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Research Paper

Designing a Model to Predict Stock Price Crash Risk in the Tehran Stock Exchange[1]

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INTRODUCTION

This study aims to investigate how and to what extent stock price crash risk is affected by various factors and tries to design a model to predict this relationship in the Tehran Stock Exchange.

MATERIALS AND METHODS

Besides reviewing the literature on stock price crash risk, 12 experts were selected from the statistical population of the capital market for the qualitative part using the theoretical sampling method and the gradual selection rule. Once the data were collected by referencing documents and interviews, the target model was extracted by MAXQDA18 software. Systematic random sampling was used to select 100 companies from a statistical sample of listed companies on the Tehran Stock Exchange from 2009-2019 to test the research hypothesis. Then, a quantitative model derived through the qualitative method was tested as structural equations using the PLS software.

RESULTS AND DISCUSSION

Based on the qualitative part and the previous theories, financial variables, business strategies, managerial ability, and information asymmetry are internal factors influencing stock price crash risk, whereas macroeconomic variables, political relations, and social responsibility act as external factors.

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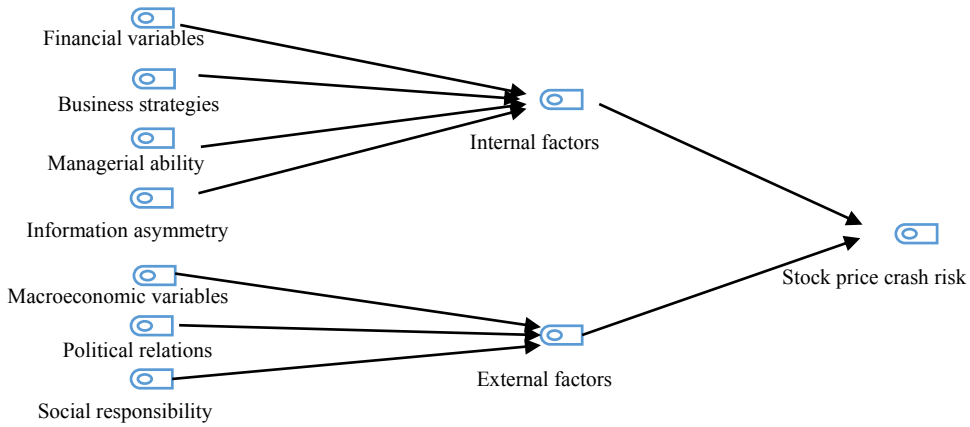

Figure 1. The final model of the qualitative part (Code Theory Model)

This study involved two steps in analyzing the data: (1) model fit with the PLS approach and (2) testing the direct effects hypotheses.

Model fit with PLS approach

External model fit (measurement model)

Reliability

Table 1 represents the relationship between each construct and its items, indicating that all items have a factor load above the threshold of 0.4. Based on factor loads, reliability is therefore confirmed.

Table 1. Factor loads

Latent construct	Observed variables	Factor load
Internal factors	Financial variables	0.700
	Business strategies	0.843
	Managerial ability	0.777
	Information asymmetry	0.682
External factors	Macroeconomic variables	0.797
	Political relations	0.758
	Social responsibility	0.863

Validity

In Table 2, the average variance extracted (AVE) for all constructs is greater than 0.5. Therefore, the external model (measurement) has acceptable reliability and validity.

Table 2. Evaluation of convergent validity through AVE index

Latent construct	AVE
Internal factors	0.568
External factors	0.652

Internal model fit (structural):

As shown in Table 3, these indicators are in the range of 0.1 and 0.3, showing that the structural model is also well fitted.

Table 3. Evaluation of internal model fit (structural)

Construct	R-square	f-Square	Q-Square
Stock price crash risk	0.249	-	0.201
External factors	-	0.163	-
Internal factors	-	0.035	-

Overall model fit

The GOF (Goodness of Fit) indicates that the model fits relatively well with a good fit since the value of this criterion is high, i.e., 0.273.

$$GOF=\sqrt{\overline{Communality} * \overline{R^2}} \qquad (1)$$

Table 4. Overall model fit

GOF	**0.273**

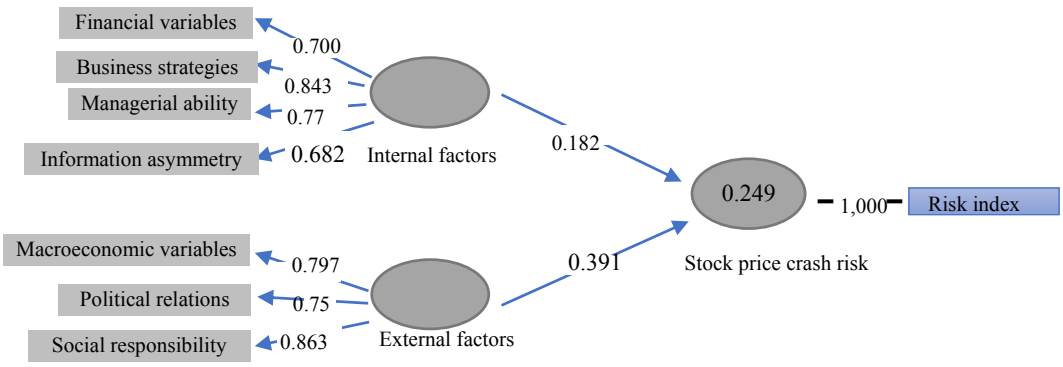

Figure 2. The final research model

Figure (2) presents the path diagram of the final model, which can be shown as the following equation.

$$Y(\text{Stock Price Crash Risk}) = 0.182\ x_1(\text{Internal Factors}) + 0.391\ x_2(\text{External Factors}) + \varepsilon_0 \qquad (2)$$

Hypotheses testing of direct effects

In the hypothesis test presented in Table 5, the null hypothesis is the absence of any significant relationship between the constructs. Therefore, acceptance or rejection of each test means accepting or rejecting the null hypothesis. Accordingly, both internal and external factors significantly affect stock price crash risk.

Table 5. Results of testing the direct effect hypotheses

Hypothesis	Path coefficient	Standard error	t statistic	Result
H1: External factors -> Stock price crash risk	0.391	0.087	4.514	The relationship is significant.
H 2: Internal factors -> Stock price crash risk	0.182	0.085	2.132	The relationship is significant.

CONCLUSION

Results of the qualitative part indicated that the model developed from qualitative interviews was consistent with previous theories, demonstrating its validity and reliability. The quantitative part showed that considering the significant effects of external and internal factors on stock price crash risk, the model was approved based on the extracted theoretical framework. Given the favorable model fitting criterion (GOF=0.273), the extracted model has significant predictive power. In addition, the value of factor loads (above 0.7) and their significance confirm the relationships between the theoretical concepts. Consequently, it is possible to achieve a model for predicting the stock price crash risk using a mixed (qualitative and quantitative) approach and providing a method to assess its fitness accuracy. Based on structural equation modeling, stock price crash risk is influenced by seven variables, including financial variables, business strategies, managerial ability, and information asymmetry as internal factors and macroeconomic variables, political relations, and social responsibility as external factors, derived from the qualitative part. The Securities and Exchange Organization of Iran is recommended to regard the implementation of the model developed by this study and assess the indicators affecting the stock price crash risk periodically using the reports provided by the companies. Investors are also suggested to forecast future stock price crashes by predicting each factor affecting the crash risk (internal and external factors) and by placing data.

Keywords: Qualitative-Quantitative Research Method, Stock, Stock Price, Stock Price Crash Risk.
JEL Classification: G10, G32, O16.