The Impact of Earnings Management on Stock Price Crash Risk: An Analysis of Malaysian Firms

Muhammad Haseeb[a], Nurul Shahnaz Mahdzan[b], Wan Marhaini Wan Ahmad[c], Saadia Irfan[d], [a]PhD Scholar, Department of Finance and Banking Faculty of Business & Accountancy University of Malaya, Kuala Lumpur, [b]Associate Professor, Department of Finance and Banking Faculty of Business & Accountancy University of Malaya, Kuala Lumpur, [c]Senior Lecturer, Department of Finance and Banking Faculty of Business & Accountancy University of Malaya, Kuala Lumpur, [d]Assistant Professor, NUST Business School National University of Sciences and Technology, Pakistan, Email: [a]haseeb171@siswa.um.edu.my, [b]n_shahnaz@um.edu.my, [c]wmarhaini@um.edu.my, [d]saadia.irfan@nbs.nust.edu.pk

This study aims to examine the impact of earnings management on stock price crash risk (SPCR). This study consists of 8499 firm-year observations of public listed companies in Malaysia for the time period of 2001-2017. This study employs fixed effect regression to check the statistical association between concerned variables. The findings reveal that opportunist managers conceal poor financial performance from investors by earnings management which cause subsequent stock crashes. Moreover, the result from the split sample describe that non-innovative firms are more prone towards SPCR as compared to innovative firms. This indicates that the information environment of innovative firms is more transparent and hence restrict bad news hoarding through earnings management. These results are consistent after using alternative proxy of SPCR and alternative regression model of generalised method of moment (GMM). This study adds in literature by empirically investigating the impact of earnings management on SPCR for non-innovative and innovative firms. The findings of this research have practical implications for investors, asset pricing and risk management. Additionally, the findings are important for policymakers and regulatory bodies to rethink about the monitoring mechanism of public listed firms.

Key words: *Stock Price Crash Risk, Earnings Management, Innovative Firms, Bad New Hoarding.*

Introduction

In the last two decades, numerous catastrophic events of stock price crashes have been observed around the globe (Callen & Fang, 2013; Omar, Said & Johari, 2016). These shattering events adversely affected investors' wealth and also caused many firms to face bankruptcy (Zhang, Xie & Xu, 2016). Consequently, legislators, practitioners and scholars have paid considerable attention to determine the root cause of these disastrous incidents. An empirical work of Jin & Myers (2006) classifies the issue as an agency problem between principal (investors) and agent (managers). They reported that managerial personal benefits act as a catalyst to suppress the negative news from investors for an extended time which increase the risk of stock crashes. For instance, Transmile Berhad was caught in a corporate scandal of altering the firm's financial statements amounting to RM 981 million. As a result, the investors revised their decisions and put enormous pressure on the stock which caused a sharp decline in stock price with a loss of RM 3384.92 million in market capitalisation (Kan, 2018).

Healy & Wahlen (1999) assert that *"earnings management occurs when managers use judgment in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about the underlying economic performance of the company or to influence contractual outcomes that depend on reported accounting numbers."* The extant studies have witnessed that executives may be involved in earnings management to suppress unfavourable news from investors for their private gains such as executive compensation, equity incentives, perks and benefits (P. C. Andreou, Louca & Petrou, 2017; J.-B. Kim, Li & Zhang, 2011b; N. H. Xu, Li, Yuan & Chan, 2014). In this vein, Hutton, Marcus & Tehranian (2009) provide the first empirical evidence of earnings management and its impact on subsequent stock prices. They argue that personal benefits of managers stimulate them to obfuscate bad news, but managers can hide the negative net present value (NPV) projects or true financial performance up to a certain level and after reaching at threshold point, it will be difficult for managers to hoard further information. Consequently, the accumulated hidden news will finally be exposed in the market, shattering the investors' confidence and putting downward pressure on the stock prices.

Moreover, it is convenient for managers to engage in earnings manipulation in high information asymmetric environment. Ben-Nasr, Bouslimi & Zhong (2019) highlight that the operations and information environment of innovative firms are different from their counterparts. However, they define innovative firms as firms that operate in Pharmaceutical, High-Tech Industries and Natural Resource[1] based on 48 industrial classification of Fama & French (1997). They declare that the operations of these industries require continuous

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[1] Pharmaceuticals (Industrial Code 12-13), High-Tech (Industrial Code 22, 32, 35, 36, 37 & 38) and Natural Resources (Industrial Code 27, 28 & 30).

research and development activities for the development of new products i.e. medicines or updated technological products and are therefore considered as innovative firms. There are two confounding views on information environment of innovative firms. The advocates of high information asymmetry describe that high corporate investments impede innovative firms for more disclosure (Bhattacharya & Ritter, 1983; Verrecchia, 1983). On the other hand, the proponents of the view of low information asymmetry in innovative firms posit that the investors in innovative firms are more stringent in monitoring and demand more financial and non-financial disclosure, therefore managers disclose more information as a positive signal (H. An & Zhang, 2013; Cockburn & MacGarvie, 2009). In this vein, high informational transparency hinders opportunist managers to camouflage information which reduces SPCR (C. L. Chen, Kim & Yao, 2017; Khurana, Pereira & Zhang, 2018). Therefore, this study aims to explore the empirical relationship of earnings management and SPCR for non-innovative firms and innovative firms.

The contribution of this study is threefold. Firstly, this contributes by empirically investigating the nexus of earnings management and SPCR for non-innovative firms and innovative firms. Secondly, it provides a methodological contribution by examining the aforementioned relationship with an alternative proxy of SPCR, by employing the system GMM to address the possible concern of endogeneity and addressing the issue of non-linearity in the relationship. Lastly, this research contributes contextually by focusing on the Malaysian capital market. A study from the Malaysian perspective is needed due to numerous reasons. For instance, the literature documents a high incidence of stock price crashes in Malaysia than other South East Asian economies i.e. Indonesia, Thailand, Singapore and Philippines (Z. An, Li & Yu, 2015). Moreover, the corporate scandals of earnings management and subsequent reported frauds in Transmile Berhad, Polymate Holdings Berhad, Megan Media Berhad, Ocean Capital Berhad, LFE Corporation Berhad, MEMS Technology Berhad and Welli Multi Corporation Berhad demand a thorough investigation of Malaysian firms (Aghghaleh, Mohamed & Rahmat, 2016). In addition, firms in emerging countries have exhibited lower financial disclosure (Salter, 1998), fewer rights of investor protection (La Porta, Lopez-de-Silanes, Shleifer & Vishny, 2002) and weaker governance (Hasnan, Rahman & Mahenthiran, 2012).

This study reports a positive relationship of earnings management and SPCR for Malaysian firms. Moreover, the results from the split sample of non-innovative and innovative firms suggest that the earnings management and SPCR nexus is more substantial in non-innovative firms as compared to innovative firms. A detailed investigation by an alternative proxy of SPCR risk (down to up volatility) and the alternative regression estimation method (system GMM) also provide consistent findings.

The remaining study is organised as follows: section 2 contains a review of the literature and hypotheses development; section 3 consists of the research design; section 4 presents the findings of the study; and section 5 provides the conclusion.

Literature Review

Stock Price Crash Risk

Previous studies have described firm-specific SPCR as the probability of happening an extreme negative returns after its adjustments with co-movement of market returns (A. Habib & Hasan, 2017a; J.-B. Kim et al., 2011b). These are extremely negative events and are usually called tail events that capture the asymmetry in returns. In this vein, researchers have examined opaque financial statements (Hutton et al., 2009), corporate governance (Panayiotis C Andreou, Antoniou, Horton & Louca, 2016), employee welfare (Ben-Nasr & Ghouma, 2018), avoidance of tax (J. B. Kim, Li & Zhang, 2011a), corporate philanthropy (Zhang et al., 2016), trust (Li, Wang & Wang, 2017), investor attention (Alvarado, De Fuentes & Laffarga, 2019) and corporate irresponsibility (Zaman, Bahadar & Mahmood, 2020) as the antecedents of SPCR.

Earnings Management and Stock Price Crash Risk

The literature have witnessed the involvement of managers in suppressing unfavourable information from investors (C. L. Chen et al., 2017; Francis, Hasan & Li, 2016; Hutton et al., 2009; Zhu, 2016). The managers hide bad news relating to poor financial performance by manipulating the firm's financial statements. They are motivated to manipulate earnings as their monetary and non-monetary benefits that are connected to corporate financial performance (Harris, Karl & Lawrence, 2019). In this regard, Hutton et al., (2009) examined the impact of opacity (proxied by discretionary accruals) in financial reports and SPCR. She documents that managers try to suppress unfavourable information for an extended time and this stockpiled unfavourable information creates information asymmetry. However, when the threshold point arrives it is difficult for the managers to further withhold the information. As a result, the accumulated bad news immediately becomes publicly available which shatters the investor's confidence and exerts extreme pressure on stock price, an incidence known as a stock price crash.

However, Zhu (2016) points out that prior studies use absolute value of discretionary accrual that may mask the real impact and therefore asserts that signed values of accruals may provide meaningful findings as managers prefer upwards earnings management to conceal bad news. He reported a positive relationship between accruals and SPCR. Nevertheless, the work of Zhu (2016) used total accruals whereas, discretionary accrual is the only portion of

total accruals which managers can manipulate (McNichols, 2000). Therefore, this research uses discretionary accrual as a measurement of earnings management and hypothesises the following:

Hypothesis 1: Other things remaining the same, there is a positive relationship between earnings management and SPCR.

Furthermore, Ahsan Habib, Hasan & Jiang (2017) indicate that probability of stock crashes vary upon the nature of business operations. Moreover, Ben-Nasr et al., (2019) assert that innovation oriented firms are unique in their operations and information environment. Therefore, this research follows Ben-Nasr et al., (2019) who adopted the Fama & French (1997) classification of partitioning firms into innovative firms and non-innovative firms. The literature reports two confounding views about informational transparency in innovation-oriented firms. On one hand, Bhattacharya & Ritter (1983) documents that innovative firms invest more in research and development (R&D) which deter the benefits of information disclosure thus provide a chance for opportunist managers to suppress information from investors (Ellis, Fee & Thomas, 2012; Verrecchia, 1983). On the other hand, the advocates of an informational role of innovation reports show that innovative firms are more motivated in information disclosure to investors. Consistent with this point, the literature documents that show investors of innovative firms tend to keep a close eye on the performance of the firm and therefore managers will use financial and non-financial disclosure (i.e. patent information) as a signal of satisfactory performance (Bhattacharya & Ritter, 1983; Cockburn & MacGarvie, 2009) and to gain competitive advantage. Therefore, a more transparent information environment discourages managers to camouflage news and the possibility of earnings management and subsequent stock crashes are fewer in innovative firms than non-innovative firms. Based on the above discussion, we hypothesise as:

Hypothesis 2: Other things remaining the same, a positive relation between earnings management and SPCR is more pronounced in non-innovative firms compared to innovative firms.

Research Design

Data and Sample

The studied sample contains non-financial Malaysian listed firms from 2001-2017. Moreover, the calculation of earnings management requires at least 10 firms in each industry within a particular year. Therefore, all firms that belong to the industry with less than 10 observations in a particular year were dropped for that specific year. All financial data were extracted from Datastream and winsorised at 1% to remove the effect of outliers.

Model Specification

The baseline model of this study is specified in Eq 1:

$$SPCR_{t+1} = \beta_0 + \beta_1 EM_t + \beta_2\ SIZE_t + \beta_3 MTB_t + \beta_4 LEV_t + \beta_5 ROA_t + \beta_6 RET_t + \beta_7 SIGMA_t + \beta_8\ DTURN_t + \varepsilon_t \quad \text{(Eq. 1)}$$

The dependent variable of this study is stock price crash risk (SPCR), it is proxied by negative conditional skewness (NSKW) and down to up volatility (DUVL), whereas the independent variable, earnings management (EM), is estimated using discretionary accruals (EM_DA) from Kothari, Leone & Wasley (2005). Moreover, the control variables are size (SIZE), market to book ratio (MTB), leverage (LEV), returns on assets (ROA), average returns (REET), standard deviation in returns (SIGMA) and detrended turnover in shares (DTURN).

Stock Price Crash Risk

Following J. Chen, Hong & Stein (2001), J. B. Kim et al., (2011a), A. Habib & Hasan (2016), Ben-Nasr et al., (2019) and Zaman et al., (2020), a firm-specific SPCR is estimated by NSKW and DUVL. The regression analysis for the extended market model was run for each firm-year. As denoted in Eq. 2, a firm-specific weekly return is calculated as $W = \ln(1+e_{it})$, where e_{it} is the residual returns from the model given below.

$$r_{i,t} = \alpha_j + \beta_1 r_{m,t-2} + \beta_2 r_{m,t-1} + \beta_3 r_{m,t} + \beta_4 r_{m,t+1} + \beta_5 r_{m,t+2} + \varepsilon_{i,t} \quad \text{(Eq.2)}$$

Where $r_{i,t}$ and $r_{m,t}$ are the weekly stock and market returns. Lags and leads values of market index have been used to avoid synchronous trading (Dimson, 1979).

The first proxy, NSKW, captures the SPCR by third moment of returns as denoted in Eq. 3:

$$NSKW_{it} = -\frac{n(n-1)^{3/2}\sum(w_{it} - \overline{w}_{it})^3}{(n-1)(n-2)(\sum(w_{it} - \overline{w}_{it})^2)^{3/2}} \quad \text{(Eq. 3)}$$

Secondly, this study uses an alternate proxy for robustness of the results. This proxy measures SPCR by down to up volatility in stock returns. A stock whose return is more volatile toward the downside as compared to the upside is more prone to crash. DUVL is calculated by taking the natural log of standard deviation for all down weeks of the firm for a year "t" divided by the standard deviation for all up weeks of the firm for a year "t", as specified in Eq. 4:

$$DUVL_{it} = \log \frac{(n_{up} - 1) \sum_{down}(w_{it} - \overline{w}_{it})^2}{(n_{down} - 1) \sum_{up}(w_{it} - \overline{w}_{it})^2} \qquad \text{(Eq. 4)}$$

Where n_{up} and n_{down} represent weeks above and lower than the average yearly returns. The higher value of NSKW and DUVL indicate a higher likelihood of SPCR (A. Habib & Hasan, 2017a; J. B. Kim et al., 2011a).

Earnings Management

This study uses Kothari et al., (2005) model to calculate discretionary accruals, as specified in Eq. 5:

$$\frac{TAC_{it}}{TA_{it-1}} = \alpha_1 \left(\frac{1}{TA_{it-1}}\right) + \beta_1 \left(\frac{\Delta REV_{it} - \Delta REC_{it}}{TA_{it-1}}\right) + \beta_2 \left(\frac{PPE_{it}}{TA_{it-1}}\right) + \beta_3 ROA_t \qquad \text{(Eq. 5)}$$
$$+ e_t$$

In Eq. 5 TAC represents total accruals and is calculated by difference in income before extraordinary items and net operating cash flows. TA, PPE, ΔREC, ΔREV and ROA are total assets, property plant & equipment, change in receivables, change in sales and returns on assets respectively. The calculation of discretionary accruals involves two steps. Firstly, the cross-sectional regressions for each industry-year from Eq. 5 were executed with minimum 10 firms in an industry. The estimated parameters for each industry year are then plugged into Eq. 6 to achieve the amount of non-discretionary accruals for each firm on yearly basis.

$$NDAC_{i,t} = \alpha_1 \left(\frac{1}{TA_{it-1}}\right) + \beta_1 \left(\frac{\Delta REV_{it} - \Delta REC_{it}}{TA_{it-1}}\right) + \beta_2 \left(\frac{PPE_{it}}{TA_{it-1}}\right) \qquad \text{(Eq. 6)}$$
$$+ \beta_3 ROA_t$$

In the second step, discretionary accruals are measures by Eq. 7.

$$EM\_DA_{i,t} = \frac{TAC_{i,t}}{TA_{i,t-1}} - NDAC_{i,t} \qquad \text{(Eq. 7)}$$

Control Variables

The control variables of this study are market to book (MB), firm size (SIZE), leverage (LEV), return on assets (ROA), average weekly returns (RET), volatility in stock returns (SIGMA) and detrended share turnover (DTURN). An explanation for the measurement of all studied variables is presented in Table 1.

Table 1: Description of variables

Symbols	Variable s	Measurement
NSKW	Negative conditional skewness of firm-specific returns	$NSKW_{it}$ $= -\dfrac{n(n-1)^{3/2}\sum(w_{it}-\overline{w}_{it})^3}{(n-1)(n-2)(\sum(w_{it}-\overline{w}_{it})^2)^{3/2}}$
DUVL	Down-to-up volatility of firm-specific returns	$DUVL_{it}$ $= \log\dfrac{(n_{up}-1)\sum_{down}(w_{it}-\overline{w}_{it})^2}{(n_{down}-1)\sum_{up}(w_{it}-\overline{w}_{it})^2}$
EM_DA	Discretionary accruals	DA = TAC – NDAC
SIZE	Size of firm	Natural log of market value of equity
MTB	Market to Book	Ratio of market value to book value
LEV	Leverage	Ratio of total debt to total assets
ROA	Return on Assets	Ratio of net income to total assets
RET	Average firm-specific returns	Average of firm-specific weekly returns
SIGMA	Standard deviation of firm-specific returns	Standard deviation of firm-specific weekly returns
DTURN	Detrended share turnover	Difference in the trading volume

Results and Discussion

Descriptive Statistics

Table 2 presents the descriptive statistics of variables undertaken in this study. The mean of NSKW and DUVL are 0.007 and -0.038 with standard deviation of 1.1013 and 0.376 respectively. The literature suggests that the higher values of NSKW and DUVL, more will be the likelihood of SPCR. These statistics indicate that on average stocks are less prone towards a crash, however, higher standard deviation and maximum values depict the existence of SPCR. Moreover, the positive value of earnings management also shows the presence of upwards earnings management. The control variables, SIZE, MTB, LEV, ROA, REET, SIGMA and DTURN, are consistent with prior studies.

Table 2: Descriptive Statistics

Variable	Obs	Mean	Std Dev	Min	Max
NSKW	8499	0.007	1.013	-1.935	2.238
DUVL	8498	-0.038	0.376	-0.775	0.775
EM_DA$_t$	8499	0.012	0.080	-1.888	0.926
SIZE$_t$	8499	12.014	1.489	9.544	16.213
MTB$_t$	8499	1.082	0.970	0.160	5.64
LEV$_t$	8499	0.22	0.159	0.001	0.737
ROA$_t$	8499	4.437	7.148	-17.8	25.03
REET$_t$	8499	0.002	0.077	-0.199	0.192
SIGMA$_t$	8499	0.568	0.307	0.142	1.555
DTURN$_t$	8499	0.001	0.019	-0.063	0.074

Correlation Analysis

The pairwise correlation matrix between studied variables is presented in Table 3. The correlation coefficient between the proxies of SPCR (i.e. NSKW and DUVL) is 0.929, which suggest a high correlation between these proxies. This higher correlation is consistent with literature which represents the accuracy of these proxies in measuring SPCR. Moreover, the correlation between SPCR risk and earnings management is significantly positive with correlation coefficients of 0.036 and 0.017 for NSKW and DUVL, respectively. Furthermore, NSKW and DUVL have positive association with MTB, LEV, SIGMA and DTURN, whereas negative relationship with SIZE, ROA and REET respectively. The unreported result of VIF also affirms the absence of multicollinearity.

Table 3: Correlation Matrix

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) NSKW$_{t+1}$	1.000									
(2) DUVL$_{t+1}$	0.929***	1.000								
(3) EM_DA$_t$	0.036**	0.017**	1.000							
(4) SIZE$_t$	-0.074***	-0.037***	-0.023**	1.000						
(5) MTB$_t$	0.047***	0.056***	-0.084***	0.465***	1.000					
(6) LEV$_t$	0.051***	0.027**	0.093***	-0.042***	-0.011	1.000				
(7) ROA$_t$	-0.096***	-0.047***	-0.037***	0.379***	0.337***	-0.185***	1.000			
(8) REET$_t$	-0.002	0.008	-0.027**	0.154***	0.279***	-0.083***	0.230***	1.000		
(9) SIGMA$_t$	0.158***	0.099***	0.028***	-0.482***	-0.138***	0.139***	-0.315***	0.042***	1.000	
(10) DTURN$_t$	0.031**	0.022**	-0.010	0.018*	0.075***	-0.006	0.035***	0.287***	0.171***	1.000

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Regression Analysis

Table 4 shows the regression results of SPCR - earnings management nexus for full sample, and split sample of non-innovative and innovative firms. The results for the full sample analysis are presented in model 1, whereas results of non-innovative and innovative firms are reported in models 2-3 respectively. The findings of the full sample reveal that earnings management has significant positive impact on SPCR *(β = 0.434, p < 0.01)*. Along with the statistical significance, these findings are economically meaningful. For instance, a rise in one standard deviation in earnings management leads to an increase of 3.42% (0.434*0.079) in SPCR. This result supports Hypothesis 1 positing that earnings management augments SPCR. The results from the split sample of non-innovative and innovative firms reports a significant positive association in earnings management and SPCR for non-innovative firms *(β = 0.448, p < 0.01)*, whereas the coefficient of innovative firms is also positive but statistically insignificant *(β = 0.295, p > 0.1)*.

Table 4: Regression Results for Earnings Management and Stock Price Crash Risk Nexus

Variables	All Firms	Non-Innovative Firms	Innovative Firms
	$NCSKW_{t+1}$	$NCSKW_{t+1}$	$NCSKW_{t+1}$
EM_DA_t	0.434***	0.448***	0.295
	(0.151)	(0.160)	(0.411)
$SIZE_t$	0.241***	0.219***	0.315***
	(0.026)	(0.028)	(0.064)
MTB_t	0.132***	0.147***	0.064
	(0.024)	(0.025)	(0.062)
LEV_t	0.287**	0.276**	0.230
	(0.120)	(0.135)	(0.279)
ROA_t	-0.016***	-0.014***	-0.020***
	(0.002)	(0.003)	(0.005)
$REET_t$	0.396*	0.266	0.962*
	(0.204)	(0.228)	(0.497)
$SIGMA_t$	0.219***	0.204***	0.254*
	(0.062)	(0.068)	(0.129)
$DTURN_t$	0.218	0.456	-0.595
	(0.576)	(0.648)	(1.173)
Constant	-3.314***	-3.070***	-4.063***
	(0.301)	(0.327)	(0.718)
Year FE	Included	included	Included
Observations	8,499	7,102	1,397
R-squared	0.105	0.107	0.137

Note: Robust standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Additional Analysis

Non-Linear Relationship

The results for examining the non-linear relationship are given in Table 5. In the literature, few studies report a non-linear association in earnings management and firm performance. For instance, Wu (2014) reports that a linear model may create biased inference and may result in measurement error in the association of accruals and performance. Therefore, this study examines the existence of a non-linear U-shape relationship by including a measurement of square-root of DA into the model to address the potential concerns of non-linearity. The results for the coefficients of SQRT*DA are statistically insignificant for the full sample and split sample of non-innovative firms and innovative firms respectively. These findings conclude the absence of non-linear relationship between SPCR and earnings management.

Table 5: Regression Results for Non-Linearity of Relationship

Variables	All Firms	Non-Innovative Firms	Innovative Firms
	NCSKW_{t+1}	NCSKW_{t+1}	NCSKW_{t+1}
EM_DA_t	0.430***	0.446***	0.378
	(0.155)	(0.167)	(0.400)
$(\text{EM\_DA}_t)^2$	-0.078	-0.024	-2.120
	(0.159)	(0.149)	(1.570)
SIZE_t	0.241***	0.219***	0.313***
	(0.026)	(0.028)	(0.065)
MTB_t	0.132***	0.147***	0.065
	(0.024)	(0.025)	(0.063)
LEV_t	0.287**	0.277**	0.233
	(0.120)	(0.135)	(0.278)
ROA_t	-0.016***	-0.014***	-0.019***
	(0.002)	(0.003)	(0.005)
REET_t	0.398*	0.267	0.985**
	(0.204)	(0.228)	(0.493)
SIGMA_t	0.219***	0.204***	0.259**
	(0.062)	(0.068)	(0.129)
DTURN_t	0.216	0.455	-0.604
	(0.576)	(0.648)	(1.186)
Constant	-3.313***	-3.070***	-4.042***
	(0.301)	(0.327)	(0.732)
Year FE	Included	included	Included
Observations	8,499	7,102	1,397
R-squared	0.105	0.107	0.138

Note: Robust standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Robustness by Alternative Proxy of Stock Price Crash Risk

Prior studies have also used down-to-up volatility as an alternate proxy of SPCR. As the composition of DUVL does not require the 3rd moment of returns and therefore, is less likely to be influenced by extreme weekly returns (A. Habib & Hasan, 2017b; Y. Kim, Li & Li, 2014; J. Xu & Zou, 2019). Table 6 shows the findings for DUVL which are similar to prior findings.

Table 6: Regression Results for Alternative Proxy of Stock Price Crash Risk

Variables	All Firms	Non-Innovative Firms	Innovative Firms
	$DUVOL_{t+1}$	$DUVOL_{t+1}$	$DUVOL_{t+1}$
EM_DA_t	0.132**	0.125**	0.138
	(0.544)	(0.058)	(0.150)
$SIZE_t$	0.053***	0.043***	0.092***
	(0.010)	(0.010)	(0.022)
MTB_t	0.045***	0.047***	0.031
	(0.008)	(0.009)	(0.022)
LEV_t	0.108**	0.108**	0.090
	(0.044)	(0.050)	(0.101)
ROA_t	-0.005***	-0.004***	-0.005***
	(0.001)	(0.001)	(0.002)
$REET_t$	0.168**	0.113	0.378**
	(0.076)	(0.084)	(0.185)
$SIGMA_t$	0.046**	0.038	0.073
	(0.022)	(0.025)	(0.051)
$DTURN_t$	0.007	0.073	-0.286
	(0.228)	(0.255)	(0.508)
Constant	-0.792***	-0.668***	-1.225***
	(0.111)	(0.121)	(0.256)
Year FE	included	included	Included
Observations	8,498	7,101	1,397
R-squared	0.071	0.071	0.107

Note: Robust standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Robustness by Alternative Estimation Regression Model (GMM)

The results presented in the prior section suggest that SPCR are more in firms with more earnings management activities. Nevertheless, the findings can be biased due to endogeneity, therefore this study uses the system GMM technique adopted by Arellano & Bover (1995) and Blundell & Bond (1998). This approach helps to control the issue of endogeneity and unobserved heterogeneity. In order to substantiate the results of GMM, the diagnostic tests of no second order autocorrelation and Hansen test for instruments validity were performed.

Table 7 reports the insignificance of AR (2) which indicates no second order serial correlation. Moreover, the statistically insignificant Hansen test indicates the validity of instruments. The findings in Table VII affirm the positive association of earnings management and SPCR and supported by the diagnostic tests. For instance, the result from the full sample suggest positive association in earnings management and SPCR *(β = 0.654, p < 0.01)*. Moreover, the result from split sample demonstrate that earnings management has insignificant relationship with SPCR for innovative firms, whereas the relationship is significantly positive for non-innovative firms *(β = 0.598, p < 0.05)*.

Table 7: Regression Results for Alternative Estimation Technique (System GMM)

Variables	All Firms	Non-Innovative Firms	Innovative Firms
	NSKW $_{t+1}$	NSKW $_{t+1}$	NSKW $_{t+1}$
NSKW(-1)	0.181***	0.158***	0.250*
	(0.033)	(0.033)	(0.129)
EM_DA$_t$	0.654***	0.598**	0.724
	(0.245)	(0.244)	(0.607)
SIZE$_t$	0.702***	0.526***	0.342*
	(0.113)	(0.114)	(0.187)
MTB$_t$	-0.160	0.200	-0.004
	(0.208)	(0.230)	(0.214)
LEV$_t$	-0.911	0.408	-1.338*
	(0.945)	(0.989)	(0.759)
ROA$_t$	-0.020***	-0.016***	-0.009
	(0.004)	(0.005)	(0.010)
REET$_t$	0.5318***	0.404***	0.754***
	(0.093)	(0.092)	(0.2255)
SIGMA$_t$	0.606	0.711*	0.538
	(0.386)	(0.366)	(0.892)
DTURN$_t$	-1.903	0.176	-6.547
	(3.885)	(4.083)	(4.077)
Constant	-8.710***	-6.198***	-3.614
	(1.228)	(2.290)	(2.545)
AR(1) p-value	0.000	0.000	0.000
AR(2) p-value	0.650	0.340	0.972
Hansen J-Stat	0.157	0.162	0.382
Instruments	122	125	49
Cross Sections	642	530	112

Note: Robust standard errors in parentheses, *** p < 0.01, ** p < 0.05, * p < 0.1

Conclusion

This study empirically investigates the earnings management and SPCR nexus for non-financial listed firms in Malaysia from 2001-2017. The panel data regression estimation approach was used for the preliminary analysis of earnings management and SPCR. The findings from multivariate regression analysis suggest a significant positive association between earnings management and SPCR. The results posit that managers may conduct earnings management activities to suppress bad news from the investors for an extended time span. However, once they continue to suppress the unfavourable news, it reaches a threshold level and the accumulated hidden information will then be exposed to investors. Consequently, the investors will respond negatively to this hidden bad news which leads to an extreme downward fall in stock i.e. stock crash. This study finds consistent results with previous studies; however, this study adds to existing literature by exploring the association of earnings management and SPCR for non-innovative and innovative firm. The results from the split sample suggest a significant positive relationship between earnings management and SPCR for non-innovative firms. These findings can be useful for decision makers and regulatory authorities in improving the disclosure regulation for Malaysian firms that may shield firms from stock price crashes. Moreover, the results are also meaningful for risk management and portfolio diversification of investors. However, the findings are limited to Malaysian firms operating under the Malaysian code of conduct, hence, future research can extend the works in the context of other economies.

REFERENCES

Aghghaleh, S. F., Mohamed, Z. M., & Rahmat, M. M. (2016). Detecting financial statement frauds in Malaysia: comparing the abilities of Beneish and Dechow Models. Asian Journal of Accounting and Governance, 7, 57-65.

Alvarado, N. R., De Fuentes, P., & Laffarga, J. (2019). Do auditors mitigate earnings manageme nt during economic crisis? Revista de Contabilidad-Spanish Accounting Review, 22(1), 6-20.

An, H., & Zhang, T. (2013). Stock price synchronicity, crash risk, and institutional investors. Journal of Corporate Finance, 21, 1-15.

An, Z., Li, D., & Yu, J. (2015). Firm crash risk, information environment, and speed of leverage adjustment. Journal of Corporate Finance, 31, 132-151.

Andreou, P. C., Antoniou, C., Horton, J., & Louca, C. (2016). Corporate Governance and Firm-specific Stock Price Crashes. European Financial Management, 22(5), 916-956.

Andreou, P. C., Louca, C., & Petrou, A. P. (2017). CEO Age and Stock Price Crash Risk. Review of Finance, 21(3), 1287-1325. doi: 10.1093/rof/rfw056

Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. Journal of econometrics, 68(1), 29-51.

Ben-Nasr, H., & Ghouma, H. (2018). Employee welfare and stock price crash risk. Journal of Corporate Finance, 48, 700-725. doi: 10.1016/j.jcorpfin.2017.12.007

Ben-Nasr, H., Bouslimi, L., & Zhong, R. (2019). Do Patented Innovations Reduce Stock Price Crash Risk? International Review of Finance. 12, 36, 158-169.

Bhattacharya, S., & Ritter, J. R. (1983). Innovation and communication: Signalling with partial disclosure. The Review of Economic Studies, 50(2), 331-346.

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. Journal of econometrics, 87(1), 115-143.

Callen, J. L., & Fang, X. (2013). Institutional investor stability and crash risk: Monitoring versus short-termism? Journal of Banking & Finance, 37(8), 3047-3063.

Chen, C. L., Kim, J. B., & Yao, L. (2017). Earnings smoothing: Does it exacerbate or constrain stock price crash risk? Journal of Corporate Finance, 42, 36-54. doi: 10.1016/j.jcorpfin.2016.11.004

Chen, J., Hong, H., & Stein, J. C. (2001). Forecasting crashes: Trading volume, past returns, and conditional skewness in stock prices. Journal of financial economics, 61(3), 345-381.

Cockburn, I. M., & MacGarvie, M. J. (2009). Patents, thickets and the financing of early-stage firms: evidence from the software industry. Journal of Economics & Management Strategy, 18(3), 729-773.

Dimson, E. (1979). Risk measurement when shares are subject to infrequent trading. Journal of financial economics, 7(2), 197-226.

Ellis, J. A., Fee, C. E., & Thomas, S. E. (2012). Proprietary costs and the disclosure of information about customers. Journal of Accounting Research, 50(3), 685-727.

Fama, E. F., & French, K. R. (1997). Industry costs of equity. Journal of financial economics, 43(2), 153-193.

Francis, B., Hasan, I., & Li, L. (2016). Abnormal real operations, real earnings management, and subsequent crashes in stock prices. Review of Quantitative Finance and Accounting, 46(2), 217-260.

Habib, A., & Hasan, M. M. (2016). Auditor-provided tax services and stock price crash risk. Accounting and Business Research, 46(1), 51-82. doi: 10.1080/00014788.2015.1035222

Habib, A., & Hasan, M. M. (2017a). Business strategy, overvalued equities, and stock price crash risk. Research in International Business and Finance, 39, 389-405. doi: 10.1016/j.ribaf.2016.09.011

Habib, A., & Hasan, M. M. (2017b). Managerial ability, investment efficiency and stock price crash risk. Research in International Business and Finance, 42, 262-274. doi: 10.1016/j.ribaf.2017.07.048

Habib, A., Hasan, M. M., & Jiang, H. (2017). Stock price crash risk: Review of the empirical literature. Accounting & Finance. 116, 184-196.

Harris, O., Karl, J. B., & Lawrence, E. (2019). CEO compensation and earnings management: Does gender really matters? Journal of Business Research, 98, 1-14.

Hasnan, S., Rahman, R. A., & Mahenthiran, S. (2012). Management motive, weak governance, earnings management, and fraudulent financial reporting: Malaysian evidence. Journal of International Accounting Research, 12(1), 1-27.

Healy, P. M., & Wahlen, J. M. (1999). A review of the earnings management literature and its implications for standard setting. Accounting horizons, 13(4), 365-383.

Hutton, A. P., Marcus, A. J., & Tehranian, H. (2009). Opaque financial reports, R2, and crash risk. Journal of financial economics, 94(1), 67-86.

Jin, L., & Myers, S. C. (2006). R2 around the world: New theory and new tests. Journal of financial economics, 79(2), 257-292.

Kan, Y. Y. (2018). Capital market offenses in Malaysia. Qualitative Research in Financial Markets. 11,2, 114-123.

Khurana, I. K., Pereira, R., & Zhang, E. (2018). Is Real Earnings Smoothing Harmful? Evidence from Firm-Specific Stock Price Crash Risk. Contemporary Accounting Research, 35(1), 558-587. doi: 10.1111/1911-3846.12353

Kim, J.-B., Li, Y., & Zhang, L. (2011b). CFOs versus CEOs: Equity incentives and crashes. Journal of financial economics, 101(3), 713-730.

Kim, J. B., Li, Y. H., & Zhang, L. D. (2011a). Corporate tax avoidance and stock price crash risk: Firm-level analysis. Journal of financial economics, 100(3), 639-662. doi: 10.1016/j.jfineco.2010.07.007

Kim, Y., Li, H. D., & Li, S. Q. (2014). Corporate social responsibility and stock price crash risk. Journal of Banking & Finance, 43, 1-13. doi: 10.1016/j.jbankfin.2014.02.013

Kothari, S. P., Leone, A. J., & Wasley, C. E. (2005). Performance matched discretionary accrual measures. Journal of accounting and economics, 39(1), 163-197.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. (2002). Investor protection and corporate valuation. The Journal of Finance, 57(3), 1147-1170.

Li, X. R., Wang, S. S., & Wang, X. (2017). Trust and stock price crash risk: Evidence from China. Journal of Banking & Finance, 76, 74-91. doi: 10.1016/j.jbankfin.2016.12.003

McNichols, M. F. (2000). Research design issues in earnings management studies. Journal of Accounting and public Policy, 19(4-5), 313-345.

Omar, N., Said, R., & Johari, Z. A. (2016). Corporate crimes in Malaysia: a profile analysis. Journal of Financial Crime. 28, 158-169.

Salter, S. B. (1998). Corporate financial disclosure in emerging markets: does economic development matter? The International Journal of Accounting, 33(2), 211-234.

Verrecchia, R. E. (1983). Discretionary disclosure. Journal of accounting and economics, 5, 179-194.

Wu, R.-S. (2014). Predicting earnings management: A nonlinear approach. International Review of Economics & Finance, 30, 1-25.

Xu, J., & Zou, L. (2019). The impact of CEO pay and its disclosure on stock price crash risk: evidence from China. China Finance Review International. 114, 89-96.

Xu, N. H., Li, X. R., Yuan, Q. B., & Chan, K. C. (2014). Excess perks and stock price crash risk: Evidence from China. Journal of Corporate Finance, 25, 419-434. doi: 10.1016/j.jcorpfin.2014.01.006

Zaman, R., Bahadar, S., & Mahmood, H. (2020). Corporate irresponsibility and stock price crash risk. International Review of Finance. 2, 6, 205-236.

Zhang, M., Xie, L., & Xu, H. R. (2016). Corporate Philanthropy and Stock Price Crash Risk: Evidence from China. Journal of Business Ethics, 139(3), 595-617. doi: 10.1007/s10551-015-2647-8

Zhu, W. (2016). Accruals and price crashes. Review of Accounting Studies, 21(2), 349-399.