Stock price crash risk, liquidity and institutional blockholders: evidence from Vietnam

Hang Thu Nguyen and Hao Thi Nhu Nguyen
Foreign Trade University, Ho Chi Minh City Campus, Ho Chi Minh City, Vietnam

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Abstract

Purpose – This study examines the influence of stock liquidity on stock price crash risk and the moderating role of institutional blockholders in Vietnam's stock market.

Design/methodology/approach – Crash risk is measured by the negative coefficient of skewness of firm-specific weekly returns (NCSKEW) and the down-to-up volatility of firm-specific weekly stock returns (DUVOL). Liquidity is measured by adjusted Amihud illiquidity. The two-stage least squares method is used to address endogeneity issues.

Findings – Using firm-level data from Vietnam, we find that crash risk increases with stock liquidity. The relationship is stronger in firms owned by institutional blockholders. Moreover, intensive selling by institutional blockholders in the future will positively moderate the relationship between liquidity and crash risk.

Practical implications – Since stock liquidity could exacerbate crash risk through institutional blockholder trading, firm managers should avoid bad news accumulation and practice timely information disclosures. Investors should be mindful of the risk associated with liquidity and blockholder trading.

Originality/value – We contribute to the literature by showing that the activities of blockholders could partly explain the relationship between liquidity and crash risk. High liquidity encourages blockholders to exit upon receiving private bad news.

Keywords Stock liquidity, Crash risk, Institutional ownership, Blockholder, Vietnam

Paper type Research paper

1. Introduction

A crash happens when a stock's return suddenly declines to extreme-negative values (Jin and Myers, 2006). Past studies have attributed this phenomenon to bad news hoarding and market responses when the bad news is disclosed (Kothari *et al.*, 2009; Chang *et al.*, 2017).

This paper investigates the effect of stock liquidity on future crash risk. We are motivated by the inconsistencies in prior literature. On the one hand, governance theory contends that liquidity alleviates crash risk (Maug, 1998; Chang *et al.*, 2017; Chauhan *et al.*, 2017). This is because liquidity allows institutional investors to purchase or sell large stakes more easily and at lower costs (Maug, 1998), strengthening institutional investors' monitoring through voice and exit (Edmans *et al.*, 2013) and preventing managers from hoarding bad news.

On the other hand, stock liquidity could magnify stock price crash risk. Based on short-termism theory, high liquidity makes it easier for short-term-oriented institutional investors

JEL Classification — G12, G14, G23, G34

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to enter and exit with low costs (Porter, 1992; Fang *et al.*, 2014; Chang *et al.*, 2017). In order to attract these transient institutions, managers tend to inflate short-term earnings or conceal short-term bad news (Bushee, 2001; Alp *et al.*, 2022). When the bad news is released, large selling by these transient institutional investors could lead to stock price crashes (Chang *et al.*, 2017). Similarly, governance theory also posits that, as liquidity facilitates blockholders' trading on their private information, stock prices could decline sharply when they sell aggressively (Edmans and Manso, 2011).

Vietnam's stock market provides an interesting transition emerging market context to examine the relationship between stock liquidity and crash risk. Its institutional framework, considered an essential determinant of stock price crash risk (Vo, 2020), is weak [1]. Additionally, retail investors dominate the market with over 90% of trading volume [2]. These unsophisticated investors exhibit herding behavior by following institutional investors' trading (Nguyen *et al.*, 2016; Bui and Nguyen, 2019). This could make extreme stock price movements more common. These make research on the relationship between institutional investors, liquidity and stock price crash risk all the more important.

Using firm-level data during an 11-year period, we find that stock price crash risk is positively associated with stock liquidity. The positive relationship is stronger in firms with ownership by institutional blockholders, especially foreign ones. Furthermore, the relationship is more pronounced when the institutional blockholders intensively sell the shares in the future.

We add to the existing literature in several ways. First, different from Chauhan *et al.* (2017) and Dinh and Tran (2023), we find that stock liquidity exacerbates crash risk, and this relation is stronger in firms with institutional ownership. Second, unlike Chang *et al.* (2017) and Alp *et al.* (2022), our findings suggest that blockholders' activities could explain the positive relationship between liquidity and crash risk. Chang *et al.* (2017) report that stock liquidity discourages blockholders from selling upon the revealed bad news. However, we show that the positive relationship between liquidity and crash risk is stronger when blockholders sell their shares intensively in the future. Put differently, high stock liquidity facilitates institutional blockholders' entry and exit. When they obtain private bad news, they sell the shares aggressively, causing crashes. Our finding is in line with institutional investors' short-termism and trading based on private information (Porter, 1992; Yan and Zhang, 2009; Admati and Pfleiderer, 2009).

2. Literature review

A crash is an unusually large and negative stock price movement (Jin and Myers, 2006; Hong and Stein, 2003). Past studies have indicated that bad news hoarding by managers and market responses to the subsequent release of the bad news are the main reasons for stock prices to crash (Kothari *et al.*, 2009; Chang *et al.*, 2017; Jin and Myers, 2006). Jin and Myers (2006) argue that managers' benefits are linked to stock prices. A short-term benefit induces them to hoard unfavorable news to avoid stock price declines. However, when a large amount of bad news is piled up and reaches a tipping point at which it is all released at once, a significant decline in stock price will be triggered (Chang *et al.*, 2017; Callen and Fang, 2015).

Previous studies have investigated the determinants of stock price crash risk. Habib *et al.* (2018) classify these factors into five groups: (1) financial and non-financial information disclosures, (2) managers' incentives and characteristics, (3) transactions in the capital market, (4) corporate governance and (5) informal institutional mechanisms. How these factors are related to stock price crashes in Vietnam's stock market has recently attracted much research interest. For example, Vo (2020), Dang and Nguyen (2021) and Thai *et al.* (2023) investigate the association between corporate governance mechanisms and crash risk, Cao

et al. (2023) examine the effects of information disclosures and Dinh and Tran (2023) study the impact of capital market transactions. Among these, stock liquidity has attracted particular attention. Prior literature provided competing evidence on this issue.

On the one hand, according to governance theory, liquidity could reduce crash risk. Maug (1998) indicates that high stock liquidity enables institutional investors to purchase large stakes quickly and affordably. As they become large owners, institutional investors have incentives to monitor the invested firms through their voice and thus improve corporate governance (Edmans *et al.*, 2013; Edmans, 2014; Bainbridge, 2005). Strong monitoring and possible intervention by institutional investors could limit managers' bad-news hoarding activities (An and Zhang, 2013).

Furthermore, since the managers' compensation is often tied to stock prices, the threat of exit by these large shareholders could discipline managers, as it negatively affects stock prices, ruining the managers' reputation and wealth (Admati and Pfleiderer, 2009; Edmans *et al.*, 2013; Edmans, 2014). Higher liquidity strengthens the threat of exit, allowing large shareholders to trade quickly at low costs. As a result, the intensity of bad news hoarding decreases with liquidity.

In line with these arguments, Chauhan *et al.* (2017) empirically find that stock liquidity mitigates crash risk, which is stronger in firms with larger ownership of blockholders. Similarly, Dinh and Tran (2023) show that stock liquidity reduces crash risk in Vietnam's stock market.

We suggest the following hypotheses:

H1a. Stock liquidity reduces stock price crash risk.

H2a. The negative effect of stock liquidity on stock price crash risk is more pronounced in firms with institutional ownership.

On the other hand, according to short-termism theory, liquidity aggravates stock price crash risk (Chang *et al.*, 2017). This is due to transient institutional investors pursuing short-term price appreciation (Porter, 1992). These investors do not spend their resources on monitoring their portfolio firms, thus making bad news hoarding more likely. Liquid stocks attract more transient institutions as they can acquire a stake at low costs (Porter, 1992; Fang *et al.*, 2014; Chang *et al.*, 2017). When bad news is revealed, these investors tend to sell aggressively (Admati and Pfleiderer, 2009), intensifying market responses to the bad news and leading to crashes (Chang *et al.*, 2017; Zhang *et al.*, 2018).

Consistent with the above arguments, Chang *et al.* (2017), Zhang *et al.* (2018) and Alp *et al.* (2022) find that stock liquidity increases crash risk. Moreover, Chang *et al.* (2017) report that this linkage is greater for firms with a higher fraction of transient institutional ownership but not for firms with higher blockholder ownership. Alp *et al.* (2022) also show that the relationship is not influenced by block ownership but by foreign institutional ownership. These findings indicate that short-term-oriented institutions play an important role in the positive relationship between liquidity and crash risk.

We propose the following hypotheses:

H1b. Stock liquidity increases stock price crash risk.

H2b. The positive effect of stock liquidity on stock price crash risk is more pronounced in firms with institutional ownership.

3. Research methodology

Following past studies such as Chang *et al.* (2017), Chen *et al.* (2001), Hutton *et al.* (2009) and Kim *et al.* (2011b), we use the following model to test our hypotheses.

$$Crash\,Risk_{i,t+1} = \alpha_0 + \alpha_1 LIQ_{i,t} + \sum_{j=1}^{k} \beta_j Control_{ji,t} + \varepsilon_{i,t} \quad (1)$$

where the subscripts i and t denote firm i in year t.

3.1 Dependent variable – crash risk

Following prior studies such as Chen *et al.* (2001), Hutton *et al.* (2009) and Kim *et al.* (2011b), we use two measures of stock price crash risk: (1) the negative coefficient of skewness of firm-specific weekly returns (NCSKEW) and (2) the down-to-up the volatility of firm-specific weekly stock returns (DUVOL). The firm-specific weekly return is estimated as the residuals from the market model, as in Equation (2).

$$R_{i,j} = \alpha_i + \beta_1 R_{m,j-2} + \beta_2 R_{m,j-1} + \beta_3 R_{m,j} + \beta_4 R_{m,j+1} + \beta_5 R_{m,j+2} + \varepsilon_{i,j} \quad (2)$$

In this model, $R_{i,j}$ is the return on stock i in week j and $R_{m,j}$ is the market return based on the VN-Index in week j. Weekly returns are calculated based on the Wednesday-to-Wednesday adjusted closing prices to avoid the weekend effect. The lead and lag terms of market return are added to control for a non-trading phenomenon (Dimson, 1979). This regression requires at least 26 observations. As the residuals $\varepsilon_{i,j}$ are highly skewed, we use their natural logarithm transformation in Equation (3) following Hutton *et al.* (2009).

$$W_{i,j} = \ln(1 + \varepsilon_{i,j}) \quad (3)$$

The NCSKEW for a given year t is computed as the negative of the third moment of firm-specific weekly returns, as in Equation (4).

$$NCSKEW_{i,t} = -\frac{n(n-1)^{3/2}\sum W_{i,j}^3}{(n-1)(n-2)\left(\sum W_{i,j}^2\right)^{3/2}} \quad (4)$$

where n indicates the number of stock return observations in year t.

The DUVOL measures the fluctuation of weekly returns relative to the mean and is calculated using Equation (5).

$$\mathrm{DUVOL}_{i,t} = ln\frac{(n_u - 1)\sum_{Down} W_{i,j}^2}{(n_d - 1)\sum_{Up} W_{i,j}^2} \quad (5)$$

For each firm i over a fiscal year t, firm-specific weekly returns are classified into two groups: "Down" weeks when the returns are lower than the annual mean and "Up" weeks when the returns are above the annual mean. The standard deviation of firm-specific weekly returns is calculated separately for each group. n_u and n_d are the number of weeks in the Down and Up groups, respectively (Chen *et al.*, 2001).

3.2 Independent variable – stock liquidity (LIQ)

Liquidity is "the ability to trade a significant quantity of a security at a low cost in a short time" (Holden *et al.*, 2014). Amihud (2002) proposes an illiquidity measure calculated as the ratio of the absolute value of daily stock return to trading volume. However, to ensure the validity of this Amihud ratio, the stock must have non-zero trading volume most of the time (Kang and Zhang, 2014). In Vietnam's stock market, non-trading days happen frequently.

Therefore, we use the adjusted Amihud illiquidity measure proposed by Kang and Zhang (2014) as in Equation (6).

$$ADJILLIQ_{i,m} = \left[ln\left(\frac{1}{D_{i,m}} \sum_{d=1}^{D} \frac{|R_{i,d}|}{Vol_{i,d}} \right) \right] \times (1 + Zero\,Vol_{i,m}) \quad (6)$$

where $ADJILLIQ_{i,m}$ is the adjusted Amihud illiquidity of stock i in month m, $R_{i,d}$ and $Vol_{i,d}$ are daily stock return and trading volume on day d of month m, $D_{i,m}$ denotes the number of trading days in month m, $ZeroVol_{i,m}$ is the percentage of zero volume days within month m. The natural logarithm is used to control for extreme values (Kang and Zhang, 2014).

The adjusted Amihud illiquidity of stock i in year t ($ADJILLIQ_{i,t}$) is calculated as the average monthly adjusted Amihud illiquidity ($ADJILLIQ_{i,m}$) with a minimum of four months in that year. $LIQ_{i,t}$ is $ADJILLIQ_{i,t}$ multiplied by (−1).

3.3 Control variables

Following previous studies such as Chen *et al.* (2001), Kim *et al.* (2011a) and Callen and Fang (2013), we used the following control variables: NCSKEW, SIZE, LEV, ROA, BTM, SIGMA, DTURN, ABACC and RET. These control variables are all measured in year t.

NCSKEW is the negative skewness of firm-specific weekly return, which controls for the persistence of return skewness (Callen and Fang, 2013; Chen *et al.*, 2001). Chen *et al.* (2001) documented that high return skewness in a year tended to be followed by high return skewness in the subsequent year.

SIZE is the natural logarithm of a firm's total assets at the fiscal year-end. Kim *et al.* (2011a) and Callen and Fang (2013) report that stock price crash risk is higher in large firms, but Vo (2020) and Chauhan *et al.* (2017) find the opposite results in Vietnam and Indian stock markets, respectively. Chauhan *et al.* (2017) argue that managers in large companies are less likely to hide bad news because of stricter penalties by the regulators if they break the law.

LEV is total liabilities divided by total assets. Firms with high leverage are more scrutinized by creditors and less likely to hide bad news (Callen and Fang, 2013), thus having a lower probability of stock price crashes (Hutton *et al.*, 2009; Callen and Fang, 2013, 2015).

ROA is net income deflated by total assets. Managers of better-performing firms are less likely to hoard bad news (Hutton *et al.*, 2009). Prior literature reports that firms with better performance have a lower stock price crash risk (Hutton *et al.*, 2009; Kim *et al.*, 2011a, b). However, Kim and Zhang (2016) and Wen *et al.* (2019) indicate a positive association between firm performance and crash risk.

BTM is the book-to-market ratio measuring firm growth. Callen and Fang (2015) document that growth stocks have a higher likelihood of price crash risk.

SIGMA is the standard deviation of firm-specific weekly returns in a fiscal year (Zhang *et al.*, 2018). Volatile stocks are more likely to experience stock price crashes (Chen *et al.*, 2001).

DTURN is the detrended stock trading volume, measuring heterogeneity in investors' opinions (Kim *et al.*, 2011a; Chen *et al.*, 2001). DTURN is a year's average monthly share turnover minus the average monthly share turnover of the previous year. The monthly share turnover is the monthly trading volume deflated by the total number of outstanding shares in that month. Stocks with high DTURN are more prone to crashes (Chen *et al.*, 2001).

ABACC is discretionary accruals that measure the opacity of financial statements. Firms with opaque financial statements are more likely to have stock price crashes (Hutton *et al.*, 2009; Jin and Myers, 2006). The estimation of ABACC is based on the modified Jones model (Dechow *et al.*, 1995) as below.

First, Equation (7) is estimated for each industry-year combination with a minimum of 10 observations.

$$\frac{Accruals_{i,t}}{TA_{i,t-1}} = \alpha_0 \times \frac{1}{TA_{i,t-1}} + \beta_1 \times \frac{\Delta Sales_{i,t}}{TA_{i,t-1}} + \beta_2 \times \frac{PPE_{i,t}}{TA_{i,t-1}} + \varepsilon_{i,t} \quad (7)$$

Then, estimated parameters are used to calculate discretionary accruals (DISACC), as in Equation (8). ABACC is the absolute value of DISACC.

$$DISACC_{i,t} = \frac{Accruals_{i,t}}{TA_{i,t-1}} - \left(\widehat{\alpha_0} \times \frac{1}{TA_{i,t-1}} + \widehat{\beta_1} \times \frac{\Delta Sales_{i,t} - \Delta Receivable_{i,t}}{TA_{i,t-1}} + \widehat{\beta_2} \times \frac{PPE_{i,t}}{TA_{i,t-1}}\right) \quad (8)$$

where the subscripts i and t denote firm i in year t, Accruals are the difference between net income and cash flows from operating activities; TA is total assets. ΔSales is the change in sales, ΔReceivables is the change in receivables and PPE is gross property, plant and equipment.

RET is firm-specific return, calculated as the average firm-specific weekly return in the fiscal year. Chen *et al.* (2001) report that price crashes happen in stocks with high past returns.

Recent studies have shown that analyst coverage and financial constraints have an effect on stock price crash risk (He *et al.*, 2019; He and Ren, 2023). Analysts serve as information intermediaries, play a monitoring role and thus could prevent bad news hoarding by managers (He *et al.*, 2019). Additionally, managers of financially constrained firms are likely to withhold bad news to secure enough external funds needed for their investments and survival (He and Ren, 2023). Thus, we add these two additional variables as control variables. ANA (analyst coverage) is measured as the natural logarithm of one plus the number of analysis reports on the stock in a particular year. FCON (financial constraint) is calculated using Whited and Wu's (2006) method.

Finally, NCSKEW, DUVOL, BTM and ABACC are winsorized at the 1st and 99th percentiles. Year and industry dummies are included to control for year and industry-fixed effects.

To test hypotheses H2, we employ dummy variables of institutional ownership. In our sample, institutional ownership is defined as holding at least 5% of a firm's common shares by institutional investors. Thus, we create a dummy variable, DINSTI, which takes the value of one if the fraction of institutional ownership is at least 5% and zero otherwise. We also create dummy variables for domestic institutional ownership (DDOM) and foreign institutional ownership (DFOR) using the same cut-off rate of 5%.

A summary of variable construction can be found in the Appendix.

4. Data and summary statistics

Trading and financial data of all stocks listed on the Ho Chi Minh Stock Exchange (HOSE) and Hanoi Stock Exchange (HNX) are retrieved from the FiinPro database. Financial firms are excluded from the sample. Firms delisted or suspended from trading and firms with fewer than 26 weeks of return data in a particular year are also removed. Observations from 2021 are also excluded to avoid the effect of the COVID-19 pandemic on stock price crashes. Vietstock provides the data on institutional ownership. As the data on institutional ownership have been available since 2010, we restricted the sample from 2010 to 2020 and obtained 4,436 firm-year observations of 589 firms.

Table 1 presents the descriptive statistics of the variables. On average, the NCSKEW and the DUVOL is negative at −0.124 and −0.09, respectively. The mean values of crash risk are consistent with previous literature such as Callen and Fang (2013) and An and Zhang (2013).

Variables	N	Mean	Median	Std. dev	Min	Max
$NCSKEW_{i,t+1}$	4,436	−0.124	−0.123	0.858	−2.430	2.434
$DUVOL_{i,t+1}$	4,436	−0.090	−0.107	0.734	−2.260	2.455
$LIQ_{i,t}$	4,436	8.566	8.213	2.812	3.212	16.219
$SIZE_{i,t}$	4,436	26.237	26.066	1.701	21.717	33.59
$LEV_{i,t}$	4,436	0.487	0.507	0.218	0.003	0.971
$ROA_{i,t}$	4,436	0.061	0.048	0.078	−0.853	0.784
$BTM_{i,t}$	4,436	1.481	1.219	1.003	0.173	5.712
$SIGMA_{i,t}$	4,436	0.054	0.050	0.023	0.004	0.316
$DTURN_{i,t}$	4,436	−0.13	−0.026	0.930	−3.732	4.271
$ABACC_{i,t}$	4,436	0.103	0.076	0.095	0.001	0.484
$RET_{i,t}$	4,436	−0.002	−0.001	0.007	−0.072	0.028
$ANA_{i,t}$	4,436	0.316	0.000	0.592	0	2.833
$FCON_{i,t}$	4,436	−1.192	−1.216	0.199	−1.45	0.256
$INSTI_{i,t}$	4,436	0.174	0.068	0.230	0	0.994
$DINSTI_{i,t}$	4,436	0.498	0	0.50	0	1
$DOMINSTI_{i,t}$	4,436	0.134	0	0.212	0	0.985
$DDOM_{i,t}$	4,436	0.381	0	0.486	0	1
$FORINSTI_{i,t}$	4,436	0.040	0	0.102	0	0.800
$DFOR_{i,t}$	4,436	0.198	0	0.398	0	1

Table 1.
Summary statistics

Source(s): Authors' own work

In Vietnam, Vo (2020) reports lower mean values of NSCKEW (−0.423) and DUVOL (−0.284). Compared to this finding, higher mean values of NSCKEW and DUVOL in our sample indicate a higher level of crash risk. Unlike Vo (2020), our sample includes recent years when Vietnam's stock market has attracted many retail investors. Their trading may lead to a higher level of crash risk.

The mean and median values of LIQ were 8.566 and 8.213, respectively. These values are similar to the corresponding numbers in China but lower than those in other Asian countries with low gross domestic product (GDP) per capita, as Kang and Zhang (2014) reported.

The book-to-market ratio (BTM) is 1.481, indicating that the stocks trade at less than their book value on average. On average, discretionary accruals (ABACC) account for 10% of total assets, similar to the findings on earnings management in Vietnam in past studies such as Hang *et al.* (2018).

On average, institutional blockholders account for 17.4% of the outstanding shares and around half of the observations are owned by institutional blockholders. 38.1% and 19.8% of firm-years are owned by domestic and foreign institutional blockholders.

5. Results

5.1 Stock liquidity and stock price crash risk

Table 2 presents the regression results of Equation (1). The coefficient of LIQ is positive and significant in both columns, indicating that stock liquidity increases crash risk. Untabulated results indicate that when liquidity increases by one standard deviation, NCSKEW (DUVOL) increases by 0.0419 (0.0392), equivalent to 33.7% (43.6%) of the sample mean. This finding contrasts with Chauhan *et al.* (2017) but is consistent with Chang *et al.* (2017), Zhang *et al.* (2018) and Alp *et al.* (2022) and supports hypothesis H1b.

Regarding the control variables, in line with Callen and Fang (2015), the coefficient of BTM is negative and significant, implying that growth stocks are more likely to crash prices. Consistent with Chen *et al.* (2001) and Chang *et al.* (2017), the coefficient of SIGMA is positive and significant, indicating that the more volatile the stock return is, the more likely price

Variables	(1) $NCSKEW_{i,t+1}$	(2) $DUVOL_{i,t+1}$
$LIQ_{i,t}$	0.0149**	0.0139**
	(2.11)	(2.30)
$NCSKEW_{i,t}$	0.00892	0.00761
	(0.39)	(0.40)
$SIZE_{i,t}$	−0.0259*	−0.0165
	(−1.72)	(−1.35)
$LEV_{i,t}$	−0.109	−0.0780
	(−1.46)	(−1.25)
$ROA_{i,t}$	−0.269	−0.304*
	(−1.29)	(−1.71)
$BTM_{i,t}$	−0.202***	−0.185***
	(−10.87)	(−10.83)
$SIGMA_{i,t}$	7.694***	7.434***
	(11.83)	(14.10)
$DTURN_{i,t}$	0.0330**	0.0306***
	(2.58)	(2.89)
$ABACC_{i,t}$	0.0250	−0.00891
	(0.18)	(−0.07)
$RET_{i,t}$	25.39***	26.23***
	(10.13)	(12.03)
$ANA_{i,t}$	0.0148	0.00681
	(0.54)	(0.28)
$FCON_{i,t}$	−0.00767	−0.00291
	(−0.11)	(−0.05)
Constant	0.611	0.425
	(1.52)	(1.26)
Observations	4,436	4,436
R-squared	0.130	0.162
Year-fixed effects	Yes	Yes
Industry-fixed effects	Yes	Yes
Clustered SE	Firms	Firms

Note(s): Robust *t*-statistics in parentheses
*, ** and *** Significant at 10, 5 and 1% levels, respectively
Source(s): Authors' own work

Table 2.
A baseline model – stock liquidity and stock price crash risk

crashes will occur. The coefficient of DTURN is positive and significant, showing that stocks that have experienced more turnover variation are more likely to crash (Chen *et al.*, 2001). RET has a positive and significant coefficient, meaning that stocks with high past returns tend to crash in the future (Chen *et al.*, 2001; Chauhan *et al.*, 2017; Callen and Fang, 2013). The coefficient of SIZE is negative and marginally significant in column (1), indicating that large firms are less likely to have stock price crash risk. This finding aligns with studies in Asian markets such as Vo (2020) and Chauhan *et al.* (2017). ROA has also a negative and marginally significant coefficient in column (2), suggesting that profitable firms have lower stock price crash risk (Hutton *et al.*, 2009; Kim *et al.*, 2011a, b).

5.2 Endogeneity

Because the stocks whose prices are less likely to crash are traded more frequently by investors, the relationship between liquidity and crash risk could be endogenous due to reverse causality (Chang *et al.*, 2017; Chauhan *et al.*, 2017). To address this issue, we employ a two-stage least squares regression approach. Following past literature, such as An *et al.* (2020), we use the industry-year median of LIQ ($MEDIANLIQ_{i,t}$) as an instrumental variable.

In the first stage, LIQ is regressed on its industry-year median and other control variables. The results are shown in Table 3, column (1). The coefficient on the instrument is positive and significant at the 1% level, indicating a high correlation between LIQ and its instrument. The partial *F*-statistic is statistically significant at the 1% level and higher than the critical value of 16.38 for the weak instrument test based on a 10% maximal size (Stock and Yogo, 2002). This result indicates that the weak instrument problem is not a concern. Columns (2) and (3) report the results from the second-stage regressions. The coefficient of LIQ is positive and significant, confirming our previous findings that liquidity increases stock price crash risk. The results on control variables SIZE, BTM, SIGMA and RET are consistent with those in Table 2. The coefficient of ANA is negative and significant, suggesting that analyst coverage could prevent bad news hoarding by managers (He *et al.*, 2019).

	First stage	Second stage	
Variables	$LIQ_{i,t}$ (1)	$NCSKEW_{i,t+1}$ (2)	$DUVOL_{i,t+1}$ (3)
$MEDIANLIQ_{i,t}$	0.329***		
	(5.12)		
$LIQ_{i,t}$		0.207**	0.190***
		(2.53)	(2.76)
$NCSKEW_{i,t}$	−0.108**	0.0301	0.0270
	(−2.20)	(1.18)	(1.25)
$SIZE_{i,t}$	0.698***	−0.160***	−0.139***
	(10.78)	(−2.68)	(−2.77)
$LEV_{i,t}$	−0.239	−0.0665	−0.0393
	(−0.79)	(−0.68)	(−0.47)
$ROA_{i,t}$	−0.140	−0.269	−0.304
	(−0.21)	(−1.03)	(−1.34)
$BTM_{i,t}$	0.199***	−0.241***	−0.220***
	(2.73)	(−8.51)	(−8.70)
$SIGMA_{i,t}$	−13.13***	10.21***	9.735***
	(−5.52)	(7.69)	(8.57)
$DTURN_{i,t}$	0.0704**	0.0205	0.0192
	(2.34)	(1.34)	(1.49)
$ABACC_{i,t}$	1.250***	−0.216	−0.229
	(3.36)	(−1.10)	(−1.37)
$RET_{i,t}$	−30.96***	31.65***	31.96***
	(−6.32)	(8.16)	(9.41)
$ANA_{i,t}$	0.171**	−0.281**	−0.264**
	(2.18)	(−2.16)	(−2.41)
$FCON_{i,t}$	1.524***	−0.0474	−0.0433
	(13.80)	(−0.98)	(−1.09)
Constant	−11.73***	2.259***	1.934***
	(−6.00)	(2.58)	(2.61)
Partial *F*-stat for the instrument	26.18		
Prob > F	0.0000		
Observations	4,436	4,436	4,436
Year-fixed effects	Yes	Yes	Yes
Industry-fixed effects	Yes	Yes	Yes
Clustered SE	Firms	Firms	Firms

Note(s): Robust *t*-statistics for the first stage and robust *z*-statistics for the second stage are in parentheses
*, ** and *** Significant at 10, 5 and 1% levels, respectively
Source(s): Authors' own work

Table 3.
Two-stage least squares – stock liquidity and stock price crash risk

5.3 The role of institutional ownership in the relationship between liquidity and crash risk

To investigate the role of institutional ownership, we add a dummy variable of institutional ownership (DINSTI) and its interactions with the independent variables as in Equation (9). To overcome endogeneity, we use the fitted value of stock liquidity from the first stage in Table 3 instead of its original value.

$$Crash\,Risk_{i,t+1} = \alpha_0 + \alpha_1 LIQ_{i,t} + \alpha_2 DINSTI_{i,t} + \alpha_3 LIQ_{i,t} \times DINSTI_{i,t} + \sum_{j=1}^{k} \beta_j Control_{ji,t} + \sum_{j=1}^{k} \gamma_j Control_{ji,t} \times DINSTI_{i,t} + \varepsilon_{i,t} \quad (9)$$

Panel A Table 4 presents the estimates of α1, α2 and α3. The coefficient on the interaction term $DINSTI_{i,t} \times LIQ_{i,t}$ is positive and significant, indicating that the positive effect of liquidity on crash risk is more pronounced in firms owned by institutional shareholders. This finding supports hypothesis H2b. Due to data availability, our definition of institutional ownership coincides with institutional blockholders whose ownership is at least 5%. Therefore, our results contradict Chang *et al.* (2017) and Alp *et al.* (2022), who do not find any evidence of blockholders influencing the relationship between liquidity and crash risk.

Panels B and C show the results using DDOM and DFOR dummy variables, respectively. The coefficient of interaction is insignificant in Panel B but positive and significant in Panel C. This means that the positive effect of liquidity on crash risk is stronger in firms owned by foreign institutional blockholders. This finding complements those of Alp *et al.* (2022).

Variables	(1) $NCSKEW_{i,t+1}$	(2) $DUVOL_{i,t+1}$
Panel A. Institutional blockholders		
$LIQ_{i,t}$	0.134	0.136**
	(1.63)	(1.97)
$DINSTI_{i,t}$	0.954	1.004
	(0.94)	(1.22)
$DINSTI_{i,t} \times LIQ_{i,t}$	0.158**	0.115**
	(2.36)	(2.07)
Panel B. Domestic institutional blockholders		
$LIQ_{i,t}$	0.188**	0.176***
	(2.34)	(2.62)
$DDOM_{i,t}$	−0.304	0.234
	(−0.27)	(0.26)
$DDOM_{i,t} \times LIQ_{i,t}$	0.0710	0.0551
	(0.97)	(0.91)
Panel C. Foreign institutional blockholders		
$LIQ_{i,t}$	0.164**	0.152**
	(2.11)	(2.39)
$DFOR_{i,t}$	1.500	0.889
	(1.44)	(1.01)
$DFOR_{i,t} \times LIQ_{i,t}$	0.192***	0.148**
	(2.62)	(2.36)

Note(s): Robust *t*-statistics in parentheses. *, ** and *** Significant at 10, 5 and 1%, levels, respectively
Source(s): Authors' own work

Table 4. Institutional ownership and the stock liquidity-crash risk relation

Although high liquidity enables investors to trade more easily, Chang *et al.* (2017) find that, upon the revelation of bad news, only transient institutional investors and non-blockholders sell intensively, whereas blockholders are discouraged from selling. In the following section, we investigate whether institutional blockholders' large selling in the future could moderate the relationship between liquidity and crash risk.

We identify a firm-year with intensive selling by blockholders by the dummy variable INTENSELL, which takes the value of one if during the year the total number of shares sold by blockholders is more than twice as large as the total number of shares purchased by blockholders and zero otherwise. $INTENSELL_{i,t+1}$ and its interactions with the independent variables in our baseline model are added as in Equation (10). The fitted value of liquidity in the first stage of Table 3 is used instead of its original value. We estimate Equation (10) for the subsamples of firms owned by institutional blockholders, domestic institutional blockholders and foreign institutional blockholders separately and present the estimates of α_1, α_2 and α_3 in Table 5.

$$Crash\,Risk_{i,t+1} = \alpha_0 + \alpha_1 LIQ_{i,t} + \alpha_2 INTENSELL_{i,t+1} + \alpha_3 LIQ_{i,t} \times INTENSELL_{i,t+1} + \sum_{j=1}^{k} \beta_j Control_{ji,t} + \sum_{j=1}^{k} \gamma_j Control_{ji,t} \times INTENSELL_{i,t+1} + \varepsilon_{i,t} \quad (10)$$

The coefficients on the interaction $INTENSELL_{i,t+1} \times LIQ_{i,t}$ are all positive and significant, suggesting that institutional blockholders' large selling positively moderates the relationship

Variables	(1) $NCSKEW_{i,t+1}$	(2) $DUVOL_{i,t+1}$
Panel A. Institutional blockholders		
$LIQ_{i,t}$	0.227**	0.198**
	(2.16)	(2.27)
$INTENSELL_{i,t+1}$	2.634	1.288
	(1.58)	(0.93)
$INTENSELL_{i,t+1} \times LIQ_{i,t}$	0.357***	0.207**
	(3.21)	(2.23)
No. of observations	2,207	2,207
Panel B. Domestic Institutional blockholders		
$LIQ_{i,t}$	0.252**	0.209**
	(1.98)	(2.01)
$INTENSELL_{i,t+1}$	2.454	0.431
	(1.26)	(0.27)
$INTENSELL_{i,t+1} \times LIQ_{i,t}$	0.379***	0.183*
	(2.93)	(1.67)
No. of observations	1,690	1,690
Panel C. Foreign Institutional blockholders		
$LIQ_{i,t}$	0.201	0.175
	(1.38)	(1.43)
$INTENSELL_{i,t+1}$	2.324	3.020
	(0.99)	(1.47)
$INTENSELL_{i,t+1} \times LIQ_{i,t}$	0.362**	0.368**
	(2.26)	(2.60)
No. of observations	878	878

Note(s): Robust *t*-statistics in parentheses
*, **, *** Significant at 10, 5 and 1% levels, respectively
Source(s): Authors' own work

Table 5.
Intensive selling by institutional blockholders and the stock liquidity-crash risk relation

between liquidity and crash risk. This finding suggests that high liquidity enables institutional blockholders to trade and their intensive selling upon bad news could increase market responses, resulting in crashes. This finding differs from Chang *et al.* (2017) but aligns with the argument by Admati and Pfleiderer (2009) that blockholders are not likely to engage in monitoring but rather trade based on their private information. This finding is also consistent with the argument by Gillan and Starks (2003) that institutional investors have a limited role in emerging stock markets. Although having informational advantages and expertise, institutional investors still face information asymmetry problems when investing in emerging markets (Vo, 2020). Thus, they will likely choose "exit" over "voice." Put differently, institutional blockholders tend to pursue short-term investment horizons and trade on their private information (Yan and Zhang, 2009).

Vietnam's stock market is dominated by retail investors with limited expertise and information. They observe the institutional investors for trading signals (Nguyen *et al.*, 2016). Large selling by institutional blockholders could trigger retail investors' herding behavior, further decreasing stock prices.

6. Conclusion

Using a dataset from Vietnam, we find that stock liquidity increases crash risk. This relationship is pronounced in firms owned by institutional blockholders, especially those held by foreign institutional blockholders. Unlike Chang *et al.* (2017) and Alp *et al.* (2022), our finding indicates that blockholders' activities could explain the positive relationship between liquidity and crash. High liquidity encourages institutional blockholders to trade. Their intensive selling upon the revelation of bad news causes crashes.

Our results provide practical implications for managers and investors, especially in emerging markets like Vietnam. Managers should practice timely information disclosures to avoid blockholders' exit and subsequent crashes in stock prices. Stock liquidity and blockholders' trading should be carefully considered in the assessment of investment risk, especially for retail investors and non-blockholders.

This paper has not accounted for heterogeneity in investors' investment objectives and styles (Yan and Zhang, 2009; Bushee, 2001). For example, banks face stricter fiduciary standards and thus are likely to have short-term investments (Bushee, 2001). This issue could be an interesting direction for future research.

Notes

1. The government has called for better "law-building" to facilitate economic development. See in Vietnam News on 25 November 2020 (see https://vietnamnews.vn/politics-laws/811720/pm-phuc-urges-better-law-building-for-country-s-development.html).
2. See https://fortune.com/2021/06/11/vietnam-stock-market-boom-retail-investor

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Appendix

Variables	Definitions
$NCSKEW_{i,t+1}$	The negative coefficient of skewness of firm-specific weekly returns following Chen *et al.* (2001), Hutton *et al.* (2009) and Kim *et al.* (2011b)
$DUVOL_{i,t+1}$	The down–to–up the volatility of firm-specific weekly stock returns following Chen *et al.* (2001), Hutton *et al.* (2009) and Kim *et al.* (2011b)
$LIQ_{i,t}$	The adjusted Amihud illiquidity in Kang and Zhang (2014) multiplied by (−1)
$SIZE_{i,t}$	The natural logarithm of total assets
$LEV_{i,t}$	Total liabilities divided by total assets
$ROA_{i,t}$	Net income deflated by total assets
$BTM_{i,t}$	Book value of equity divided by market capitalization
$SIGMA_{i,t}$	The standard deviation of firm-specific weekly return in a fiscal year
$DTURN_{i,t}$	The average monthly share turnover of a year minus the average monthly share turnover of the previous year. The monthly share turnover is the monthly trading volume deflated by the total number of outstanding shares in that month
$ABACC_{i,t}$	The absolute value of discretionary accruals based on the modified Jones model (Dechow *et al.*, 1995)
$RET_{i,t}$	The average firm-specific weekly return in the fiscal year
ANA	The natural logarithm of one plus the number of analysis reports on the stock in a particular year
FCON	The financial constraint index was calculated using the method of Whited and Wu (2006)
$INSTI_{i,t}$	Total percentage of common shares owned by institutional blockholders who own at least 5% of common shares
$DINSTI_{i,t}$	Takes one if the fraction of institutional ownership of a firm is at least 5% and zero otherwise
$DOMINSTI_{i,t}$	Total percentage of common shares owned by domestic institutional blockholders
$DDOM_{i,t}$	Takes one if the fraction of domestic institutional ownership of a firm is at least 5% and zero otherwise
$FORINSTI_{i,t}$	Total percentage of common shares owned by foreign institutional blockholders
$DFOR_{i,t}$	Takes one if the fraction of domestic institutional ownership of a firm is at least 5% and zero otherwise

Table A1.
Variable definitions

Corresponding author
Hang Thu Nguyen can be contacted at: nguyenthuhang.cs2@ftu.edu.vn