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Social Costs of Bankruptcy, Government Intervention, and Stock Price Crash Risk

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ABSTRACT

This research examines the impact of the social costs of bankruptcy and government intervention on stock price crash risk. The study's statistical population consists of 166 companies listed on the Tehran Stock Exchange from 2013 to 2022. Given that the dependent variable in this research is binary (zero and one), logistic regression was used to analyze the hypotheses. The results indicated that as the social costs of bankruptcy for companies increase, the risk of stock price crashes for these companies decreases. The degree of influence of the social costs of bankruptcy on the risk of stock price crashes increased with government intervention. It can be said that in situations where a significant portion of a company's shares is owned by the government or state-owned enterprises, the negative impact of the social costs of bankruptcy on the risk of stock price crashes is greater.

KEYWORDS: Social costs of bankruptcy, government intervention, stock price crash risk

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1. Introduction

Economic development and prosperity in any country are undoubtedly dependent on the dynamism of money and capital markets, especially the capital market, which provides medium- and short-term funding for economic enterprises (Khajavi et al., 2018). On the other hand, the primary goal of investors in investing is to gain future benefits. Therefore, investors strive to invest at the best opportunity and achieve the highest return relative to the associated risks (Foroughi Nasab et al., 2021). Volatility is an inherent characteristic of all stock markets, occurring in price surges and crashes. Significant fluctuations in stock prices, particularly sharp and sudden declines in asset prices which are considered synonymous with negative skewness in returns are among the main concerns of investors and regulators (Li & Zhan, 2016). Price increases are often gradual, while large downward changes in stock prices typically occur over a short period. A substantial portion of the literature related to stock markets indicates that the largest changes in stock markets have been downward rather than upward (Xue & Ying, 2020). Since stock price crashes often cause widespread and profound disruptions in financial markets and the overall economy, this behavior has become an area of interest for academics seeking to provide models and explanations for stock price crashes (Habib & Huang, 2019). Managers have incentives to conceal bad news because disclosing negative information can adversely affect their rewards or job positions (Valizadeh et al., 2022). However, bad news ultimately becomes apparent at a certain point. When managers can no longer hide bad news and all negative information is suddenly released, it leads to a significant negative fluctuation in stock prices (sharp price drop); this type of risk is known as stock price crash risk (Cao et al., 2018; Harper et al., 2020). The underlying mechanisms of stock price crash risk examined by previous researchers can generally be divided into two categories: heterogeneity in investor beliefs about a company's fundamental values and opportunistic behaviors by company managers (Fakhari Nasiri, 2020). A common element among the underlying mechanisms of stock price crash risk is the non-disclosure of bad news regarding a company's fundamental values and ultimately the release of this news into the stock market (Khajavi et al., 2018).In light of these sudden declines and investors' ongoing concerns about rapid and unexpected drops in stock prices, identifying factors that influence stock price crash risk has always been a focus for researchers. It is believed that by identifying these factors and working towards reducing stock price crash risk, balance and stability in capital markets can be improved, facilitating investment in the economy and consequently enhancing national production financing (Toulabi & Amjadiyan, 2020).The classification of all enterprises based on ownership characteristics can divide companies into two categories: state-owned and non-state-owned. Li et al. (2024), in their joint study, suggested that when state-owned companies are forced to dissolve due to bankruptcy, they usually take into account the social costs of bankruptcy. This is because, compared to private companies, state-owned companies are less likely to be dissolved as they have more motivation to pay off their debts, such as government financial subsidies to these companies, loan term extensions by banks, and debt restructuring measures like converting debt into equity (Li et al., 2024). In other words, compared to private companies, the likelihood of dissolution for state-owned enterprises is lower because they have a greater incentive to repay their debts. Furthermore, state-owned companies are more likely to receive government assistance and have a lower probability of defaulting on

corporate bonds due to the high political pressure they face (Wang & Yan, 2023). From another perspective, investors generally perceive state-owned companies as having higher credit ratings due to their ownership characteristics compared to non-state-owned companies. Similarly, banks are more inclined to allocate their funds to state-owned companies when making credit decisions (Fiorillo et al., 2023). In other words, when state-owned companies are at risk of bankruptcy and dissolution, banks tend to rescue them, thereby somewhat reducing the risk of a stock price crash (Zhang et al., 2023). Accordingly, the main issue in this research is whether the social costs of bankruptcy and government intervention significantly impact stock price crash risk.

2. Theoretical Foundations and Hypothesis Development

In the third millennium, a significant portion of accounting and finance research has focused on examining the determinants of stock price crash risk in companies (Chen et al., 2001; Hong & Stein, 2003; Huang & Wang, 2009). In these studies, stock price crash risk refers to the probability of a sudden large decline in a company's stock price. This group of studies has identified two main causes of stock price crashes. First, managers have various incentives to conceal bad news due to factors such as performance-based contracts and professional concerns (Kothari et al., 2009; Graham et al., 2005). If managers succeed in keeping bad news hidden for an extended period, negative information accumulates within the companies, leading to a negative inflation of stock prices. When this accumulated negative information reaches its peak, the likelihood of it being disclosed to external investors increases, resulting in a sudden transfer of this information that causes a significant drop in the company's stock price; in simpler terms, a stock price crash occurs (Kim et al., 2016; Kim Zhang, 2016). Second, due to agency conflicts, managers are incentivized to invest in projects with negative net present values for their benefits. This is because the presence of free cash flows raises shareholders' expectations for higher dividends; therefore, managers reduce this by investing in projects. In this context, managers have an incentive to conceal bad news related to these projects. Consequently, maintaining these poor-performing projects over time leads to an accumulation of weak performance. When this accumulated negative information reaches its peak, further concealment of this bad news becomes very costly, and thus all this news is suddenly communicated to the market; as a result, this factor causes a stock price crash (Habib & Huang, 2019).On the other hand, the financial bankruptcy of businesses is a recurring topic in financial literature, and the development of techniques and models for predicting financial bankruptcy risk is a priority for financial research. The significance of bankruptcy lies in the fact that its consequences and negative effects do not only affect the bankrupt trader or company but also harm third parties, creditors, and counterparties depending on the extent of the trader's or company's activities. Sometimes, if a company’s activities are extensive, it can lead to other bankruptcies and unemployment for their workers and employees, resulting in dire consequences for the country's economy (Hashemi Heydarpoor, 2021). When a company suffers from a capital shortage, there are two main financing options it can utilize: internal financing and external financing. Issuing equity and debt are two common types of external financing (Wu et al., 2022). According to the pecking order theory proposed by Myers, companies typically prioritize using debt financing to obtain a substantial amount of external financial resources (Yuan et al., 2022). However, debt financing

has drawbacks because the company incurs periodic cash costs (interest and fees), which can have dire consequences for the company and lead to a financial crisis or, worse, bankruptcy and dissolution (Babar & Habib, 2021). In this case, if the company is at risk of bankruptcy and dissolution due to a heavy debt burden, and this poses a political burden for the government, the government, and banks usually pay more attention to the company and rescue it. They tend to use "soft budget constraint policies" policies, such as lowering interest rates on bank loans or providing direct financial subsidies to companies to help save them from bankruptcy (Akyildirim et al., 2020). Wu et al. (2022) demonstrate that when a company has many employees and bears higher political and social responsibilities, the social costs of bankruptcy for that company will also be higher. This leads to increased government and bank assistance to the company, thereby reducing the risk of stock price crashes (Chen et al., 2021). Accordingly, the first hypothesis of this research is as follows:

Hypothesis 1: The higher the social costs of bankruptcy, the lower the risk of stock price crashes.

When a company operates in a competitive area where the level of marketization is higher, government intervention gradually decreases. The economic behaviors of local governments intervening in companies gradually diminish, reducing the "policy burden" that companies must bear (Wen et al., 2023). Furthermore, the extent of government intervention affects bank credit support (Huang & Fan, 2022). Therefore, if the level of government intervention is low, local government interference in banks' and other financial institutions' lending decisions is manageable. In this scenario, the optimal incentives for debt contract terms will be the only fundamental basis and assumption for banks to allocate credit funds (Bai & Ho, 2022). Thus, in places where the level of government intervention is low, although the social costs of bankruptcy are higher when an enterprise suffers from bankruptcy dissolution, the credit risk of corporate bonds issued by the company increases to a certain extent. The reduction in financial assistance from the government and banks leads the company to have insufficient motivation to repay its debts (Deng & Yu, 2021). Therefore, a decrease in government intervention reduces the close relationship between the government and enterprises, significantly lowering the social costs of bankruptcy for companies while steering enterprises away from the government and banks toward the market. As support from the government decreases, companies must rely on their ability to prevent and withstand market risk. Consequently, the social costs of bankruptcy will increase their impact on the risk of stock price crashes for companies (Gao et al., 2023). Accordingly, the second hypothesis of this research is as follows:

Hypothesis 2: The degree of impact of social costs of bankruptcy on the risk of stock price crashes for companies increases with low government intervention in the region.

3. Research Methodology

This research is classified as applied research based on its objectives and descriptive based on its methodology; it is also an empirical study in the field of financial accounting research. The statistical population of this study includes all companies listed on the Tehran Stock Exchange. The companies under review met the following criteria:

Table 1. Sample Selection Process

Total number of companies listed on the exchange at the end of the year 2022	**603**
Criteria:	
Number of companies that were inactive in the stock exchange during the period from 2013 to 2022	**(217)**
Number of companies accepted into the stock exchange after 2013	**(103)**
Number of companies that were not holding companies, investment firms, financial intermediaries, banks, or leasing companies	**(61)**
Number of companies whose fiscal year did not end on Esfand 29 or changed their fiscal year during the research period	**(56)**
Number of companies for which data was not available during the research period	**-**
Number of sample companies	**166**

In total, 166 companies (equivalent to 1660 firm-years) met the above criteria, and their data were collected, summarized, classified, and refined using Excel software. Ultimately, the data were analyzed using Eviews statistical software. Considering that the dependent variable in this research is dichotomous (zero and one), logistic regression was used to analyze the hypotheses.

Research Model, Variables, and Measurement Methods

To test the research hypotheses, the following models were utilized:

1) Model for testing Hypothesis One

$$\text{Risk}_{\text{it}=} \alpha_0 + \alpha_1 \text{Scost}_{\text{it}} + \alpha_2 \text{Lev}_{\text{it}} + \alpha_3 \text{Size}_{\text{it}} + \alpha_4 \text{Age} + \alpha_5 \text{Sgr}_{\text{it}} + \alpha_6 \text{Cfo}_{\text{it}} + \varepsilon_{\text{it}}$$

2) Model for testing Hypothesis Two

$$\text{Risk}_{\text{it}} = \alpha_0 + \alpha_1 \text{Scost}_{\text{it}} + \alpha_2 \text{Govi}_{\text{it}} + \alpha_3 \text{Scost}_{\text{it}} * \text{Govi}_{\text{it}} + \alpha_4 \text{Lev}_{\text{it}} + \alpha_5 \text{Size}_{\text{it}} + \alpha_6 Age + \alpha_7 \text{Sgr}_{\text{it}} + \alpha_8 Cfo_{\text{it}} + \varepsilon_{\text{it}}$$

Where:

• **Stock Price Crash Risk (Risk):** To measure the risk of stock price crashes, it is essential to consider the overall market situation since sharp declines in stock prices may result from a general market downturn. Therefore, the severe decline in a company's return should be interpreted in comparison to the market's performance. For this purpose, the specific return of the company is calculated using the following formula:

$$R_{i,t} = \beta_0 + \beta_1 R_{m,t-2} + \beta_2 R_{m,t-1} + \beta_3 R_{m,t} + \beta_4 R_{mt} + 1 + \beta_5 R_{m,t+2} + \varepsilon_{i,t}$$

In this equation, R_i represents the monthly return of the company, R□ represents the monthly return of the market, and **t** represents the months of the year. The residual of the above equation indicates the company's specific return relative to the market, which is adjusted to approach a normal distribution using the following formula:

$$W_{it} = Ln(1 + \varepsilon_{i,t})$$

In this equation, W_i□ represents the specific return of the company. According to this definition, assuming a normal distribution of specific returns, a crash period is defined as a period during which the company's specific return is 3.09 standard deviations below its mean specific return. According to Jia et al. (2024), if a company experiences a crash once a year, its value will be one (1), otherwise, it will be zero (0).

• **Social Costs of Bankruptcy (Scost):** In this research, following Jia et al. (2024), social costs of bankruptcy for companies are identified as the loss of benefits and costs incurred by society to assist employees when a company faces delayed dissolution in bankruptcy. The natural logarithm of the number of retired employees in a company is used as a variable for the social costs of bankruptcy.

• **Government Intervention (Govi):** In Jia et al. (2024), the value of "decreased government intervention in companies" is used to measure the extent of government intervention in regional companies. The lower this value, the higher the level of government intervention in regional companies. In this research, the percentage of government ownership is utilized, which is equal to the sum of shares held by governmental and quasi-governmental entities (any government-affiliated investments such as the Foundation of the Oppressed, Social Security Investment Organization, National Investment Company of Iran, etc.) relative to the total shares issued by the company (Rashidian et al., 2014).

Finally, following studies by Jia et al. (2024), Naeem & Chankaya (2022), Chen et al. (2021), and Foroughi Nasab et al. (2021), this research examines the following control variables, with their measurement methods provided below:

• Leverage (Lev): Total debt to total equity (Naeem & Chankaya, 2022).

• Firm Size (Size): Natural logarithm of the total assets of the company (Jia et al., 2024).

• Firm Age (Age): The time elapsed since the company entered the stock market until the current year (Jia et al., 2024).

• Sales Growth (Sgr): Current year's sales divided by last year's sales minus one (Chen et al., 2021).

• Operating Cash Flows (Cfo): The ratio of cash inflow or outflow to total assets (Foroughi Nasab et al., 2021).

4. Research Findings

Table 2 presents the central and dispersion indices including mean, standard deviation, minimum, and maximum for the research variables.

Table 2. Descriptive Statistics of Research Variables

Maximum	Minimum	Standard Deviation	Median	Mean	Observations	Variables	
1/000	0/000	0/499	1/000	0/514	1660	Risk	Stock Price Crash Risk
5/225	3/465	0/464	4/709	4/603	1660	Scost	Social Costs of Bankruptcy
0/999	0/091	0/187	0/168	0/242	1660	Govi	Government Intervention
21/572	10/532	1/735	14/734	15/053	1660	Size	Firm Size
1/565	0/031	0/211	0/536	0/540	1660	Lev	Financial Leverage
55/00	1/000	9/248	19/00	20/308	1660	Age	Firm Age
136/02	-0/537	3/651	0/333	0/621	1660	Sgr	Sales Growth
0/661	0/000	0/137	0/147	0/183	1660	Cfo	Operating Cash Flows

In this section, the average for each variable is first mentioned, indicating the average values obtained for each variable. For example, regarding stock price crash risk, the average is 0.514, suggesting that on average, 51% of the studied companies face a risk of stock price crashes. The standard deviation of the data is also an important statistic in descriptive statistics that indicates the degree of data dispersion. The level of dispersion can be interpreted based on the minimum and maximum values obtained for each variable. Based on the results obtained, it can be concluded that the data do not exhibit high dispersion, indicating a homogeneity among the data.
After presenting the descriptive statistics, the research hypotheses are tested statistically based on both models. Therefore, this section addresses the testing of the research hypotheses.In the first hypothesis, the impact of the social cost of bankruptcy on the risk of stock price collapse is examined. The findings from the test of this hypothesis are presented in Table (3).

Table 3. Results of Estimation for Hypothesis One

Risk of Stock Price Collapse					
Multicollinearity	Probability	T	Coefficient	Variable	
-----	0/7263	-0/350	-0/151	α	Intercept
1/005	0/0000	-6/784	-0/352	Scost	Social Cost of Bankruptcy
1/084	0/0342	2/298	0/124	Size	Company Size
1/245	0/0000	4/029	0/204	Lev	Financial Leverage
1/005	0/2206	1/225	0/004	Age	Company Age
1/336	0/1430	1/464	0/081	Sgr	Sales Growth
1/456	0/2349	-1/187	-0/023	Cfo	Operating Cash Flows
0/4039				McFadden's R^2	
18/864				LR Statistic	
0/000000				Significance of LR Statistic	

*- Source: Research Findings

Since none of the figures related to the variance inflation factor exceeds 10, it can be concluded that the independent variables in the research do not exhibit significant multicollinearity. Based on the results presented in Table (3), we first address the overall model fit. The probability value of the LR statistic for testing the significance of the overall model is 0.0000, which is less than the error level of 0.05. Therefore, it can be claimed that the first model of the research is significant, and at least one of the explanatory variables has a significant impact on the dependent variable (risk of stock price collapse). McFadden's R^2 value is 0.4039, indicating that approximately 40% of the behavior of the dependent variable is explained by the independent and control variables.

The probability value for the social cost of bankruptcy variable is 0.0000, which is less than the desired error level of 5%. Therefore, it can be claimed that the social cost of bankruptcy has a significant impact on the risk of stock price collapse. The obtained beta coefficient is -0.352, indicating that as the social cost of bankruptcy increases, the risk of stock price collapse decreases. Consequently, the first hypothesis of the research is confirmed.

In the second hypothesis, the role of government intervention on the impact of the social cost of bankruptcy on the risk of stock price collapse is examined. The findings from testing this hypothesis are presented in Table (4).

Table 4. Results of Estimation for Hypothesis Two

Risk of Stock Price Collapse					
Multicollinearity	**Probability**	**T**	**Coefficient**	**Variable**	
-----	0/0000	-11/084	-0/632	α	Intercept
2/648	0/0000	-6/422	-0/346	Scost	Social Cost of Bankruptcy
5/416	0/0007	-3/219	-0/125	Govi	Government Intervention
7/465	0/0000	-9/127	-0/484	Scost* Govi	Social Cost of Bankruptcy * Government Intervention
1/084	0/0351	2/278	0/124	Size	Company Size
1/247	0/0000	4/044	0/207	Lev	Financial Leverage
1/005	0/2238	1/216	0/004	Age	Company Age
1/340	0/1558	1/419	0/079	Sgr	Sales Growth
1/459	0/2323	-1/194	-0/025	Cfo	Operating Cash Flows
0/434				McFadden's R^2	
26/019				LR Statistic	
0/000000				Significance of LR Statistic	

*- Source: Research Findings

Since none of the figures related to the variance inflation factor exceeds 10, it can be concluded that the independent variables in the research do not exhibit significant multicollinearity. Based on the results presented in Table (4), we first address the overall model fit. The probability value of the LR statistic for testing the significance of the overall model is 0.0000, which is less than the error level of 0.05. Therefore, it can be claimed that this model is significant, and at least one of the explanatory variables has a significant impact on the dependent variable (risk of stock price collapse). The McFadden's R^2 value is 0.434, indicating that approximately 43% of the

behavior of the dependent variable is explained by the independent, moderating, and control variables.In the second hypothesis, the probability value for the social cost of bankruptcy * government intervention variable is 0.0000, which is less than the desired error level of 5%. Thus, government intervention moderates the effect of the social cost of bankruptcy on stock price collapse risk. The beta coefficient is -0.484, and considering the beta coefficient for the impact of the social cost of bankruptcy on stock price collapse risk in the first model, which is -0.352, it can be said that government intervention increases the negative impact of the social cost of bankruptcy on stock price collapse risk.

5. Conclusion and Recommendations

This paper selected companies listed on the Tehran Stock Exchange from 2013 to 2022 as a research sample to confirm the relationship between the social costs of bankruptcy and stock price collapse risk. The results indicated that as the social cost of bankruptcy for companies increases, the risk of stock price collapse decreases. The degree to which social costs of bankruptcy affect companies' stock price collapse risk increased with government intervention. It can be said that in situations where a majority of a company's shares are owned by the government or state-owned companies, the negative impact of the social costs of bankruptcy on companies' stock price collapse risk is greater.Based on the results obtained from this research, it is recommended that investors and market participants pay more attention to the social cost of corporate bankruptcy when estimating the risk of stock price declines. Additionally, it is advised that the Securities and Exchange Organization require companies to provide information on the social costs of bankruptcy. In line with the findings of Jia et al. (2024), they could mandate companies to clarify the exact number of retired employees and their family members, the number of current employees and their family members, as well as detailed information on corporate social responsibility costs.Furthermore, it is recommended that the Securities and Exchange Organization, having taken effective steps in this regard by preparing and formulating internal control guidelines, also consider the ownership structure of companies as a key factor in the requirements for company listings on the stock exchange. This would support shareholder rights, prevent violations, and organize and develop the securities market.

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ETHICAL CONSIDERATION

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CONFLICT OF INTEREST

Author/s confirmed no conflict of interest.