, financial costs, and retained earnings (Pindado et al., 2008).

Etemadi and colleagues employed genetic programming with data from 144 bankrupt and healthy companies listed on the Tehran Stock Exchange to model bankruptcy prediction (Etemadi et al., 2009). Their genetic model achieved accuracy rates of 94% and 90% in training and validation samples, respectively.

Muslimi and colleagues predicted financial distress using financial ratios from a sample of 212 small and medium-sized French companies (Muslimi et al., 2017). The results indicated that financially distressed companies were smaller, more leveraged, and had lower liquidity, profitability, and repayment capacity. Chiaramonte and Casu (2017) found that improving liquidity and ownership ratios reduced the likelihood of financial distress based on evidence from European companies.

Tahamasi et al (2020) proposed a model for predicting bankruptcy of Iranian companies using data mining techniques. Moradi Shahdadi et al (2020) also examined the effects of intellectual capital on liquidity and

the likelihood of bankruptcy on the Tehran Stock Exchange, finding that asset and stock liquidity positively affected liquidity status, while liquidity inversely impacted the likelihood of bankruptcy. Research into modeling for predicting financial distress and bankruptcy continues globally.

In recent periods leading up to the end of 2023, researchers have increasingly utilized artificial intelligence models and machine learning methods alongside statistical models, which have shown superior performance compared to traditional statistical methods. For instance, Kao et al (2022) employed a machine learning method known as Bayesian networks, Dube and colleagues (2023) used artificial intelligence methods with neural networks, and Zhou et al (2023) applied machine learning techniques for predicting financial distress.

Research Methodology

This type of research is applied and is classified as a descriptive accounting study. It is also categorized as quasi-experimental research since hypothesis testing involves the use of historical data. The study employs an inductive reasoning method and is grounded in empirical research. It is field-library research that makes use of historical data in a retroactive fashion (i.e., by employing information from the past). All businesses registered on the Tehran Stock Exchange comprise the statistical population for this study, which is further limited by the following:

The selected sample of this research are companies that have the following conditions:

The selected companies must be listed on the Tehran Stock Exchange.

The companies should have been accepted before 2011.

Necessary data must be available from 2011 to 2021.

To ensure consistency in reporting dates and eliminate seasonal effects, their financial periods must end at the end of the solar year.

Companies must not be banks or financial institutions (investment companies, financial intermediaries, holding companies, and leasing companies).

Accordingly, after applying the above limitations, 152 companies met these criteria during the period from 2011 to 2021. Therefore, the research hypotheses were tested within this timeframe and the selected companies. In this research, logistic regression models were used for modeling. Eviews10 software was utilized for hypothesis testing in this study.

Research Hypotheses

Hypothesis 1: Financial leverage has a significant impact on the financial health of companies listed on the Tehran Stock Exchange (adapted from Chiaramonte et al., 2017).

Hypothesis 2: The current ratio has a significant impact on the financial health of companies listed on the Tehran Stock Exchange (adapted from Banayi Ghadim, 2022).

Hypothesis 3: Profitability has a significant impact on the financial health of companies listed on the Tehran Stock Exchange (adapted from Ghaqalani and Rao, 2015).

Hypothesis 4: The level of cash holding has a significant impact on the financial health of companies listed on the Tehran Stock Exchange (adapted from Ghaqalani and Rao, 2015).

Hypothesis 5: The ratio of working capital to total assets has a significant impact on the financial health of companies listed on the Tehran Stock Exchange (adapted from Banayi Ghadim, 2022).

Hypothesis 6: Agency costs have a significant impact on the financial health of companies listed on the Tehran Stock Exchange (adapted from Chiaramonte et al., 2017).

Regression Model and Research Variables

Dependent Variable

Financial Health: This research uses the Zmijewski model (1984). In this model, when Z is less than zero, the company is considered bankrupt.

$$Z = -3.4 - 4.5X_1 + 5.7X_2 + 0.004X_3$$

Independent Variables

Financial Leverage: The amount of debt a company can bear to acquire more assets is obtained from the ratio of total debt to total assets. (Ogour et al., 2022)

$$LEV = \frac{DEBT}{TA}$$

Current Ratio: This is the ratio of current assets to current liabilities. (Ogour et al., 2022)

$$\text{current ratio} = \frac{\text{Current assets}}{\text{current debt}}$$

Profitability: This indicator is estimated from the ratio of net profit to sales. (Ogour et al., 2022)

$$PROFIT = \frac{\text{Net profit}}{SALE}$$

Cash Holding Level: This indicator is the ratio of cash to total assets. (Sadeghi et al., 2012)

$$CASHHOLDING = \frac{CASH}{TA}$$

Agency Costs: The asset turnover ratio (annual sales to total assets) is used as an indicator of agency costs. This ratio indicates how much sales are generated for each unit of currency invested in assets. (Sadeghi et al., 2012)

$$\text{Agency fee} = \frac{SALE}{TA}$$

Working Capital Ratio: This ratio is calculated by dividing working capital by total assets.

Control Variables

Return on Assets (ROA): This is the ratio of net profit to total assets. (Ogour et al., 2022)

$$ROA = \frac{NET\ PROFIT}{TA}$$

Company Size: This is the natural logarithm of total assets. (Ogour et al., 2022)

$$SIZE = \text{LOG}(TA)$$

Research Findings

Table 1. Description of Company Variables

level of significance	Jarque-Bera statistics	Minimum	Maximum	Standard deviation	Median	Mean	Variables
0.000	293.7	0	1	0.47	0.52	0.66	Financial health
0.000	1039.1	0.03	3.8	0.25	0.37	0.56	Financial leverage
0.000	771749	0.15	27.09	1.4	1.31	1.60	current ratio
0.000	230265	20.52-	112.06	41.26	0.12	25.94	profitability
0.000	1861.5	0.0001	0.82	0.094	0.041	0.075	Keeping cash
0.0000	17928.7	0.83-	2.9	0.28	0.16-	0.14-	Working capital ratio
0.000	5883.1	0.016	5.7	0.53	0.76	0.87	Agency fee
0.000	209.8	10.35	21.33	1.69	14.46	14.66	Company size
0.000	89.38	0.58-	0.68	0.16	0.13	0.15	Return on assets

Based on the results obtained from the research, 66% of the companies in the sample from 2011 to 2021 did not have adequate financial health, while only 34% of these companies exhibited financial health.

The Central Limit Theorem states that if the sample size is more than 20, even when the Jarque-Bera test findings show that the study variables do not follow a normal distribution., The variable's distribution will incline towards a normal distribution (Safarishali, 2011). The non-normality of the data based on this test will thus not impair the fit of the regression model because there are a relatively large number of firms in the sample.

Investigating the Validity of Research Variables

Table 2. Panel Data Unit Root Test

Levin, Lynn and Chow	Result		Variables
10.50-	Statistic value	Mana on the level	Financial health
0.000	Significant level		Financial leverage
16.20-	Statistic value	Mana on the level	current ratio
0.0000	Significant level		profitability
9.66-	Statistic value	Mana on the level	Keeping cash
0.0000	Significant level		Working capital ratio

24.08-	Statistic value	Mana on the level	Agency fee
0.0000	Significant level		Company size
27.18-	Statistic value	Mana on the level	Return on assets
0.0000	Significant level		
7.30-	Statistic value	Mana on the level	
0.000	Significant level		
9.78-	Statistic value	Mana on the level	
0.000	Significant level		
9.40-	Statistic value	Mana with a difference	
0.0000	Significant level		
14.04-	Statistic value	Mana on the level	
0.0000	Significant level		

Investigating Of Collinearity Among Research Variables

Table 3. Investigating of Collinearity Among Research Variables

Working capital	Company size	Return on assets	Profitability	Financial leverage	Current ratio	Cash holding level	Agency fee	Variables
0.08	0.03	0.014	0.05	0.005	0.05	0.07	1	Agency fee
0.33	0.04	0.09	0.025	0.05	0.33	1		Cash holding level
0.05	0.086	0.065	0.02	0.06	1			Current ratio
0.0005	0.04	0.05	0.08	1				Financial leverage
0.04	0.18	0.09	1					Profitability
0.034	0.14	1						Return on assets
0.09	1							Company size
1								Working capital

In this study, the Variance Inflation Factor (VIF) among the independent variables is used to assess the presence or absence of multicollinearity (Souri, 2012). Given that there is fewer than 0.50, there is no multicollinearity among the independent variables.

Table 4. Logistic Regression Coefficients for Research Hypotheses

Significant level (Prob)	Z statistic	Standard error	B (regression coefficient)	Independent variable	Dependent variable
0.000	4.86-	0.10	0.52-	Agency fee	Company bankruptcy
0.25	1.13	0.68	0.76	Cash holding level	
0.58	0.54-	0.04	0.02-	current ratio	
0.99	0.005-	0.26	0.001-	Financial leverage	
00000	7.11-	0.045	0.32-	profitability	
0.76	0.29	0.25	0.07	Working capital ratio	
0.000	6.54-	0.04	0.26-	Company size	
0.006	2.73	0.46	1.26	return on assets	
0.000	8.67	0.59	5.13	constant coefficient a	
318.02			Statistic LR		
0.000			Significant level		

This result is less than 0.05 at the 95% confidence level for the variables of agency costs, considering the significance level of the z-test. and profitability, it can be concluded that only Hypothesis 3 and Hypothesis 6 of the research are confirmed. This indicates that agency costs and profitability have a negative and significant impact on the bankruptcy of the company. In other words, with increased profitability and agency costs, the firm's financial situation gets better.

Discussion and Conclusion

Given the importance and necessity of identifying factors affecting the prediction of financial health to benefit organizations and financial institutions with a warning system for potential financial distress and considering that previous research has not comprehensively examined the variables of this study, this study used logistic regression to look at how financial factors affected listed firms' financial health. To accurately assess the effect of each identified indicator on financial health, research hypotheses were formulated and tested using logistic regression. The results indicated that profitability and agency costs can effectively predict financial health. The findings suggest that to enhance the predictive power for investors and reduce company risk, identifying factors that affect financial health and consequently investment opportunities can

be very beneficial and significant. Ugur et al. (2022), Nguyen and Kien (2021), and Wang et al. (2018) reached results consistent with those of the present study.

It is recommended that analysts help investors minimize decision-making errors by using the results of conducted studies and influential variables to develop a model for extracting and calculating the degree of financial health of companies. It is recommended that analysts on the Tehran Stock Exchange focus on financial indicators in their assessments if corporate management confirms that the company will not be able to sustain its operations for the foreseeable future. Investors in the Tehran Stock Exchange are advised to consider the financial indicators of companies when investing to assess their financial health. Companies active in the stock market are recommended to present figures related to financial indicators accurately. It is recommended that auditors of businesses listed on the Tehran Stock Exchange examine financial indicator statistics more thoroughly. This research was conducted over a short period and utilized quantitative financial indicators; therefore, caution should be exercised in generalizing its results. Given that bankruptcy, as covered by Article 141 of the Commercial Code, is a concept based on profitability, it is recommended that this study be repeated with more profitability ratios. Future studies could also explore non-financial indicators and compare the impact of financial and non-financial signs of a company's financial health and hardship.

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