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Article

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BANKING & FINANCE | RESEARCH ARTICLE

Stock liquidity and stock price crash risk: Evidence from Vietnam

Ngoc Bao Dinh^{1*} and Hy Nguyen Song Tran¹

Abstract: This research examines whether stock liquidity affects the crash risk of stock price for companies listed on the Vietnamese stock market. Using a comprehensive dataset encompassing all stocks listed on the Ho Chi Minh Stock Exchange (HOSE) and the Hanoi Stock Exchange (HNX) from 2010 to 2022, we find that stock liquidity has a negative impact on stock price crash risk. Our findings are consistent with governance theory, which considers stock liquidity as a governance mechanism to discipline managers for hiding negative information, that could lead to stock price crashes. To the best of our knowledge, our paper is one of the initial studies to provide evidence regarding the impact of stock liquidity on stock price crash risk in the context of Vietnam. Thus, this study significantly contributes to the research literature on stock liquidity and crash risk in emerging markets. Furthermore, this research provides valuable insights for policymakers, authorities, managers, and investors, offering potential strategies for managing the crash risk of stock price.

Subjects: Economics; Finance; Business, Management and Accounting

Keywords: stock liquidity; stock price crash risk; governance mechanism; regression model

1. Introduction

Stock liquidity is considered an important mechanism for monitoring management, enabling the facilitation of good corporate governance either through trading (Edmans, 2009) or through the intervention of blockholders (Maug, 1998). Stock price crash risk refers to the possibility of a stock's price falling dramatically over a short period. Stock liquidity and stock price crash risk of financial market have attracted a lot of considerable attention of economists and researchers. However, there has been limited academic research in this domain so far. Most of the empirical research on how stock liquidity enhances good governance has predominantly taken place in developed countries. There is a lack of sufficient empirical findings regarding the impact of stock liquidity on enhancing stock market performance, particularly in emerging and developing countries, which differ from developed countries in several aspects.

The Vietnamese stock market is growing rapidly, attracting increasing interest from investors. However, this market is characterized by lower liquidity and efficiency, primarily driven by unsophisticated investors (Loc et al., 2010; Tran et al., 2018; Vo, 2016). Especially during volatile market periods, such as the recent COVID-19 epidemic, the risk of stock price crashes becomes a more critical concern. Therefore, investigating the impact of stock liquidity on the stock price crash risk of listed firms in the Vietnamese stock market is of utmost importance.

While several studies on stock price crash risk in Vietnam have been conducted, no previous studies regarding the impact of stock liquidity on stock price crash risk in Vietnam have been undertaken. Indeed, Vo (2018) investigated the relationship between foreign ownership and the crash risk in Vietnam and suggested that foreign investors have a positive relationship with stock price crash risk. In 2022, Cao et al. examined the impact of corporate social responsibility disclosure on the stock price crash risk in Vietnam from 2014 to 2018. These authors indicated that corporate social responsibility disclosure has a negative impact on stock price crash risk. Recently, Tran et al. (2023) analyzed how powerful CEOs influence the risk of stock price crash in Vietnamese family businesses and revealed that increased CEO ownership in family firms is associated with a reduction in the risk of stock price crashes.

Our paper distinguishes itself from previous studies by focusing on the impact of stock liquidity and on stock price crash risk in Vietnam. In this study, we hypothesize that if stock liquidity indeed facilitates effective monitoring, stocks with higher liquidity should exhibit a lower level of crash risk. This research is among the first to provide evidence concerning the effect of stock liquidity on stock price crash risk within the context of Vietnam. Thus, our study emphasizes the significant role played by stock liquidity in mitigating stock price crash risk in emerging markets. In particular, we investigate the relationship between stock liquidity and stock price crash risk in the Vietnamese stock market, which has emerged as one of the notably promising emerging markets over the past decade. Through a case study of Vietnam, this research aims to provide valuable insights to assist investors in evaluating and selecting effective stocks in emerging countries, with the ultimate goal of reducing crash risk and enhancing investment efficiency. Additionally, this study will contribute to improving transparency and fairness within Vietnam's stock market, thereby facilitating enhancements in market performance through government and regulatory agencies.

The paper is structured as follows: Section 2 presents the literature review and hypotheses. Section 3 describes our sample data and variable construction. Section 4 presents empirical evidence regarding the relationship between stock liquidity and stock price crash risk in the Vietnamese stock market. Finally, Section 5 concludes the paper.

2. Literature review

2.1. Stock price crash risk

According to theoretical studies, the causes of stock price crash risk include the behavior of managers, corporate governance characteristics, and disagreements among investors. Indeed, based on the framework of agency theory that Jin and Myers (2006) suggested, stock price crash risk arises due to information asymmetries between corporate insiders and external stakeholders (Hutton et al., 2009; Kothari et al., 2009; Kim et al., 2011a, 2011b). These studies, which investigate managers' opportunistic behavior, suggest that managers intentionally engage in bad news hoarding to mitigate the potential negative consequences that may arise from the disclosure of such information. When bad news hoarding reaches a tipping point, for example, when managers are no longer willing to conceal bad news, the disclosure of accumulated negative information may cause a stock price crash (Bleck & Liu, 2007; Jin & Myers, 2006).

On the other hand, studies focusing on heterogeneity in investor beliefs suggest that disagreements among investors are an underlying mechanism of stock price crash risk (Chen et al., 2001; Hong & Stein, 2003). An important assumption in Hong and Stein's (2003) model is that investors may be overconfident and tend to believe only the signals they receive themselves. This can result in disagreements among investors. In such cases, negative information about a company's fundamental value may not be fully disclosed to the market promptly. The risk of a stock market crash increases only when the investor who initially received a positive signal regarding the firm's fundamental value adjusts their beliefs in response to bad news, thereby revealing the previously hidden negative information from other investors to the public.

The study of stock price crash risk has attracted significant attention from finance experts and economists. In China, numerous studies have also been conducted to analyze the determinants of stock price crash risk. For instance, Dayong and Wenfeng (2019) examined the effect of margin trading on the crash risk of stocks listed in China from 2011 to 2017. They discovered that stocks with greater margin trading volatility are associated with increased future crash risk. This study revealed that margin-trading volatility leads to overpricing and reduced information content in stock prices, resulting in higher crash risk. In 2022, Khalil et al. investigated the impact of board social capital on stock price crash risk in China from 2004 to 2018. They indicated that internal board social capital increases future stock crashes, however, external board social capital reduces future crash risk. Furthermore, these authors found that institutional investors' monitoring amplifies the influence of external social capital on stock price crash risk.

Another empirical study related to stock price crash risk in China was conducted by Qiong et al. (2021) to examine whether gambling preferences explain the occurrence of stock price crashes. Their study suggested that local gambling preferences impact on the risk of stock price crash, with firms exhibiting stronger gambling preferences experiencing greater crash risk. More rigorous external monitoring and better internal monitoring were found to reduce crash risk. Recently, Jing (2022) examined the effect of a CEO's alumni relations on the risk of stock price crash during the CEO turnover of Chinese listed companies between 2010 and 2020. His work revealed that during CEO turnover, the benefits that CEOs have within alumni networks tend to slightly raise crash risk. Moreover, this research found that neither internal nor external corporate governance can effectively constrain the opportunistic behavior of CEOs as a whole. However, a sound legal framework can successfully prevent managerial opportunistic behavior.

2.2. Stock liquidity and stock price crash risk

The relationship between stock liquidity and stock price crash risk has been a topic of debate for several decades. Regarding the impact of stock liquidity on stock price crash risk, two conflicting theories have emerged: governance theory and short-termism theory. According to governance theory, stocks with high liquidity are expected to have lower stock price crash risk. In contrast, short-termism theory argues that stocks with high liquidity will experience higher stock price crash risk.

According to governance theory, an enhanced level of stock liquidity is believed to decrease the risk of stock price crashes since it enables shareholders to effectively monitor corporate governance (Datar et al., 1998; Kim & Zhang, 2016). More effective supervision by equity holders reduces the likelihood of bad news emerging due to inefficient investment decisions, resulting in a decreased crash risk. Companies with high liquidity often have a larger number of shareholders actively participating in corporate governance, which leads to better corporate governance and tighter control over governance mechanisms. This, in turn, helps reduce the risk associated with management actions and increases the ability to detect operational mistakes within the company early, ultimately supporting stock price stability. Furthermore, higher stock liquidity enhances the availability of publicly accessible information and transactions (Hong et al., 1999). As stock prices reflect more information, managers are less likely to accumulate bad news over time, thereby reducing the potential for a stock price crash.

Based on the governance theory, as proposed by Maug (1998) and Edmans (2009), increased stock liquidity may also reduce crash risk due to its facilitation of blockholders' monitoring of firm management. Effective blockholder monitoring reduces the likelihood of unfavorable news emerging, leading to a diminished risk of a stock price decline. According to Holden et al. (2014) and Holmstrom and Tirole (1993), an increase in stock liquidity has a positive impact on information creation and informed trading. As stock prices become more informative, managers should find it increasingly difficult to accumulate negative news over an extended period, thus reducing the risk of a stock price crash.

The second theory is the short-termism theory (Chang et al., 2017), defined as an excessive focus of investors on short-term financial results rather than the long-term goals and sustainability of the company. According to this theory, investment and management decisions by managers are influenced by the short-term demands of shareholders and the market. Managers tend to prioritize meeting short-term shareholder expectations over investing in research and development projects that yield long-term benefits for the company. When stock liquidity is high, investors often exhibit a preference for short-term strategies. If this trend persists over an extended period, it can result in a decline in the company's market value, reduced performance, and an increased risk of a stock price crash.

So far, several empirical studies have examined the impact of liquidity on stock price crash risk, yielding varying results. Chang et al. (2017), Zhang et al. (2018), and Alp et al. (2021) have found a positive correlation between stock liquidity and the risk of stock price crash. Based on the short-termism theory, these authors argue that liquidity increases the risk of stock price crashes because managers have a propensity to hoard and hide information. This can be attributed to the fact that high liquidity can cause investors to focus excessively on short-term information. Companies often tend to pursue business strategies geared towards achieving short-term profits, which may involve concealing information and inflating stock prices, ultimately leading to an increased risk of future stock price crashes. Indeed, Chang et al. (2017) examined the relationship between liquidity and stock price crash risk in the US market. Their results demonstrated that high stock liquidity increases the risk of stock crashes because liquidity encourages managers to withhold negative news. Similarly, utilizing the difference-in-differences (DID) method, Zhang et al. (2018) indicated that stock liquidity can give rise to hidden costs. Consequently, the high liquidity of shares can impose certain "hidden costs" that investors and stakeholders must bear, further elevating the risk of stock price crashes. Furthermore, Alp et al. (2021) also explored the impact of stock liquidity on the risk of stock price crashes, considering the role of foreign investors in this relationship. By employing corporate data from Borsa Istanbul spanning from 2009 to 2019, their study suggested that higher liquidity in the stock market is likely to increase the risk of stock price crashes

An alternative perspective that deserves consideration is that stock liquidity can have a negative impact on stock price crash risk. By directly influencing executive compensation, liquidity may exert a detrimental effect on crash risk. According to Jayaraman and Milbourn (2011), there is a connection between high stock liquidity and a substantial proportion of equity-based compensation, along with a heightened sensitivity to pay-for-performance (PPS). This aligns with earlier theoretical and empirical studies (e.g., Fang et al., 2009; Holmstrom & Tirole, 1993). When PPS relies more on stock prices in comparison to other performance metrics like earnings, managers are incentivized to conceal negative information to stabilize and boost stock prices. Furthermore, a study conducted by Chauhan et al. (2017) in India supports the governance theory. The study's results indicated a significant negative impact of stock liquidity on stock price crash risk. Essentially, this study examined how stock liquidity functions as a mechanism to discipline managers who withhold negative news. The high liquidity of a stock can reduce the risk of a stock price crash by disciplining managers through the threat of intervention and by increasing transparency through price information. In other words, liquidity mitigates the risk of a stock price crash by enhancing shareholders' ability to oversee managers and curbing the accumulation of negative news. High liquidity in stocks can also reduce the risk of a stock price crash by expediting the disclosure of public information, thus limiting the hoarding of adverse news. Moreover, high liquidity in the stock market promotes competition and equity among investors. Additionally, information about companies and stocks tends to be quickly reflected in stock prices, reducing the risk of vital information being concealed or not disclosed in a timely manner, thereby diminishing the risk of a stock price crash.

2.3. Hypothesis development

Previous studies on stock liquidity have proposed two relevant hypotheses concerning stock price crash risk: governance theory and short-termism theory. In accordance with governance theory,

increased stock liquidity promotes information generation and informed trading, enabling more effective monitoring by blockholders. This, in turn, reduces the likelihood of negative news and leads to a decreased risk of a stock price crash (Chauhan et al., 2017; Edmans, 2009; Holden et al., 2014; Holmstrom & Tirole, 1993; Maug, 1998).

On the other hand, the short-termism theory predicts that higher stock liquidity attracts investors focused on short-term financial results and may lead managers to engage in short-termist behavior, ultimately diminishing firm value and increasing the risk of a stock price crash (Alp et al., 2021; Chang et al., 2017; Zhang et al., 2018).

In what follows, we develop the hypothesis regarding the effects of stock liquidity on stock price crash risk based on previous studies. Determining which hypothesis is applicable in the context of Vietnam—an emerging market—is an important issue that requires empirical research. Among the previous studies, we adopt the research hypothesis proposed by Chauhan et al. (2017) due to the similarities between the Vietnamese and Indian stock markets. Chauhan et al. (2017) examined the role of stock liquidity as a governance mechanism for disciplining managers who withhold negative news and concluded that high stock liquidity reduces stock price crash risk in India. Several similarities exist between the Vietnamese and Indian stock markets. Both India and Vietnam are considered emerging markets with significant growth potential. According to World Bank data, India's annual GDP growth rate in 2022 was 7%, while Vietnam's GDP grew by 8% in the same year. Moreover, both markets are attracting increasing foreign investment, indicating promising growth potential in the future. However, the liquidity of both Vietnamese and Indian markets remains limited, especially for small-cap stocks. As a result, both countries are striving to enhance stock liquidity by improving the legal framework related to securities trading activities, particularly in terms of ownership and investor protection.

Given these similarities between the two emerging markets, Vietnam and India, we anticipate results similar to those found by Chauhan et al. (2017) regarding the impact of liquidity on stock price crash risk. Therefore, the hypothesis proposed in this study is as follows:

Stock liquidity decreases stock price crash risk in Vietnam.

3. Data and variables

3.1. Data

We obtained data on stock transactions, including stock price data and trading volume, as well as the audited accounting data from financial statements of listed companies on the Vietnamese stock market. The data was provided by FiinGroup, a leading Vietnamese financial technology company that specializes in collecting and providing information and data on the economy, financial market, and securities in Vietnam. The data is thoroughly screened to ensure validity and reliability. The sample includes all firms listed on Vietnamese stock exchanges, including the Ho Chi Minh Stock Exchange (HOSE) and Hanoi Stock Exchange (HNX), from the period spanning 2010 to 2022.

Following the approach of Muhammad et al. (2011), we excluded firms in the financial and services sectors. From the initial sample of 536 listed companies in Vietnam, we excluded observations that did not provide enough information to construct crash risk measures. Additionally, the sample was chosen exclusively based on non-missing observations of stock liquidity. To mitigate the impact of outliers, we winsorized all variables in the regression analyses at both the 5th and 95th percentiles. As a result, our final sample comprises approximately 2,400 firm-year observations from about 430 listed companies in Vietnam during the period spanning from 2010 to 2022. This sample is utilized to investigate the impact of stock liquidity on the risk of stock price crashes in the Vietnamese stock market.

3.2. Variable measurement

3.2.1. Measuring firm-level crash risk

In line with empirical studies by Chen et al. (2001), Xu et al. (2013), Chang et al. (2017), and Chauhan et al. (2017), this study employs the Negative Condition Skewness (NCSKEW) variable to measure stock price crash risk. The NCSKEW index is defined in as follows:

$$\text{NCSKEW}_{i,T} = - \frac{(n(n-1)^{\frac{3}{2}} \sum_{i,t} W_{i,t}^3)}{((n-1)(n-2) (\sum_{i,t} W_{i,t}^2)^{\frac{3}{2}})} \quad (1)$$

where $W_{i,t}$ represents the weekly return of stock i over period t . and n is the number of weekly stock return observations of the company i in year T . A higher value associated with a greater stock price crash risk, and vice versa.

3.2.2. Measuring stock liquidity

To measure liquidity, two explanatory variables namely ILLIQ (Illiquidity—The illiquidity of stocks) and TURN (Turnover—Stock turnover ratio) are used in this research. The illiquidity of stock is estimated based on the suggestion of Amihud (2002) as follows:

$$\text{ILLQ}_{i,T} = \frac{1}{D_{i,T}} * \sum_{d=1}^D \frac{|R_{i,d}|}{V_{i,d}} \quad (2)$$

In which, $D_{i,T}$ is the number of trading days of stock i in year T , $R_{i,d}$ is the cumulative daily return of stock i at day d in year T , $V_{i,d}$ is the trading value of stock i on day d in year T (VND). Higher liquidity is associated with lower ILLIQ, and vice versa. To address concerns regarding the difference in units of measurement between the numerator and denominator, we use the natural logarithm to calculate the ILLIQ value (Sivathaasan et al., 2016).

In addition, to enhance result accuracy, we use an additional explanatory variable to measure stock liquidity: the stock turnover ratio (TURN). This ratio indicates the total volume of shares of stock i traded in year T as a proportion of the total number of shares outstanding in that year. A high TURN value indicates high stock liquidity, while a low value indicates the opposite. The formula for calculating the stock turnover ratio ($\text{TURN}_{i,T}$) is as follows:

$$\text{TURN}_{i,T} = \frac{\text{Total trading volume after adjustment}_{i,T}}{\text{Total number of shares outstanding}_{i,T}} \quad (3)$$

3.2.3. Control variables

Considering the potential impact of firm-specific characteristics on stock price crash risk, we follow the approach of previous studies (Alp et al., 2021; Chang et al., 2017; Chen et al., 2001; Zhang et al., 2018) and include a set of control variables in our regression analysis. These variables consist of:

- (1) DTURN (Turnover Change)—The difference in firm-specific annual trading volume divided by the total number of shares outstanding.
- (2) STD (Volatility)—The standard deviation of idiosyncratic returns.
- (3) RET (Stock Return)—The cumulative annual firm-level stock return estimated using firm-specific daily returns.
- (4) PB (Price to Book)—Market value divided by book value of equity at the end of year T .
- (5) LEV (Financial Leverage)—Liabilities divided by equity annually.
- (6) SIZE (Firm Size)—The natural logarithm of the market value of equity at the end of year T , measured in VND.
- (7) ROA (Return on Assets)—Net income divided by total assets.

3.3. Research model

We examine the relationship between stock liquidity and stock price crash risk using estimation models, which are Pooled OLS and the dynamic system generalized method of moments approach (System GMM). The study conducts an analysis based on a panel data regression model designed as follows:

$$CRASHRISK_{i,T} = \alpha + \beta_1 Stockliq_{i,T-1} + \beta_n CONTROL_{i,T-1}^n + \theta_i + \delta_y + \varepsilon_{i,T} \quad (4)$$

where the variable $CRASHRISK_{i,T}$ represents the risk of stock price i crash at the year T and is measured by the $NCSKEW_{i,T}$ (Negative Condition Skewness). To measure the stock liquidity, the regression model uses two explanatory variables, $ILLIQ_{i,T-1}$ (stock illiquidity) and $TURN_{i,T-1}$ (stock turnover ratio). Control variables including $DTURN$, STD , RET , PB , LEV , $SIZE$ are indexed as $CONTROL_{i,T-1}$ for company i at year $T-1$. The error variable is denoted $\varepsilon_{i,T}$.

All variables in model (4) are measured annually, with independent variables included in regressions lagged by 1 year. Model (4) also includes industry fixed effects (θ_i) and year fixed effects (δ_y) to control for industry and time fixed effects. In addition, we estimate regressions using robust standard errors to address heteroskedasticity and cluster at the firm level (Petersen, 2009).

4. Empirical results

4.1. Descriptive statistics

Table 1 presents descriptive statistics for the stock price crash risk variable, stock liquidity measures, and control variables. We have reduced and winsorized the number of extreme observations at 95% and 5% levels to mitigate the effect of outliers in the sample.

As seen in Table 1, the mean value of $NCSKEW$ is -0.238 , and the median value of this variable is 0.240 . Since the mean is much smaller than the median, the value of the dependent variable $NCSKEW$ has a left-skewed distribution, with many values below the mean appearing in the distribution. The maximum value of $NCSKEW$ is recorded as 1.860 . This result is much higher than in previous studies, such as those of Chen et al. (2001) in the US market, Dai et al. (2019) in the China market, and Chauhan et al. (2017) in the Indian market. This indicates that stock price crash risk in Vietnam is more sensitive than in other countries, especially developed ones. The statistical findings show that while the greatest value for the variable $NCSKEW$ is recorded at a significantly higher level (1.860), 75% of observations have fairly low values (less than 0.840). This also suggests that stock price crashes in the Vietnamese stock market frequently occur abruptly and are followed by rapid falls. $ILLIQ$ and $TURN$ are the explanatory variables measuring

Variable	N	Mean	STD	Min	Percentile 25%	Median	Percentile 75%	Max
NCSKEW	5,119	- 0.238	0.779	-1.460	-0.340	0.240	0.840	1.860
ILLIQ	5,113	-21.270	2.646	-27.40	-23.220	-20.530	-19.240	-17.250
TURN	5,157	0.493	0.688	0.010	0.060	0.190	0.600	3.340
DTURN	5,121	0.019	0.329	-1.050	-0.070	0.000	0.070	1.370
STD	5,123	2.963	0.772	1.520	2.350	2.920	3.530	4.710
PB	5,151	1.061	0.684	0.230	0.560	0.880	1.360	3.380
RET	5,142	0.024	0.153	-0.280	-0.080	0.010	0.120	0.440
LEV	5,141	1.307	1.058	0.100	0.470	0.990	1.870	4.830
SIZE	5,124	26.174	1.351	23.600	25.130	25.960	27.150	29.370
ROA	5,133	0.057	0.049	-0.010	0.020	0.050	0.090	0.200

stock liquidity. ILLIQ has a mean value of -21.269 and a median value of -20.530. The mean ILLIQ is lower than the median, indicating that the data distribution is left-skewed. TURN has a value ranging from 0.010 to 3.340, with a mean value of 0.493 and a standard deviation of 0.688. This indicates that the degree of change in stock liquidity among different listed companies in Vietnam varies widely.

Table 2 displays the Pearson correlation coefficient matrix for the variables utilized in this study. Based on the Pearson correlation coefficient, our results initially imply that there is no multicollinearity among the independent variables in the regression model.

The degree of multicollinearity among the independent variables in the regression model was retested using the VIF method (Variance Inflation Factor). The results, as shown in Table 3, indicate that all the independent variables in the model have VIF values less than 2. These results confirm that there is no multicollinearity among the independent variables in the regression model.

4.2. Stock liquidity and stock price crash risk

Table 4 presents the results regarding the impact of liquidity on stock price crash risk, utilizing a sample encompassing all listed companies on the Ho Chi Minh Stock Exchange and the Hanoi Stock Exchange for the period spanning from 2010 to 2022. Model (4) incorporates all independent variables with lagged values. Industry-fixed and year-fixed effects are controlled for, and robust standard errors are employed to address heteroskedasticity, with clustering conducted at the firm level.

As presented in Table 4, the regression results in column (1) indicate that the coefficient for the illiquidity variable (ILLIQ) is 0.05 (t-stat = 7.08), consistently positive, and significant at the 1% level. This indicates that stock price crash risk and stock liquidity are negatively correlated. The coefficient estimates on TURN in column (2) also confirm this negative relationship, with a coefficient of -0.11, and significance at the 1% level (t-stat = -3.88). This implies that our results remain consistent when employing an alternative measure of stock liquidity. Furthermore, the economic significance of these results is notable. To illustrate, a one-standard-deviation increase in stock liquidity measured by stock illiquidity (ILLIQ), which is 2.646, leads to a decrease of

Table 2. Correlation matrix

Variable	NCSKEW	ILLIQ	TURN	DTURN	STD	RET	P_B	LEV	SIZE	ROA
NCSKEW	1.000									
ILLIQ	-0.007 0.633	1.000								
TURN	0.003 0.834	-0.528 0.000	1.000							
DTURN	0.200 0.000	-0.160 0.000	0.345 0.000	1.000						
STD	-0.071 0.000	0.306 0.000	0.031 0.031	0.048 0.001	1.000					
P_B	0.074 0.000	-0.086 0.000	-0.095 0.000	0.014 0.327	-0.154 0.000	1.000				
RET	-0.606 0.000	0.056 0.000	-0.019 0.205	-0.267 0.000	0.150 0.000	-0.107 0.000	1.000			
LEV	-0.018 0.231	0.048 0.001	0.039 0.008	0.016 0.272	0.096 0.000	-0.107 0.000	0.042 0.004	1.000		
SIZE	0.066 0.000	-0.430 0.000	0.116 0.000	0.069 0.000	-0.307 0.000	0.412 0.000	-0.075 0.000	-0.057 0.000	1.000	
ROA	0.108 0.000	-0.097 0.000	-0.061 0.000	0.022 0.144	-0.211 0.000	0.310 0.000	-0.166 0.000	-0.394 0.000	0.184 0.000	1.000

Table 3. Results of testing for multicollinearity by VIF

Variable	VIF	1/VIF	Variable	VIF	1/VIF
TURN	1.18	0.8453	ILLIQ	1.50	0.6655
DTURN	1.27	0.7849	DTURN	1.20	0.8362
STD	1.25	0.7975	STD	1.34	0.7470
P_B	1.40	0.7123	P_B	1.42	0.7038
RET	1.19	0.8414	RET	1.18	0.8444
LEV	1.24	0.8080	LEV	1.24	0.8039
SIZE	1.49	0.6694	SIZE	1.70	0.5868
ROA	1.43	0.6970	ROA	1.43	0.6988

approximately 13.23 percentage points ($= 2.646 \times 0.05$) in stock price crash risk (NCSKEW). Similarly, a one-standard-deviation increase in stock liquidity measured by stock turnover ratio (TURN), which is 0.688, results in a decrease of approximately 7.57 percentage points ($= 0.688 * (-0.11)$) in stock price crash risk (NCSKEW). These results provide further support for a negative and statistically significant correlation between stock liquidity and crash risk.

Regarding the control variables, most coefficients on these variables are statistically significant, aligning with previous studies (Chauhan et al., 2017; Chen et al., 2001). The results indicate that crash risk is positively correlated with stock returns (RET), price to book (PB), financial leverage (LEV), firm size (SIZE), and firm performance (ROA). However, crash risk is negatively associated with firm volatility (STD).

Table 4. Regression results

Variable	NCSKEW _T (1)	NCSKEW _T (2)
ILLIQ	0.05*** (7.08)	
TURN		-0.11*** (-3.88)
DTURN	-0.02 (-0.28)	-0.05 (-0.84)
STD	-0.11*** (-4.48)	-0.07*** (-3.10)
P_B	0.04* (1.67)	0.08*** (2.96)
RET	0.37*** (2.97)	0.37*** (2.99)
LEV	0.05*** (3.15)	0.04** (2.37)
SIZE	0.08*** (5.13)	0.03* (1.78)
ROA	1.04*** (2.79)	0.61 (1.64)
Year Fixed Effect	Yes	Yes
Industry Fixed Effect	Yes	Yes
N	2,359	2,396
R-Squared	0.20	0.19

**** and * represent significance at the 1%, 5% and 10%.

Values in parentheses show t-statistics.

The regression models' results offer evidence of a significantly negative relationship between stock liquidity and crash risk, with significance at the 1% level. In essence, this large-scale analysis of companies listed on the Vietnamese stock market supports the conclusion that highly liquid stocks exhibit lower crash risk. These results align with previous research (Chauhan et al., 2017; Fang et al., 2009; Holmstrom & Tirole, 1993; Jayaraman & Milbourn, 2011). Consequently, our findings substantiate the hypothesis proposed in this study: *Stock liquidity decreases stock price crash risk in Vietnam.*

Our study has investigated the relationship between stock liquidity and stock price crash risk in the context of Vietnam's emerging financial market. Our results are consistent with the governance theory, which regards stock liquidity as a governance mechanism for disciplining managers in terms of crash risk. According to governance theory, as suggested by Maug (1998) and Edmans (2009), higher stock liquidity reduces crash risk by facilitating blockholders' monitoring of firm management. If stock liquidity primarily affects crash risk through the blockholder channel, the relationship between stock liquidity and crash risk should be more pronounced as blockholder ownership increases. Previous research indicates that enterprises with higher level of institutional ownership have greater stock liquidity (Fehle, 2004; Jennings et al., 2002). Indeed, institutional ownership, by enhancing corporate governance in the companies they hold, may improve investor protection and firm transparency. Because of their substantial ownership, institutional investors have inherent motivations to diligently monitor corporate management and mitigate agency conflicts (Aggarwal et al., 2011; Boone & White, 2015). In addition, according to Kim et al. 2011a, 2011b; Kothari et al. (2009),

Table 5. Regression results with GMM model

Variable	NCSKEW _T (1)	NCSKEW _T (2)
NCSKEW _{T-1}	0.13*** (2.85)	0.14*** (3.13)
ILLIQ _{T-1}	0.05*** (5.42)	
TURN _{T-1}		-0.10*** (-3.51)
DTURN _{T-1}	0.003 (0.05)	0.004 (0.07)
STD _{T-1}	-0.1*** (-2.86)	-0.08** (-2.48)
P _B _{T-1}	0.07** (2.00)	0.1*** (2.64)
RET _{T-1}	1.54*** (7.02)	1.53*** (7.12)
LEV _{T-1}	0.07*** (3.20)	0.05** (2.51)
SIZE _{T-1}	0.06*** (2.61)	0.01 (0.45)
ROA _{T-1}	2.18** (2.51)	1.17 (1.36)
Year Fixed Effect	Yes	Yes
Industry Fixed Effect	Yes	Yes
AR (1)	0.000	0.000
AR (2)	0.056	0.053
N	2,175	2,226

**** and * represent significance at the 1%, 5% and 10%.

Values in parentheses show t-statistics

asymmetric information between insiders and external stakeholders is a determinant of stock price crash risk.

In the context of Vietnam’s emerging financial market, the impact of stock liquidity on stock price crash risk may indeed occur through the blockholder channel. Monitoring by blockholders diminishes the likelihood of negative news, thereby decreasing stock price crash risk. Our results are in good agreement with the assumption that an increase in stock liquidity reduces crash risk, and the impact of liquidity on crashes can occur by way of blockholder mechanism. Therefore, firms with higher institutional ownership would improve stock liquidity and reduce crash risk.

4.3. Robustness checks

We carry out a number of robustness tests to enhance the confidence in our results reported in the OLS regression model. Endogeneity in the relationship between analyst stock liquidity and stock price crash risk may arise when crash risk persists over time, and stock liquidity and crash risk face simultaneity issues, potentially creating ambiguity in causality. To address this concern, we include the 1-year lagged NCSKEW as a control variable in Eq.(4). The regression model is estimated by the dynamic system generalized method of moments approach (SGMM). The findings of the regression based on SGMM are displayed in Table 5.

As shown in Columns (1) and (2) of Table 5, the findings remain consistent with those in the primary analysis reported in Table 4. The estimated coefficients are 0.05 (t-stat = -5.65) for the ILLIQ variable and -0.12 (t-stat = -4.16) for the TURN variable, respectively.

In summary, Table 5 demonstrates that the results of the GMM regression model align with those of the main OLS regression model. The coefficients of the explanatory variables are all statistically significant, indicating a negative correlation between stock liquidity and crash risk.

Table 6. Regression results with sample excluding the period of COVID-19 epidemic

Variable	NCSKEW _T (1)	NCSKEW _T (2)
ILLIQ _{T-1}	0.03*** (3.18)	
TURN _{T-1}		0.03 (0.77)
DTURN _{T-1}	0.03 (0.43)	-0.01 (-0.17)
STD _{T-1}	-0.1*** (-3.18)	-0.06** (-2.16)
P_B _{T-1}	0.05 (1.44)	0.07** (2.25)
RET _{T-1}	0.33** (2.09)	0.36** (2.21)
LEV _{T-1}	0.04** (2.05)	0.03* (1.76)
SIZE _{T-1}	0.07*** (3.87)	0.04** (2.35)
ROA _{T-1}	0.9** (2.02)	0.85* (1.93)
Year Fixed Effect	Yes	Yes
Industry Fixed Effect	Yes	Yes
N	1,621	1,642
R-Squared	0.19	0.16

**** and * represent significance at the 1%, 5% and 10%.

Values in parentheses show t-statistics

In addition, we consider the potential influence of the COVID-19 epidemic on the correlation between stock liquidity and crash risk among listed firms in the Vietnamese stock market. Consequently, we select a sample that does not include the COVID-19 epidemic (2020 – 2022) in order to estimate Model (4).

After re-estimating the regression models using a sample that excludes the period affected by the COVID-19 epidemic, the results remain consistent with those of the OLS and GMM regression models. Indeed, as presented in Table 6, in the group of explanatory variables, the coefficient for the variable representing stock liquidity (ILLIQ) remains positive and statistically significant at the 1% level, indicating a negative impact of stock liquidity on stock price crash risk. Furthermore, the coefficient for the other variable measuring stock liquidity (TURN) consistently appears negative and statistically significant at the 1% level, suggesting a negative effect of stock liquidity on crash risk. Therefore, the crisis caused by the COVID-19 epidemic does not seem to have a significant impact on the correlation between stock liquidity and crash risk.

These robustness checks confirm the reliability of our findings and reduce the likelihood that they are influenced by omitted correlated variables or other endogeneity issues. These findings suggest that stock liquidity contributes to improved corporate governance, subsequently reducing stock price crash risk.

5. Conclusion

In this study, we have investigated the impact of stock liquidity on the stock price crash risk of listed companies in the Vietnamese stock market from 2010 to 2022. The results show that stock price crash risk has a negative relationship with stock liquidity. This means that highly liquid stocks have a lower crash risk. High liquidity is a significant factor in mitigating crash risk, leading to higher firm investment and improving firm performance. This conclusion is also supported by governance theory, which considers stock liquidity as a governance mechanism to manage stock price crash risk. Our results remain robust with two measures of stock liquidity, analyses with different samples, and different methods to control for endogeneity problems.

Our findings can be considered as useful indicators for the board of directors and financial managers in deciding on appropriate corporate governance mechanisms to improve firm performance and also useful for investors in making investment decisions. This study will enhance current understanding of the impact of stock liquidity on crash risk in emerging markets, enabling managers to determine governance mechanisms that improve stock liquidity and reduce crash risk. Managers should establish a comprehensive liquidity monitoring and early warning mechanism. They should also create more efficient systems for monitoring and incentive mechanisms. As supervisors, it is important to regularly monitor the operation of key liquidity indicators. If necessary, moderate interventions in market liquidity can be carried out through administrative mechanisms. This research will also offer valuable insights to assist investors in evaluating and selecting effective stocks in emerging countries, with the goal of reducing the risk of stock price crashes and enhancing investment efficiency. Recognizing stock liquidity as a crucial predictor of extreme return outcomes could have valuable implications for risk management. Consequently, investment decisions should favor companies with greater liquidity or substantial institutional ownership.

Our paper contributes to the existing literature that examines the determinants of stock price crash risk. Academics and policymakers are increasingly concerned about the potential for stock liquidity to instigate volatility in financial markets (e.g., O'Hara, 2004). The results of our study provide empirical evidence that stock liquidity reduces the risk of stock price crashes, thereby stabilizing the capital market. Policymakers and authorities should formulate strategies to boost liquidity and attract institutional investors. Consequently, this study will also contribute to enhancing transparency and fairness in Vietnam's stock market, thereby improving the overall performance of the financial market.

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