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The effect of earnings management on stock price crash risk: a comparative study of developing and developed Asian economies

Muhammad Jawad Haider
PhD Scholar, Faculty of Management Sciences, International Islamic University Islamabad, Pakistan.

Tahira Awan
Assistant Professor, Faculty of Management Sciences, International Islamic University Islamabad, Pakistan.

Wajid Khan
Assistant Professor, Department of Business Management, University of Baltistan, Skardu.

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Abstract

The purpose of this study is to investigate the impact of earnings management on the stock price crash risk in Asian economies by using the yearly dataset of 432 non-financial firms from 6 countries (i.e. Pakistan, India, China, Japan, Hong Kong, and Singapore) for the period from 2009 to 2020. The dependent variable i.e., stock price crash risk is measured by its two renowned proxies such as negative conditional skewness and down-up volatility. The data for earnings management, stock price crash risk, and all control variables are compiled from Thomson Reuters DataStream. To overcome autocorrelation and heteroscedasticity problems, the authors use generalized least square panel regression. The results indicate that earnings management significantly and positively influences the stock price crash risk. Overall, the findings of this study have several implications for investors, firm managers, regulators, and policymakers in understanding the key factors that determine the stock price crash risk specifically when it comes to non-financial firms in Asian economies.

Keywords: Stock price crash risk, earning management, generalized least square.

1. Introduction

The global financial meltdown of 2007-2008 and several corporate scams (WorldCom, Enron, and Satyam) have drawn the attention of practitioners, researchers, and regulators in exploring stock price crash risk. A stock market crash is a sudden drop in the prices of an index relative to a recent price peak (Patel, & Sarkar, 1998). Whereas the stock price crash

risk is defined as the conditional skewness of the return distributions that capture the asymmetry in the risk associated with the individual stocks (Kim et. al., 2014) due to the presence of the explosivity (Moradzadehfard, 2011).

The agency theory which is explained by Jensen and Meckling (1976) supports this research phenomenon.According to Baysinger and Hoskisson (1990), Simon Herbert in June 1959, stated that managers might be "satisfiers" rather than "maximizers", That is, they are more concerned with maintaining their presence in the company rather than maximizing shareholder wealth. In other words, these managers are not seeking ultimate growth but rather a reasonable amount of growth. In the presence of potential agency problems, the tendency of managers to conceal and suppress unfavorable information from outsiders becomes a primary cause of stock price crashes (e.g., Jin & Myers, 2006; Kothari, Shu, & Wysocki, 2009; Hutton, Marcus, & Tehranian, 2009;Callen & Fang, 2015b). In general, the stock price crashes are caused by manager's holding of unfavorable news (e.g., Chang, Chen, & Zolotoy, 2017; Kim, Li, & Zhang 2011, b; Hutton, Marcus, & Tehranian 2009), which means that managers tend to hide company-related bad news from their external stakeholders. To do so, the managers may be motivated by their selfish management practices, such as undertaking projects with a negative present value, tax evasion, the absence of transparency in financial reporting, as well as their career growth, compensation, personal benefits, and other concerns to keep the bad news hidden for a longer time. In general, their actions such as making investment decisions that temporarily increase the stock prices, or indulging in earning management practices to protect an inflated stock price, are unjustifiable and will eventually cause stock prices to crash when the real facts are revealed. Thus, the information asymmetrical information between shareholders and managers, combined with the self-centered mindset of managers, is related to stock price crash risk (Jin & Myers, 2006).

Firms' future stock price crash risk could also be explained by the higher level of accounting conservatism demanded by the customers, as suggested by Hui, Klasa, and Yeung (2012). Similarly, Kim and Zhang (2016) claim that a higher level of accounting conservatism helps in minimizing the stock price crash risk. Firms tend to manage earnings upward to improve their financial image, which helps them attract new customers, negotiate better contract terms, and encourage customers to invest in relationship-specific investments. Bowen, DuCharme, and Shores (1995) concluded that managers pursue income-increasing accounting policies to improve firms' reputations for meeting implicit customer claims.

Stock price crash risk remains a muddled concept – all the argument on its various facets has not yet resulted in objective rules or theories. There exist a negative association between financial reporting and stock price crash risk, more transparent and actual reporting offinancial accruals minimizes the possibility of a stock price crash and vice-versa. Accruals narrated in financial statements by various accountants are inconsistent and normally recorded on the concept of earnings management (Shah, Butt, and Hassan, 2009). The managers making financial decisions using such manipulated financial statements face the problem of financial distress (Yadiati, 2017), and investors who are making investment decisions in stocks using such financial statements, lead to stock price crash risk, which has serious consequences for the wealth of shareholders (Habib et al., 2018).

Habib et al., (2018) systematically reviewed the empirical literature on the stock price crash risk to find out gaps for future research. Literature highlights that a minimal or insufficient

research emphasis has been given to the understanding of stock price crash risk and its consequences in the setting of developing economies. Therefore, it is important to research the likelihood of stock price crashes in developing economies.

We use Kothari et al., (2005) model as a measure of earnings management, and two widely used proxies i.e. negative conditional skewness (NCSKEW) and down up volatility (DUVOL) for measuring stock price crash risk. The sample comprises 432 non-financial publicly listed firms from six countries for the period of 2009–2020. Our findings report that ahigher level of earnings management increases stock price crash risk in Asian economies. This finding is in line with the modified Jones (1991) model, which also employed discretionary accruals as a proxy for measuring earnings management. Specifically, our results uncover a positive association between earnings management and the likelihood of a stock price crash.

This study adds to the existing body of literature in two ways.Firstly, despite Asia's growing importance in global stock markets, literature on stock price crash risk in Asian economies is relatively limited. We add to the existing literature by establishing the relationship between earnings management and stock price crash risk in Asia. Secondly, it is probably one of the pioneering efforts in Asian countries regarding the comparative study of developed vs developing non-financial markets. As such the current study has contributed theoretically to the existing literature on accounting and finance for this part of the sphere.

This paper is structured as follows: a literature review and hypotheses are presented in section 2. The details related to data and methodology are discussed in section 3, whereas, section 4 presents the baseline and robustness results of our panel data regressions. The conclusion, implications, and avenues for future research are provided in section 5. Finally, references are included in section 6.

2. Background and hypothesis development

Almahrog and Lasyoud (2021) defined earnings management as the process through which accounting professionals use their knowledge to influence the figures presented in the financial reports while adhering to the regulations related to accounting principles. Therefore, rather than presenting the firm's actual performance, the figures will show the shareholders what the management wants them to know.

Previous studies (Kim & Zhang, 2016; Kim, Li, & Zhang, 2011a, 2011b; Jin & Myers, 2006, etc.) have confirmed that managers are motivated to withhold bad news opportunistically and selectively from investors due to multiple reasons (i.e. concerns about their careers, the terms of their compensation contracts, the possibility of legal action, the need to meet earnings targets, and the desire to build an empire. The "Bad News Hoarding" idea is proposed by Jin and Myers. in their 2006 paper, arguing that when managers hide unfavorable news for longer periods, this bad news is expected to be hoarded within the company, when the stockpiled negative information reaches a critical limit or a threshold, All previously concealed negative information suddenly becomes public, causing a rapid decline in stock values.

Earnings management (EM) has been acknowledged as the primary method by which managers hide unfavorable news from their shareholders and investors. Earning Management can be categorized into two: Accrual-based earnings management (AEM) and Real earnings (REM). According to Dechow and Skinner (2000), AEM employs accounting

discretion to "obscure" or "mask" the real economic situation. AEM has a pattern of misrepresenting the company's underlying operations in the company's financial records, although this practice typically does not include modifying the operations themselves. On the other hand, Schipper, (1989) describes REM as a mechanism through which the reported earnings are manipulated by the managers by actually making economic decisions. When managers use AEM or REM to hide or disguise the negative news within the firm, the financial record of a firm does not accurately show the firm's real economic performance and becomes less transparent.

Existing literature suggests that both AEM and REM are used to avoid unfavorable news surprises in earnings or to meet other benchmarks for earnings. For instance, Burgstahler and Dichev (1997), reported that accruals such as cash flow from operations and changes in working capital are manipulated by the managers to prevent earnings decreases and losses. Furthermore, Guidry et al., (1999), also reported that managers employ AEM to maximize their short-term bonus compensation.

Basu (1997), asserts that the managers usually have important private information about the operations of their companies and the values of their assets. He further argues that if managerial compensation is tied to the performance of reported earnings, then managers have an incentive to conceal unfavorable news that would have a negative impact on their earnings/compensation. Fischer and Verreechia (2000) conclude that managers are incentivized to bias reporting in a situation where the market is unable to perfectly adjust to the manager's bias.

Graham et al., (2005) conducted a detailed survey in which they ask CFOs to describe their decisions regarding reported voluntary disclosure and accounting numbers. CFOs acknowledge that they tend to hold up the release of unfavorable news as compared to good news. Furthermore, the results of the survey confirmed that managers are primarily concerned with meeting or exceeding earnings targets to influence equity prices, which will be beneficial to managers in terms of their career and reputation. Ball (2001, 2009) claims that non-monetary motivations such as maintaining one's peers' esteem or expanding one's empire are more powerful than commonly assumed, and are sometimes the primary intention for concealing unfavorable information. Thus, based on the above discussion, we can conclude that managers' opportunistic withholding of bad news in the firm is influenced by both financial and non-financial motives.

Conrad, Dittmar, and Ghysels (2013) defined stock price crash risk as the possibility that a stock will experience an abrupt, large-scale decline in stock price. The possibility of this sudden, large-scale, downward price movement increases investors' holding costs, and investors, therefore, demand higher expected returns on stocks that have a greater crash risk. According to Chen et al. (2001), stock price crash risk can be defined as the conditional skewness of the return distribution, as opposed to the likelihood of extremely negative returns. Conditional skewness, like mean and median, is an important characteristic of the return distribution. Unlike prior studies that focus on stock performance and firm risk, which capture the mean (first moment) and variance (second moment) of the return distribution, stock price crash risk focus on conditional skewness, the third moment of the return distribution. Crash risk captures asymmetry in risk, especially downside risk, this is important for investment decisions and risk management.

Practically, the idea behind crash risk is that managers have a propensity to conceal unfavorable information for a prolonged period of time, hence allowing negative information to accumulate. If managers are successful in keeping unfavorable information out of the stock market, then in such a scenario, the distribution of stock returns would be asymmetrical. When the accumulated unfavorable news reaches a certain threshold, it is immediately released to the market, resulting in a large negative stock price decline, such a phenomenon is known as stock price crash risk (Hutton et al., 2009).

Although the transparency of financial reporting and its effect on the likelihood of a stock price crash has been the primary focus of research thus far, several additional factors may potentially contribute to the price crash. The Benmelech, Kandel, & Veronesi, (2010) model suggests that managers with equity-based contracts persist with projects that have a negative net present value (NPV) in order to make the most out of their compensation/remuneration packages. The clue that this model provides managerial motivations for withholding negative news, is the precursor to a price crash. The manager will eventually be forced to reveal the unfavorable information, which will result in a significant drop in stock price. The "information blockage" model, proposed by Cao, Coval, and Hirshleifer (2002), is another way to explain price crashes. In this model, investors who are well-informed and see that prices are going up are more likely to trade. Less knowledgeable investors, on the other hand, naturally have doubts about how accurate the signals are and wait to trade until the price falls. As the economic outlook becomes pessimistic and the less knowledgeable marginal investors reach the market, a price correction is inevitable. As a result of the information blockage, negative returns skewness occurs when prices rise, but positive skewness occurs when prices fall (Zhu, 2016).

Neifar and Utz (2019) investigated the impact of earnings management (EM) on stock price crash risk (SPCR). Their study sample consists of 820 firm-year observations of 188 non-financial firms listed on German stock exchanges from the year 2008 to the year 2014. The findings of the study report that EM significantly affects SPCR. The results confirm that stock price crash risk can be decreased by applying the EM practices.

Luo et al., (2020) also investigated the relationship between earning management and stock price crash risk based on a sample of Chinese listed firms from the year 2000 to 2017. The result of the study confirms that there exists a positive insignificant relationship between earning management and stock price crash risk. Contrary to the above findings, Murata and Hamori (2021) also investigated the association between earning management and stock price crash risk, following Kim et al. (2014), and Hutton et al. (2009), the researchers employed discretionary accruals absolute value (ABACC) as the proxy for earnings management. The authors considered *ABACC* as a proxy for levels of opacity in corporate financial reporting. The results of the study report the existence of a positive significant relationship between earning management and stock price crash risk. Similarly, Kim and Yasuda (2021) also report a positive significant relationship between earning management and stock price crash risk while investigating the association between policy uncertainty, bad news disclosure, and stock price crash risk.

Based on the previous discussion, we formulate the following hypothesis:

H1. Firms with a higher level of earnings management are associated with higher stock price crash risk.

3. Research Methodology

3.1 Sample and Data

The current study covers the sample of non-financial firms of selected six Asian economies i.e., Pakistan, India, China, Japan, Singapore, and Hong Kong to examine the effect of earnings management on stock price crash risk. The countries are selected based on the commonality in their economic characteristics and financial institutions are excluded because they differ from non-financial enterprises in several ways, including capital structure, a high level of central bank regulation of liquidity, bad debts, and cash holdings. The firms having enormous missing observations are excluded from the sample. The current study uses Morgan Stanley Capital International's (MSCI) country classification data on developing and developed countries.

This study covers all non-financial firms from the year 2009 to 2020. These non-financial firms are listed on the respective stock exchanges of 6 countries. Our final sample comprises 432 listed firms leading 5184 firm-year observations for 2009 to 2020.To control for potential accounting errors or abnormal shocks at the firm level, the data is winsorized at the 1 percent and 99 percent levels, and outliers are removed from the data (Bond et al., 2003). The data related to our variables is all compiled from Thomson Reuters DataStream.

3.2 Dependent Variable: Stock Price Crash Risk

Following previous studies (Chen et al., 2001; Kim et al., 2014; Dang et al., 2018; Thuy et al, 2022; Murata & Hamori, 2021; Dai et al, 2019), the present study employed two proxies for the measurement of stock price crash risk i.e. negative conditional skewness (NCSKEW), and down up volatility (DUVOL). These measures are based on firm-specific weekly returns estimated as the residuals from the market model. For instance, Chen et al., (2001) estimate the residuals from the market model based on the firm-specific weekly returns following the expanded market model regression as follows:

$$r_{j\mathcal{T}} = a_j + \gamma_{1,j} r_{m,\mathcal{T}-2} + \gamma_{2,j} r_{m,\mathcal{T}-1} + \gamma_{3,j} r_{m,\mathcal{T}} + \gamma_{4,j} r_{m,\mathcal{T}+1} + \gamma_{5,j} r_{m,\mathcal{T}+2} + \varepsilon_{it} (1)$$

Where j and t show firm and week, r is stock return, lead and lag of market index are included for non-synchronous trading (Dimson, 1979). The natural logarithm of one plus the residual return is used to estimate the firm weekly return for firm j in week τ (Wj,).

NCSKEW is measured by taking the negative of the third moment of firm-specific weekly returns for each year and normalizing it by the standard deviation of firm-specific weekly returns raised to the third power. Specifically, for each firm j in years, NSKEW is calculated as:

$$NCSKEW = -[n(n-1)^{3/2} \sum w^3_{i,J}\ ] / [(n-1)(n-2)\left(\sum w^2_{i,J}\right)^{3/2}] \qquad (2)$$

The second measure of stock price crash risk is the down-to-up volatility measure (DUVOL). For each firm j throughout a fiscal-year period s, the firm-specific weekly returns are divided into two groups: "down" weeks when the returns are lower than the annual mean, and "up" weeks when the returns are higher than the annual mean. For each of these two groups, the standard deviation of firm-specific weekly returns is computed separately. DUVOL is the natural logarithm of the ratio of the standard deviation during "down" weeks to the standard deviation during "up" weeks:

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$$DUVOL_{j,t} = \log\{ (n_u - 1) \sum_{Down} w^2{}_{i,J} \ / (n_d - 1) \sum_{Up} w^2{}_{i,J} \qquad (3)$$

3.3 Independent Variable: Earning Management

The present study follows Kothari et al., (2005) to estimate discretionary accruals as a measure of earnings management. As total accruals are the sum of discretionary accruals and non-discreationary accruals. Thus, discretionary accruals can be calculated by subtracting the non-discretionary accruals from the total accruals i.e.

$$DA_{i,j,t} = TA_{i,j,t} - NDA_{i,j,t} \qquad (4)$$

Where $DA_{i,j,t}$ is the discretionary accrual.

The subscript *i* represents the sample firm, *j* represents the country, and subscript *t* is time in years.

3.4 Control Variables

Following previous stock price crash risk studies (Hasan et al., 2020; Chen et al., 2001; Dang et al., 2018; Kim et al., 2014) and to reduce the potential bias caused by omitted variables, we control for other general firm characteristics by including firm age, firm size, tangibility, profitability, and leverage as control variables. Moreover, to account for serial correlation, we use a one-year-lagged stock price crash risk.

3.5 Empirical Model

To investigate the association between earning management and stock price crash risk, the present study estimates the following baseline model:

$$SPCR_{i,j,t} = \beta_o + \beta_1 SPCR_{i,j,t-1} + \beta_2 EM_{i,j,t-1} + \beta_3 Age_{i,j,t-1} + \beta_4 Size_{i,j,t-1} + \beta_5 Tan_{i,j,t-1} + \beta_6 ROA_{i,j,t-1} + \beta_7 Lev_{i,j,t-1} + \mu_{i,j,t} \qquad (5)$$

Where β_o is the constant term, $\beta_{3to\,7}$ are the coefficients for the control variables (firm age, firm size, tangibility, profitability, and leverage), β_2 is the coefficient of an independent variable (i.e. earning management), The subscript "i" represents the sample firm, subscript "j" represents the country, and the subscript "t" is the time in years, SPCR is the stock price crash risk, proxied by NCSKEW and DUVOL, Age is the firm age, Size is the firm size, TAN is the tangibility, DM is the debt maturity, ROA is the profitability, EM is earning management, and $\mu_{i,j,t}$the error term.

Table 1 Measurement of variables

Variable	Sign	Description	Source
		Independent variable	
Earning Management	+	Earning management is measured by discretionary accruals	Mahrani, & Soewarno, (2018)
		Control variables	
Firm Size	+ / -	Firm size is measured as the log value of total assets.	Banerjee, Gupta, & McIver (2019)

Firm Age	+ / -	Firm age is measured as the log value of the age of the firm in years plus one.	Banerjee, Gupta, & McIver (2019)
Tangibility	+ / -	Tangibility is calculated by dividing fixed assets by total assets	Chipeta & Deressa, (2016)
Profitability	+ / -	Profitability is measured by calculating its return on assets i.e., net income divided by total assets.	Kim et al., (2014)
Leverage	+ / -	Leverage is calculated by dividing total debtby total assets	Fatima et al., (2020)
Dependent variable			
Stock price crash risk		(NCSKEW)The negative skewness of firm-specific weekly returns over the fiscal year (DUVOL) The log of the ratio of the down week to up week standard deviations in firm-specific weekly returns	Chen et al., (2001); Kim et al., (2014)

4. Empirical Results

4.1 Descriptive Statistics

Descriptive statistics for the entire sampleis presented in Tables 2.

Table 2: Descriptive statistics (Full Sample)

	N	Mean	Std. Dev.	min	max	skewness	kurtosis
NCSKEW	5184	.149	0.786	-1.524	2.089	.239	2.679
DUVOL	5184	.04	0.133	-.256	.358	.154	2.639
EM (DA)	5184	.036	0.032	.001	.193	2.316	10.63
Age (Years)	5184	20.222	11.546	2	47	.644	2.613
Size (Log)	5184	7.848	1.095	5.78	10.253	.213	2.23
Tan (Ratio)	5184	.34	0.237	.006	.957	.746	2.74
ROA (Ratio)	5184	.066	0.067	-.098	.288	.835	4.251
Leverage (Ratio)	5184	.233	0.175	0	.679	.449	2.449

For the full sample data, the mean and standard deviation value for the first measure (NCSKEW) of our dependent variable i.e. Stock price crash risk is 0.149 and 0.786. Similarly, DUVOL, the second measure of stock price crash risk shows a mean value of 0.04 and a standard deviation of 0.1333. Table 2 show that both NCSKEW and DUVOL reported a positive means, implying that the stock price crash risk of companies included in our sample is generally high. The result of the study is in line with the findings that were published in the context of the US, Malaysia, and China (Kim et al. 2011; Nasr and Ghouma 2018; Ertugrul et al. 2017; Jin et al. 2019; Lobo et al. 2020; Tee et al. 2018).

Discretionary accruals are used as a proxy for measuring our independent variable i.e, earning management. The mean value of discretionary accruals, calculated by using the Kothari et al. (2005) model, is 0.036 and has a standard deviation of 0.032.

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4.2 Correlations

Correlation is a statistical measure that tells us how closely two or more variables fluctuate in relation to one another.

Table 3: Pairwise correlations (Full Sample)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) NCSKEW	1.00							
(2) DUVOL	0.37*	1.00						
(3) EM	0.02	0.01	1.00					
(4) Age	0.03	0.12*	-0.10*	1.00				
(5) Size	0.05*	0.13*	-0.15*	0.50*	1.00			
(6) Tan	0.00	0.08*	-0.02	-0.09*	-0.04*	1.00		
(7) ROA	-0.22*	-0.02	0.04	-0.13*	-0.11*	-0.16*	1.00	
(8) Leverage	0.14*	-0.01	0.02	-0.02	0.11*	0.28*	-0.52*	1.00

**show the significance at .01level*

The results of correlation analysis confirm that our independent variable i.e. earning management is positively associated with both measures (negative conditional skewness and down-up volatility) of our dependent variable i.e. stock price crash risk. This means that an increase in earning management will also increase the stock price crash risk.

Table 4: Multicollinearity test – Variance Inflation Factor (VIF)

Variables	VIF (Full Sample)	Variables	VIF (Developing)	Variables	VIF (Developed)
Lev	1.47	Lev	1.68	Age	1.57
ROA	1.40	ROA	1.51	Size	1.49
Size	1.38	Size	1.19	Lev	1.32
Age	1.38	Tan	1.14	ROA	1.30
Tan	1.10	Age	1.12	Tan	1.10
EM	1.03	EM	1.02	EM	1.04
Mean VIF	1.29	Mean VIF	1.27	Mean VIF	1.30

According to the findings of the VIF Multicollinearity test, there is no correlation between the variables that are being tested independently in our research model. In other words, the model demonstrates that there is no problem with multicollinearity in the model. The Variance Inflation Factor test for the full sample, developing, and developed Asian economies are presented in Table 4. The result shows that the VIF values for all independent and control variables i.e. firm size, firm age, tangibility, profitability, earning management, and leverage lie within the acceptable range thus it could be concluded that there is no problem of multicollinearity.

4.4 Results

Based on the results of different model specification, the present study employed generalized least square (GLS) panel regression to overcome the problems autocorrelation and heteroskedasticity. Previous studies by Neifar and Utz (2019), Chen et al. (2003), Gujarati,

(2003), and Greene (2007) also recommend the use of GLS, if serial correlation and heteroscedasticity exist in the data.

Tables 5 and 6 reports the result of the general least square (GLS) panel regression approach for the first and second measure of stock price crash risk i.e. NCSKEW and DUVOL respectively. Using a sample of developed and developing Asian economies comprising 6 economies and 432 firms. GLS is applied separately to the entire sample, as well as the developed and developing samples of Asian economies. The results of each sample are reported separately in each column.

The result shows that lagged value of our independent variable i.e. earning management (EM_{t-1}) is positively and significantly related to both measures of stock price crash risk. These results are consistent across all regression models and all samples except for one, where the relationship between the said variables is found to be positive but insignificant. Similarly, Kim et al. (2021), Cheng et al. (2020), Wu and Laiy (2019), Neifar and Utz (2019),and Kim et al. (2011) also reported a significant and positive relationship between earnings management and stock price crash risk. Whereas, Hasan et al. (2020) reported a positive insignificant relationship between earning management and stock price crash risk.

Table 5: GLS results of negative conditional skewness

VARIABLES	(1) GLS (Full Sample)	(2) GLS (Developing)	(3) GLS (Developed)
$NCSKEW_{(t-1)}$	0.125***	0.345***	-0.014
	(0.015)	(0.020)	(0.020)
$EM_{(t-1)}$	0.997***	0.057	2.628***
	(0.348)	(0.360)	(0.664)
$Age_{(t-1)}$	0.048	-0.016	0.113*
	(0.046)	(0.064)	(0.066)
$Size_{(t-1)}$	-0.006	-0.003	0.003
	(0.012)	(0.018)	(0.016)
$Tan_{(t-1)}$	-0.175***	-0.321***	-0.019
	(0.048)	(0.064)	(0.070)
$ROA_{(t-1)}$	-1.242***	-0.631***	-1.287***
	(0.197)	(0.216)	(0.385)
$Lev_{(t-1)}$	0.218***	0.281***	0.184
	(0.075)	(0.089)	(0.121)
Constant	0.127	0.164	-0.071
	(0.090)	(0.141)	(0.130)
Observations	4,752	2,376	2,376
Number of ccd	432	216	216

Notes: This table reports upon the results of general least square panel regressions with measures for stock price crash risk as to the dependent variables. We measure crash risk by

the negative conditional skewness (NCSKEW). The first line for each variable represents the coefficient, and the second line contains the robust standard errors. *, **,***Significant at 0.1, 0.05 and 0.01 levels, respectively.

The results presented in Tables 5 and 6 are economically meaningful. For instance, in terms of economic significance, for the full sample data and for the first measure of stock price crash risk i.e. earning management reports a coefficients value of 0.997, which suggests that a unit increase in earning management is associated with an increase of 0.997 unit in stock price crash risk as compared to firms without extreme overvaluation or little EM, holding all other independent variables fixed. The findings reported in tables 5 and 6 also support/accept our hypothesis that earning management has a positive significant relationship with stock price crash risk.

The results for our control variables are also consistent with previous studies. For instance, the lagged value of profitability (ROA_{t-1}) shows a negative significant relationship with stock price crash risk which is in line with Kim et al. (2011), Jin et al. (2019), and Chang et al. (2017). They also found that the previous year's return on assets (ROA_{t-1}) is inversely and significantly related to the current year's stock price crash risk.The result of the coefficient for the lagged value of the firm age is consistent with the findings of Thuy et al. (2022) who also find that the firm's age is significantly and positively associated with NCSKEW. Whereas the firm size shows a positive and significant relationship which means that the larger firm size (SIZE) is associated with higher stock price crash risk. Ming-Te Lee, (2016) and Kim et. al. (2014) also reported a similar relationship between firm size and stock price crash risk.

Table 6: GLS results for down-up volatility

VARIABLES	(1) GLS (Full Sample)	(2) GLS (Developing)	(3) GLS (Developed)
$DUVOL_{(t-1)}$	0.130***	0.399***	-0.191***
	(0.014)	(0.019)	(0.020)
$EM_{(t-1)}$	0.137**	0.120*	0.227**
	(0.060)	(0.065)	(0.102)
$Age_{(t-1)}$	0.033***	0.047***	0.006
	(0.008)	(0.012)	(0.010)
$Size_{(t-1)}$	0.008***	0.006*	0.010***
	(0.002)	(0.003)	(0.002)
$Tan_{(t-1)}$	0.051***	0.079***	-0.016
	(0.008)	(0.012)	(0.011)
$ROA_{(t-1)}$	-0.047	0.035	-0.112*
	(0.033)	(0.038)	(0.059)
$Lev_{(t-1)}$	-0.038***	-0.040**	-0.026
	(0.013)	(0.016)	(0.019)
Constant	-0.083***	-0.122***	-0.004
	(0.016)	(0.025)	(0.020)

Observations	4,752	2,376	2,376
Number of ccd	432	216	216

Note(s): This table reports upon the results of general least square panel regressions with measures for stock price crash risk as to the dependent variables. We measure crash risk by the down-up volatility (DUVOL). The first line for each variable represents the coefficient, and the second line contains the robust standard errors. *, **,***Significant at 0.1, 0.05 and 0.01 levels, respectively.

4.5.3 Two-step system GMM approach

A two-step system GMM approach is employed to address endogeneity issues. Roodman (2009), preferred two-step GMM as compared to one-step GMM due to certain limitations. For instance, in the case of missing values in data, one-step GMM can result in the loss of too many observations. To overcome this problem, a second-order transformation was suggested by Arellano and Bover (1995). Roodman (2009), suggested that lagged values of the dependent variables may be employed as instruments for controlling endogeneity in the model. As these instruments are identified from the existing econometric model, they are often termed 'internal instruments'.

Table 7: GMM Results of negative conditional skewness

Note(s): To address the endogeneity issues table 7 shows the results from the two-step

VARIABLES	(1) GMM (Full Sample)	(2) GMM (Developing)	(3) GMM (Developed)
$EM_{(t-1)}$	0.267**	0.147**	0.179*
	(12.207)	(6.856)	(10.299)
$NCSKEW_{(t-1)}$	-0.675**	-0.880***	-0.522***
	(0.320)	(0.140)	(0.191)
$Age_{(t-1)}$	-3.288	-0.556	-0.064
	(3.339)	(0.397)	(0.743)
$Size_{(t-1)}$	1.495	-0.613*	-0.034
	(1.725)	(0.362)	(0.258)
$Tan_{(t-1)}$	-0.616	-0.989	-0.648
	(2.125)	(1.379)	(0.929)
$ROA_{(t-1)}$	-0.016	-2.834***	-3.508***
	(1.717)	(0.801)	(1.214)
$Lev_{(t-1)}$	0.754	0.441**	-0.005
	(1.662)	(0.200)	(0.222)
Constant	-6.525	7.943***	3.083**
	(8.767)	(2.399)	(1.319)
Industry Effects	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes
Observations	4,752	2,160	2,160

Number of ccd	432	216	216
Post-Estimation test			
statistics	-2.72	-4.50	-3.26
AR (1)	0.006	0.000	0.001
p-value	-1.34	-0.87	1.40
AR (2)			
p-value	0.179	0.383	0.161
Over identification test			
Hansen *J* statistic	7.35	70.97	14.12
p-value	0.061	0.932	0.516

system GMM of the association between earnings management, control variables, and the first measure of stock price crash risk i.e. negative conditional skewness (NCSKEW). The significance is indicated by the symbols *, **, and *** for 1%, 5%, and 10%, respectively.

Table 8: GMM results of down-up volatility

VARIABLES	(1) GMM (Full Sample)	(2) GMM (Developing)	(3) GMM (Developed)
$EM_{(t-1)}$	0.362**	0.262**	0.564**
	(0.150)	(0.111)	(0.221)
$DUVOL_{(t-1)}$	2.203***	2.323**	1.333
	(0.774)	(0.983)	(3.079)
$Age_{(t-1)}$	-0.138	0.034	-0.553
	(0.100)	(0.032)	(0.404)
$Size_{(t-1)}$	0.145***	0.078*	0.228
	(0.051)	(0.042)	(0.156)
$Tan_{(t-1)}$	0.023	-0.025	-0.599
	(0.141)	(0.188)	(0.377)
$ROA_{(t-1)}$	-0.054	0.014	-0.648*
	(0.099)	(0.090)	(0.387)
$Lev_{(t-1)}$	-0.106**	-0.058***	0.031
	(0.051)	(0.022)	(0.045)
Constant	-0.903***	-0.651**	-0.489
	(0.267)	(0.291)	(0.686)
Industry Effects	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes
Observations	4,752	2,160	2,160
Number of ccd	432	432	432

Post-Estimation test			
statistics	-2.86	-5.20	-3.18
AR(1)	0.004	0.000	0.001
p-value			
AR(2)	0.64	0.30	1.19
p-value	0.520	0.766	0.233
Over identification test			
Hansen *J*-statistic	48.15	37.25	23.83
p-value	0.721	0.565	0.213

Note(s): To address the endogeneity issues table 8 shows the results from the two-step system GMM of the association between earnings management, control variables, and the second measure of stock price crash risk i.e. down up volatility (DUVOL).The significance is indicated by the symbols *, **, and *** for 1%, 5%, and 10%, respectively.

Despite taking into consideration the endogenous association between earning management and stock price crash risk, the results are shown in Tables 7 and 8 indicate that the relationship between earning management and stock price crash risk remains the same.

5. Conclusion

This paper aims to examine the influence of earnings management on stock price crash risk in the Asian context for the defined following three categories i.e., full sample, developing, and developed selected Asian economies. To meet this objective, the dataset employed for this study is analyzed through generalized least square models. The data covers a set of 432 non-financial firms in six countries (i.e. Pakistan, India, China, Japan, Hong Kong, and Singapore) that are listed on their respective stock exchanges. The annual frequency of the dataset ranges from the year 2009 to 2020 (12 years).

For the first measure of stock price crash risk i.e. negative conditional skewness (NCSKEW), earning management shows a significant positive relationship with stock price crash risk for the two categories i.e. full sample data and developed economies. On the other hand, for the second measure of stock price crash risk i.e. down up volatility (DUVOL),earning management shows a significant positive relationship with stock price crash risk for all the three categories i.e. full sample, developing, and developed economies.

The findings of the paper have implications for stakeholders and also offer avenues for future research. This paper may encourage managers to be skeptical about earnings management, as higher earnings management will result in stock price crashes.For regulators, increased monitoring and further limiting earnings management could reduce the likelihood ofa stock price crash.Furthermore, the impact of high earnings management on management's opportunistic behaviors should be considered by researchers attempting to determine why firms are likely to experience stock price collapses. Finally, future research might look into the various factors that can lead to firms becoming highly overvalued, and the association between different reasonsfor overvaluation and stock price crashes.

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