Print ISSN: 2288-4637 / Online ISSN 2288-4645
doi:10.13106/jafeb.2021.vol8.no1.623

Information Risk and Cost of Equity: The Role of Stock Price Crash Risk

Sana SALEEM[1], Muhammad USMAN[2]

Received: September 30, 2020 Revised: November 22, 2020 Accepted: December 14, 2020

Abstract

The purpose of this research is to examine the impact of information risk on the Cost of Equity (COE) and whether the risk of a stock price crash mediates the relation between information risk and COE. To test the dynamic nature of the proposed model, the two-step system GMM dynamic panel estimators are applied to all the non-financial firms listed on the Pakistan Stock Exchange (PSX) from 2007- 2018. The results of this study show that all three types of information risk, as well as the risk of the share price crash, increases the COE. The crash risk strengthens the impact of information risk on the COE. Moreover, these three information risks are correlated with each other and an increase in information quality reduces the effect of asymmetric information and improves the investor interpreting ability, while an increase in private information decreases the transparency. The finding is crucial for asset pricing, portfolio management, and information disclosure. This study contributes to the literature by providing novel findings on the impact of three different types of information risk, i.e. private information, quality of information, and transparency of information on the COE as well as whether crash risk mediates the relationship.

Keywords: Information Risk, Stock Price Crash Risk, Private Information, Information Quality, Transparency of Information, Cost of Equity

JEL Classification Code: G11, G12, G14, G15

1. Introduction

Cost of equity (COE) is an important concept in financial decision making. Managers always consider the importance of COE while taking various financial decisions. These financial decisions affect the firm's long-term growth, commitment to a large number of funds, and associated risks as well (Pandey, 2005). In this scenario, information risk has gained much importance as it is believed to have a strong influence on stock prices as well as on the COE. There is much debate over the issue in the literature but the debate is non-conclusive. Traditional asset pricing models did not include information risk and they believed it was diversifiable. As a result, it did not account for a risk premium (Butt & Sadaqat, 2020).

In contrast, this literature provides considerable evidence of the significant relationship between these two constructs. We contribute to this debate by investigating, empirically, the impact of information risk on COE. Easley and O'Hara (2004) conducted one of the earlier studies on the topic. They found, investors with low information demand risk premium for asymmetric information. However, Lambert, Leuz, and Verrecchia (2007) argued that it is not asymmetric information rather it is the quality of information that determines the COE. Despite the diverse perspectives, both the models present a certain level of common ground. Easley and O'Hara (2004) identified the significant role of asymmetric information, while Lambert, Leuz, and Verrecchia (2007) recognized the role of information accuracy, on the COE. Both the models assumed that stability in asset prices is affected by information risk which causes dissimilarities in expected returns. Similarly, Francis et al. (2005) also provided a similar piece of evidence.

Barth, Konchitchki, and Landsman (2013) highlighted another source of information risk termed as information

[1]First Author. [1] PhD Scholar, Department of Management Sciences, University of Gujrat, Gujrat, Pakistan [2] Lahore School of Business, University of Lahore, Pakistan. Email: sana.saleem@lbs.uol.edu.pk
[2]Corresponding Author. Assistant Professor, Department of Management Sciences, University of Gujrat, Gujrat, Pakistan [Postal Address: University of Gujrat Hafiz Hayat Campus, Gujrat, 50700, Pakistan] Email: drusman@uog.edu.pk ; usmanhust@gmail.com

transparency; the degree to which financial reports divulge a firm's true business performance to intelligible investors and other stakeholders. This study argues that information risk is comprehensive and dynamic in nature. The information risk is not restricted to the poor reporting quality but also linked to the interpretability of information by investors. Theoretically, it is argued that transparency in financial reporting will decrease the COE as transparency minimizes the information risk.

On the other hand, these variants of information risk led to another grave risk faced by investors, the unexpected crash in share prices. Jin and Myers (2006) argued that the risk of a share price crash is instigated by the accumulation and stockpile of negative news. Managers hide the negative news by manipulating the earnings (Hutton, Marcus, & Tehranian, 2009; DeFond et al., 2014; Kim & Zhang, 2014, 2016). Therefore, when the stock prices fluctuate, investors demand a higher return for increased uncertainty and risk (Liu & Ren, 2019).

This study is inspired by the interesting debate over the role of information risk in defining COC, and further, the mediating role of crash risk. In this respect, the unique capital market environment in Pakistan provides an opportunity to examine the issue in a setting, unlike established capital markets.

As in developing countries like Pakistan, financial reporting quality is not that good resulting in a lack of quality and transparency of information. The implementation of regulations is weak, and the acquisition of exact information is costly. This fragile public information system in these developing markets provide corporate managers with higher liberty to withhold negative news from investors, leading to more conspicuous crash risk in these markets compared with developed markets.

However, the present study contributes to the existing finance literature in many ways. First, the current study backs the theoretical dispute that information risk does affect asset prices (Easley & O'Hara, 2004; Easley & O'Hara, 2003; Lambert, Leuz, & Verrecchia, 2007). Earlier studies used one source of information risks such as private information (Easley, Hvidkjaer, & O'Hara, 2002), information quality (Kim & Qi, 2010; Ogneva, 2008), and information transparency (Barth, Konchitchki, & Landsman 2013). However, this study considers all three sources of information risk.

Further, in contrast to Bae, An, and Kim (2020) who found out the impact of information quality on COE by considering the mediating role of market risk, liquidity risk, and information asymmetry, failed to consider the potential source of endogeneity between information quality and COE. However, this study tries to find out the mediating role of the risk of stock price crash between the information risk and COE. The role of stock price crash risk is considered as a mediator in this study because, in the case of a developing country like Pakistan, the financial reporting quality is poor due to the weak regulations, which makes the acquisition of actual information costly and increases the information risk. This opaque information environment affects the investor's ability to interpret the financial reports and creates uncertainty about the fluctuation in future stock prices. Therefore, the investor increases risk premium causing a further increase in COE. Moreover, this study also accounts for the potential source of endogeneity between the concerned variables by making the model dynamic.

2. Literature Review

Traditional asset pricing models recommended that information disclosure risk is completely diversifiable by investors, thus it should not be considered as a factor in the COE (Fama, 1991). This traditional view has been challenged in numerous studies (Leland, 1992; Wang, 1998; Easley & O'Hara, 2004) emphasizing the association between information irregularity and COE. Wang (1993) developed a multi-period asset pricing model and suggested the two effects of information asymmetry on equilibrium asset prices. First, the existence of uninformed investors increases the risk premium. Supply shocks can affect the risk premium only under asymmetric information. Information asymmetry among investors can increase price volatility and negative autocorrelation in returns. Second, informed trading makes the prices more informative and decrease the risk for less-informed investors, thus reducing the COE.

Leland (1992) argued that private information increases the share prices on average, and the presence of insiders makes prices more informative. Even though he does not phrase his investigation in terms of COC, but on average, higher share prices commensurate with the decline in COC. Bhattacharya et al. (2000) stated that shares trading in the Mexican Stock Exchange (MSX) do not seem to react to company news. They found that there is nothing unusual about returns, the volatility of returns, volume of trade, or bid-ask spreads. hey provided evidence that suggested that unrestricted insider trading causes prices to fully incorporate the information before its public release.

Easley and O'Hara (2004) investigated the role of information in affecting a firm's COE. They showed that differences in the composition of information between public and private information affect the COE, with investors demanding a higher return to hold stocks with greater private information. This higher return arises because informed investors are better able to shift their portfolio to incorporate new information, and uninformed investors are thus disadvantaged. Besides, they also noticed the role of

information precision which reduces the COE by reducing the information risk faced by uninformed investors

Lambert, Leuz, and Verrecchia (2007) argued that information precision affects the prices and makes the information risk diversifiable, arisen through private information under the assumption of perfect competition. They define precision as the quality of expected cash flows and this average quality of cash flows determines the firm's expected returns and thus, affects the COE. Irrespective of different viewpoints, Easley and O'Hara (2004) and Lambert, Leuz, and Verrecchia (2007) have shared a few common points as well. Easley and O'Hara (2004) acknowledged that information asymmetry is reduced by precision, while Lambert, Leuz, and Verrecchia (2007) recognized information asymmetry becomes important in the presence of an imperfect market. However, they suggested that stability in prices is affected by information disclosure risk which may cause differences in the expected rate of return.

Botosan, Plumlee, and Xie, (2004) argued that COE increases with the accuracy of private information while declines with the accuracy of public information. They examined the relationship between the cost of COE and the quality of public and private information. They found an inverse relationship between the COE and the precision of public information, but the effect is more than offset by a positive relationship between the COE and the precision of private information. Francis et al (2005) examined the effect of disclosure, measured by the accuracy of public information, in the capital market. They provided empirical support for this and they reexamined the interplay of accruals quality, information risk, and COE, where several important institutional and regulatory differences are hypothesized to affect the relation between accruals quality and COE. The results suggested that, while accruals quality impacts on the COE for firms, some salient differences exist. Francis et al. (2005) also provided empirical support for the association between information risk and the cost of capital. Using the quality of accruals as a proxy for information risk, report that firms with poorer accruals quality exhibit higher costs of debt and equity capital than firms with better accruals quality.

Hong, Ma, and Zhang (2019) also suggested that earning quality is inversely correlated with share prices. Patton and Verardo (2012) and Xing and Yan (2019) demonstrated that disclosed annual reports reveal information not only about the prospects of the firm but also about its peer and largely the entire economy. Therefore, investors can use this information to rectify their expectations about the firm's profitability and the whole economy in general. Shakespeare (2020) and Saleh, Afifa, and Alsufy (2020) investigated the importance of earnings quality as a determinant of firm performance. The results of this study suggested that the higher control level on the behavior of the managers and its consequence will have an impact on earnings quality, and therefore the firm performance increases. Besides, the high relevance of accounting information will enhance earnings quality, and therefore earnings quality with the interaction factors of the firm's environment work on enhancing performance.

Another stream of associated studies reflects the role of earning's transparency and one more source of information risk. Although transparency has been defined as a required feature of annual reports, transparency is not precisely described in terms of financial reporting. However, earlier studies exhibited that there exists an inverse relationship between COE and information transparency (Barth & Schipper, 2008; Dasgupta, Gan, & Gao, 2010; Barth, Konchitchki, & Landsman, 2013; Zhan & Li, 2014). Thus, earnings transparency will decrease the COE only if decreases the problem of asymmetric information.

Zhan and Li (2014) reasoned that the degree to which the investors can fully comprehend the content related to information and attempt to make the investment decisions will also influence the investment risk. Investor's capacity to understand the information is a notion applicable to the entire group of investors, not just a few of them. As the investors hold heterogeneous beliefs and skills, their interpreting ability gets reflected in stock prices. Leong and Hazelton (2019) argued that information disclosure alone does not bring the change until the user can understand or receive the relevant information related to their goal. Changes will only come about if investors receive information relevant to their goals and are able to translate it into political action.

Above discussion lead to the development of the following hypotheses, by bearing in mind the role of information risk raised from private information, information quality, and information transparency on COE:

H1*: Information risk increases the cost of equity (COE)*

H1a*: Private Information is positively related to the cost of equity (COE)*

H1b*: Information Quality is negatively related to the cost of equity (COE)*

H1c*: Information Transparency is negatively related to the cost of equity (COE)*

2.1. Information Risk and Cost of Equity: Mediating Role of Stock Price Crash Risk

Another severe risk confronted in the stock market is the unexpected crash in the share price. Jin and Myers (2006) argued that the risk of a share price crash is instigated by the accumulation and stockpile of negative news by managers, due to the lack of corporate transparency. Literature shows that crash in share prices is lower when the quality of

financial reporting improves (Hutton, Marcus, & Tehranian, 2009; Kim et al., 2011; and Kim & Zhang, 2016). In most developing markets, financial and accounting information is of poor quality. A weak public information system in these developing markets make managers suppress negative news, leading to the obvious risk of a stock price crash.

Literature also indicates that by having private information insiders perform successfully (Seyhun, 1990; John & Lang, 1991; Ke, Huddart, & Petroni, 2003). Insider trading returns signify a kind of reparation for managers (Roulstones, 2003; Denis & Xu, 2013). Seyhun (1992) exhibited that top executives earned a 9% abnormal return in sub-sequential trading in the open market. Since top executives are in a better position to get superior information, they are less inclined to take efforts for increasing the firm value. (Levmore, 1982; Manove, 1989; Ausubel, 1990). Therefore, crash risk can be decreased to a larger extent by controlling insider trading.

The ability of corporate executives to gain significant profit from exploiting the private information incentivizes them to suppress bad news, leading to inflated stock prices. Nonetheless, bad news cannot be suppressed beyond a certain level, therefore, the abrupt release of negative news stimulates the bubble to burst and crashes the share price (Jin & Myers, 2006; Hutton, Marcus,& Tehranian, 2009). Similarly, in the environment of weak minority protection and information opaqueness, the board of directors and incumbent shareholders are not in the position to take corrective intercession which ultimately brings a crash in stock prices. (Bleck & Liu, 2007).

In sum, information risk arises from private information, lack of quality, and transparency of information which leads to the risk of a crash. Therefore, due to information asymmetry, when crash risk increases, investors will demand a high return (Liu & Ren, 2019). This leads to the development of the second hypothesis as follow:

H2a: *Stock price crash risk mediates the relationship between private information and the cost of equity (COE)*

H2b: *Stock price crash risk mediates the relationship between information quality and cost of equity (COE)*

H2c*: Stock price crash risk mediates the relationship between Information transparency and cost of equity (COE)*

3. Methodology

There are a total of 559 companies listed on the Pakistan Stock Exchange (PSX). For empirical analysis, the financial sector is excluded from the sample. There are a total of 430 non-financial firms listed on the PSX and data is obtained from annual reports published by these firms. Share price data is obtained from the business recorder. A time period of twelve years from 2007 to 2018 is covered.

3.1. Variables Description

3.1.1. Private Information: Price Non-Synchronicity

This study uses price informativeness as a measure of private information, represented by the variance of firm-specific returns (Roll, 1986). Variations in stock returns can be broken down into various elements like; market-wide, industry-wide, and firm-level variation. The first two elements account for the systematic variation while the firm-specific variation captures price informativeness. This can be estimated by taking R square from the following equation:

$$ri_{i,j} = \beta_{i,0} + \beta_{i,m} r_{m,t} + \beta_{i,j} \beta r_{i,j} + \varepsilon_{ij} \quad (1)$$

Where, $\boldsymbol{ri_{j,w,j}}$, firm's return, is regressed on market return $\boldsymbol{r_{m,w,t}}$ and industry return $r_{i2,w,t}$. Returns are based on weekly data. Unlike Roll (1986), this study used the industry return in addition to market return by following the Durnev et al. (2003). Industry return is measured by the following model:

$$r_{i2,w,t} = \frac{\sum_{k \in i2} W_{k,w,t} r_{k,w,t} - W_{j,w,t} r_{j,w,t}}{J_{i2} - 1} \quad (2)$$

Where $W_{k,w,t}$ is the value weight of firm k in industry i_2 in week w and Ji_2 is the number of firms in industry i_2. After that, the variance of $\varepsilon_{j,w,t}$ is divided by the total variance of the dependent variable used in eq 1 to obtain the following model:

$$\Psi_{j,t} = \frac{\sum_{W \in t} \varepsilon^2_{j,w,t}}{\sum_{w \in t} (r_{j,w,t} - \bar{r}_{j,t})^2} \quad (3)$$

Equation (3) is estimated for each firm in each year. A higher value of $\psi_{j,t}$ depicts that a greater amount of firm-specific information is realized by informed traders in share prices.

3.1.2. Information Quality

This study uses AQ, developed by Dechow and Dichev (2002), to measure information quality:

$$TCA_{it} = \beta_0 + \beta_1 CFO_{i(t-1)} + \beta_2 CFO_{it} + \beta_3 CFO_{i(t+1)} + \varepsilon_{it} \quad (4)$$

Later on, Francis et al. (2005) updated this model by adding two more factors of accruals:

$$TCA_{it} = \beta_0 + \beta_1 CFO_{i(t-1)} + \beta_2 CFO_{it} + \beta_3 CFO_{i(t+1)} \beta_4 \Delta REV_{it} + \beta_5 PPE_{it} + \varepsilon_{it} \quad (5)$$

Where *i* indicate firm and *t* is for time. ΔREV is the change in sales and assets. Equation 4 is estimated for each industry group in each year. A firm's reporting quality is determined by taking the standard deviation of the residual (obtained from equation 5) over the 5 years, and a high value of AQ indicates the less quality information available to investors (Amrah & Obaid, 2019).

3.1.3. Information Transparency

This study uses the earning transparency developed by Barth, Konchitchki, and Landsman (2013) as the measure of investor's capability to interpret the information disclosed in financial reports. This measure is operationalized by performing three steps. In the first step, regression is conducted in consonance with equation (3) for each industry in each year to calculate the covariance of earnings with returns, depicted by adjusted R square in equation (6) denoted by TRANSI.

$$RET_{i,t,t} = a_0^I + a_1^I E_{i,j,t} / P_{i,j,t-1} + a_2^I \Delta E_{i,j,t} / P_{i,j,t-1} + \varepsilon_{i,j,t} \quad (6)$$

Where RET is the firm's annual return, Et/P_{t-1} is earnings divided by lagged price and ΔE changes in earnings. Earnings and changes in earnings are divided by price to make it consistent with the return.

In the second step, companies are divided into three groups from smaller to larger based on the value of residual derived from equation (6). After that, regression is conducted in each group as depicted in equation (7). Likewise, the adjusted R square represents the co-variance of earnings and change in earnings with returns on each firm group denoted by TRANSIN

$$RET_{i,p,t} = a_0^{IN} + a_1^{IN} E_{i,p,t} / P_{i,p,t-1} + a_2^{IN} \Delta E_{i,p,t} / P_{i,p,t-1} + \varepsilon_{i,p,t} \quad (7)$$

Finally, the adjusted R square in equation 3 and 4 are added to get the earnings Transparency

$$TRANS_{i,t} = TRANSI_{j,t} + TRANSIN_{p,t} \quad (7.1)$$

3.1.4. Cost of Equity (COE)

In this study, COE is measured by subtracting the risk-free rate from the annual stock return, denoted by Ri-Rf (Huang & Kang, 2018).

3.2. Mediating Variable: Stock Price Crash Risk

To calculate the crash risk, this study first estimates the weekly returns (Wiτ) by taking residual from the following model:

$$r_{j,t} = a_j + \beta 1_{,j} r_{m,t-1} + \beta 2_{,j} r_{m,t-1} + \beta 3_{,j} r_{m,t+1} + 1 + \beta 1_{,j} r_{m,t+2} + \varepsilon_{j,t} \quad (8)$$

Where, $r_{j,t}$ is the return of firm *i* in week *t*, $r_{m,t}$ is the market return in week *t*.To control the effect of non-synchronous trading, lag and lead values of market returns are used (Dimson, 1979; Scholes & Williams, 1977). After that, the natural logarithm of one plus the residual estimated from eq (9) is taken to compute the weekly return (W iτ)i.e

$$W_{i\,t} = ln\ (1 + \varepsilon i,\ t) \quad (9)$$

Finally, negative conditional skewness of the weekly returns is used to determine crash risk which is as follows:

$$NCSKEW = [n(n-1)^{\frac{3}{2}} \sum w^{3jt}] / [(n-1)(n-2)(\sum w^{2jt})^{\frac{3}{2}}] \quad (10)$$

Where n is the number of weeks.

3.3. Control Variables

The natural logarithm of a firm's total assets is used as a measure of firm size. (Kamran & Shah, 2014). Leverage (LEVG) is determined as long-term debt deflated by total assets (Dimitropoulos & Asteriou, 2010; Kamran & Shah, 2014). The market value of equity is deflated by the book value of equity to figure out the B/M ratio. Beta is taken as a proxy of systemic risk. ROA as a measure of profitability is measured by dividing the net income by total assets.

3.4. Empirical Model

To test the hypotheses developed above and to check the mediating role of stock crash risk between the concerned variables, the following empirical models are analyzed:

First, the effect of information risk on the COE is examined by using the following empirical model:

$$COE_{i,t} = \beta_0 + \beta_1 COE_{t-1} + \beta_2 IR_{i,t-1,\tau} + \beta_3 Size_{i,t-1} + \beta_4 Lev_{i,t-1} + \beta_5 \beta eta_{i,t-1} + \varepsilon \quad (11)$$

Secondly, one can consider whether the crash risk mediates the relation between COE and information risk by following the procedure of Baron and Kenny (1986) as given:

$$COE_{i,t} = \beta_0 + \beta_1 COE_{t-1} + \beta_2 IR_{i,t-1,\tau} + \beta_3 Size_{i,t-1} + \beta_4 Lev_{i,t-1} + \beta_5 \beta eta_{i,t-1} + \varepsilon \quad (12)$$

$$CRASH_{i,t} = \beta_0 + \beta_1 Crash_{i,t-1} + \beta_2 IR_{i,t-1,\tau} + \beta_3 Size_{i,t-1} + \beta_4 Lev_{i,t-1} + \beta_5 BM_{i,t-1} + \varepsilon \quad (13)$$

$$COE_{i,t} = \beta_0 + \beta_1 Crash_{i,t-1} + \beta_2 Size_{i,t-1} + \beta_3 Lev_{i,t-1} + \beta_4 \beta eta_{i,t-1} + \varepsilon \quad (14)$$

$$COE_{i,t} = \beta_0 + \beta_1 Coe_{i,t-1} + \beta_2 IR_{i,t-1,\tau} + \beta_3 Crash_{i,t-1} + \beta_4 Size_{i,t-1} + \beta_5 Lev_{i,t-1} + \beta_6 \beta eta_{i,t-1} + \varepsilon \quad (15)$$

Where Crash is the occurrence of a sudden decrease in stock prices in the following year, thus representing the future crash risk. Where *IR* is the information risk, the subscript τ equals 1 when *IR* is the private information, '2' for lack of information quality, and '3' in case of low information transparency. In previous literature, several studies regressed the information risk on the COE to investigate the existence of the cross-sectional relationship. However, this approach may lead to the presence of endogeneity bias caused by four reasons. First, omitted variables that are associated with the response and explanatory variables drive the relationship and cause potential endogeneity such as business risk, cost of disclosure, and business risk (Nikolaev & Van Lent, 2005). This unobserved heterogeneity determines the overall information environment of each firm each year.

Second, the panel data is used for much of the empirical accounting literature with repeated observations overtime on the same group of companies. The interesting variable is often correlated both cross-sectionally and serially in that situation. However, the is an emergent need to recognize the autocorrelation between Y_t and Y_{t-1}. (Gow, Ormazabal, & Taylor, 2010; Eugster, 2020)

Third, in the case of reverse causality, independent variables and dependent variables affect each other simultaneously, and reciprocal causal effects arise (Wooldridge, 2002). Because the model's error term involves all unobserved variables influencing the dependent variable and the dependent variable affects the independent variable in the presence of simultaneity, the error term is also associated with the independent variable, leading to problems with endogeneity. In this model, the past COE influence the disclosure decision of the firm. Increased COE leads the manager to present less quality and transparent information. Similarly, the firm with a higher risk of the crash is more likely to manipulate the information which will further increase the future risk of a crash.

Fourth, the firm's past COE is also associated with control variables such as size. For example, if the management believes that the current COE is higher than what is expected, in that case, the firm will not accept all available projects. In this way, past COE will determine the firm size (Eugster, 2020).

In this situation, OLS (ordinary least squares a type of linear least-squares method for estimating the unknown parameters in a linear regression model). in equation 13 generate biased and inconsistent estimates because the error term ε_{it} is naturally correlated with crash i, t-1 as well as inefficient estimates due to autocorrelation generated by unobserved heterogeneity. This problem of autocorrelation can be resolved by random effect but the most serious issue of inconsistency remains. The consistent estimates can be obtained by taking the within-group average in a fixed effect structure by the data differentiation which eliminates all types of constant terms of model whether observable or not. However, the fixed effect is invalid when the model presents a lagged dependent variable as a dependent variable because these panel models (random, fixed, and Ist difference) are strictly exogenous. However, to resolve the issue of unobserved heterogeneity and reverse causality, models are made dynamic by incorporating the lagged value of the dependent value as an independent variable.

Further, to check the effect of one information risk on another, multiple regression analysis was performed. For that purpose, an interaction term between the different types of information risk is created. For example, the interaction term, *AQ * TRANS,* is used to check whether the effect of investors' capacity to interpret the financial information is influenced by the quality of financial reporting.

$$COE_{i,t} = a_0 + a_1 TRANS_{i,t} + a_2 Lev_{i,t} + a_3 Size_{i,t} + a_4 Beta_{i,t} + a_5 AQ_{i,t} + a_6 AQ_{i,t} * TRANS_{i,t} + a_7 1 - R^2 * AQ + a_8 1 - R^2 * TRANS + a_9 (1 - \mathrm{R}\,2) + \eta_{i,t} \quad (16)$$

4. Results And Discussion

4.1. Correlation Analysis

The Correlation Matrix in Table 2 shows that there is no issue of multicollinearity existing among the independent variables.

4.2. Information Risk and Cost of Equity

Table 3 shows the impact of information risk on COE after applying the two-step system GMM by considering the potential endogeneity problem. In column 1, the lag value of the dependent variable is significant, showing the dynamic nature of the model. (Arellano & Bond,1991). This demonstrates the mean reversion behavior of COE where the previous COE affects the current COE. The coefficient value of information quality (β =0.0551, P< 1%) shows that the imprecision of information increases the COE. These results are in line with the results of Safdar and Yan (2016), Dakhlaoui et al., (2017), Hong, Ma, and Zhang (2018), and Baimukhamedova, Baimukhamedova, and Luchaninova, (2020) which lead to the acceptance of Hypothesis H1b.

Table 1: Descriptive Statistics

Variables	Mean	S.D	Minimum	Maximum
Cost of Equity	0.1793	0.7765	-1.047	6.3524
Information Quality	0.62821	1.6647	0.00816	5.9987
Information Transparency	0.2645	0.3677	0.0045	1.5808
Private Information	0.6809	1.0344	0.1125	7.23
CRASH RISK	-1.1579	0.3279	-2.2277	1.07724
BETA	0.5175	0.7861	-5.7341	8.6095
SIZE	17.0625	2.5179	9.1499	24.7922
LEVERAGE	0.2013	0.3926	0	5.6739
BOOK TO MARKET RATIO	0.1947	1.4118	-9.4027	35.198

Table 2: Correlation Matrix

	COE	AQ	PI	Trans	Beta	Size	BM	Lev	NCSKEW
RFR	1.0000								
AQ	0.1444	1.0000							
PI	0.0342	0.0195	1.0000						
Trans	-0.0919	-0.0312	0.0532	1.0000					
Beta	0.1098	-0.0321	0.0397	0.0065	1.0000				
SIZE	-0.0282	0.0249	-0.0264	0.0404	-0.0003	1.0000			
BM	-0.0066	-0.0118	0.1703	0.0522	0.0129	0.1325	1.0000		
Lev	-0.0185	-0.0209	-0.1164	0.0135	0.0328	-0.0724	-0.0142	1.0000	
DUVOL	0.2635	0.1048	0.1286	-0.1133	-0.0379	-0.0353	-0.0072	-0.0126	1.0000

The coefficient value of information transparency (β=-0.2409, P<10%) in column 2 indicates that information transparency has a significant inverse relation with COE. These results are in line with the results of Barth, Konchitchki, and Landsman (2013), Zhang and Li (2014), and Kim, Lu, and Yu (2019) and confirms the hypothesis H1c. These results also support the signaling theory. According to this, signals aims to acquire information about the capital market to reduce the extensive asymmetry between social and economic information. This signal quality such as the quality of disclosed information depends on the degree to which the disclosed information related to earnings represents the real economic value of the firm and can be easily deciphered by the investors. However, when the information content cannot be easily interpreted by the investors, they will charge a higher premium on investment which leads to an increase in the COE.

Column 3 in Table 3 shows that, the coefficient value of private information (β= 0.1704 P<1%) indicates that private information has a significantly positive association with COE, which is in line with the results of Easley and O'Hara (2004), Go and Lau (2014), and Huang and Kang (2018).

As far as control variables are concerned, size has a negative relation with COE, showing that larger firms have a lower COE (Agustini, 2016). Investors associate more systematic risk with an asset having less information, leading to lower prices and demand for these stocks (Petrova, 2012). Leverage has a negative and significant relationship with the COE (Riyath & Jahfer, 2015).

4.3. Information Risk and Stock Price Crash Risk

Table 4 exhibits the link between information risk and crash risk after applying the GMM to deal with potential endogeneity. The lag value of the COE is significant, showing the dynamic nature of the model. (Arellano & Bond,1991). This shows the mean reversion behavior of crash risk where the previous risk of share price crash affects the current crash risk. The coefficient value of information quality (β =0.0852, P<1%)confirms that lower quality leads toa higher risk of a crash (Jin & Myers, 2006, Chae, Nakano & Fujitani, 2020). In column 2, the coefficient value of information transparency (β =-0.1173, p<5%)indicates a negative relationship which means more transparent firms are less exposed to crash risk. (Barth, Konchitchki, & Landsman, 2013; Kim, Lu & Yu, 2019).

Table 3: Information Risk and Cost of Equity (COE)

Variables	Information Quality (AQ)	Information Transparency (Trans)	Private Information (PI)
Constant	0.6521 *** (0.0087)	0.4978** (0.1659)	-0.1402*** (0.0078)
COEt-1	0.0522** (0.0015)	0.2785*** (0.0343)	0.0688*** (0.0022)
IR	0.0551*** (0.00001)	-0.2409* (0.0608)	0.1704*** (0.0032)
Leverage	-0.8199*** (0.0175)	0.2155 (0.1353)	0.1490*** (0.0238)
Size	-0.0121 *** (0.0003)	-0.0139 (0.0089)	0.0185*** (0.0003)
Beta	0.0637 *** (0.0007)	0.1078 *** (0.02831)	0.0225*** (0.0007)
AR 1	0.000	0.000	0.000
AR 2	0.134	0.155	0.344
Sargan/Hansen	0.133/0.002	0.459/0.174	0.194/0.187
No. of Instruments	39	173	155
No. of Groups	370	370	370

Notes: The significance level of the AR (1) indicates the presence of a serial correlation of the first order that rejects the null hypothesis of no first difference serial correlation exists among the error term. Moreover, AR (2) shows insignificantly that there is no second-order serial association between error terms in level regression. Sargan / Hansen test overvalue is insignificant, indicates the reliability of the instrument, and is not excessively identified. Ultimately, AR (1), AR (2), and Sargan/Hansen test outcomes revealed that GMM is correctly defined with no validation problems. While creating a linear dynamic panel regression model, the Ramsey RESET test is used to check whether a significant non-linear relationship exists. The insignificance of the Ramsey test suggests that, without any specification problems and omitted variable bias, the model is linear and the results are not biased. Furthermore, in the estimation of dynamic panel models, ignoring the cross-sectional correlation will lead to severely biased statistical results and invalid statistical inference if the cross-sectional dependence is present. To determine whether or not the residuals from the fixed effect estimation of the dynamic regression model are spatially independent, the null cross-sectional dependence hypothesis suggested that residuals are not cross-sectionally related. To measure whether or not the residuals from the dynamic regression model's fixed effect estimate are spatially independent, the null hypothesis of cross-sectional dependency stated that residuals are not cross-sectionally associated. Pearson test is used to define cross-sectional dependency, and the test's insignificance value indicates that the regression residuals are cross-sectionally independent of the fixed effect estimation. Values in parenthesis represent the standard errors, "***", "**" and "*" shows the significance level at 1%, 5%, and 10% respectively.

The coefficient value of private information ($\beta = 0.0559$, $p<10\%$) demonstrated a positive and significant relation with crash risk, which is consistent with Hu, Kim & Zhang, (2016) and Chen, Kim & Yao,(2017). This indicates that when the firm annual reports are more opaque, less firm related information is available to affect its stock. These firms are less expected to be affected by volatility relative to market-wide variation. However, when the firm-specific data is eventually exposed to the public, these firms often face a greater risk of drastic results. This causes a crash in stock price.

The positive and significant value of firm size means larger firms are more susceptible to crash risk (Hutton, Marcus & Tehranian,2009). Firms are more disposed to crash risk with more systematic risk (Fauzi & Wayudi, 2016). Book to market value and leverage have a statistically insignificant relation with crash risk (Liu, 2018).

Furthermore, Table 4 in column 5 shows the impact of crash risk on COE after applying the two-step system GMM to confront potential endogeneity. The lag value of the COE is significant, showing the dynamic nature of the model. (Arellano & Bond,1991). This indicates the mean reversion behavior of COE where the previous COE affects the current COE. The coefficient value of crash risk is 0.6181, revealing a positive relationship between concerned variables and they are significant at 1%. This shows that a high risk of the crash will lead to an increase in COE. When the share prices fluctuate greatly due to asymmetrical information, investors cannot timely gauge the business position, as well as it is very difficult to supervise the managers. As a result, investors demand compensation for this increased uncertainty which increases the COE (Liu & Ren, 2019; Liang & Mao, 2019).

Table 4: Information Risk and Stock Price Crash Risk

Panel A: Information Risk and Stock Price Crash Risk				Panel B: Stock Price Crash Risk and COE
Variables	**Information Quality (AQ)**	**Information Transparency (Trans)**	**Private Information (PI)**	**Crash Risk**
Constant	-0.7813* (0.0310)	-0.3380* (0.1341)	-1.2689*** (0.2760)	1.4581* (0.5779)
$Crash_{t-1}$	0.0527*** (0.0086)	0.1743*** (0.0269)	0.1949** (0.0597)	
COE_{t-1}				0.1477* (0.0620)
Crash				0.6181*** (0.1205)
IR	0.0852*** (0.00008)	-0.1173** (0.0347)	0.0559* (0.0302)	
Leverage	0.1556*** (0.0275)	-0.0965 (0.0796)	0.2484* (0.1001)	-0.0999* (0.2445)
Size	0.0129*** (0.0019)	0.0543*** (0.0075)	0.0054 (0.0132)	-0.0227* (0.0316)
BM	-0.1397*** (0.0046)	0.0753*** (0.0203)	-0.0842* (0.0448)	
Beta	0.0615*** (0.0011)	0.0228** (0.0067)	0.0678*** (0.0138)	0.2362*** (0.0582)
AR 1	0.021	0.000	0.000	0.000
AR 2	0.182	0.172	0.109	0.108
Sargan/Hansen	0.507/ 0.118	0.998/ 0.114	0.194/0.192	0.635/0.219
No. of Instruments	45	112	166	52
No. of Groups	370	370	370	370

Notes: Where Crash risk is measured by NCSKEW in the year t; "***", "**" and "*" shows the significance level at 1%, 5%, and 10% respectively.

4.4. Mediating Effect of Stock Price Crash Risk

Table 5 shows the mediating role of crash risk between information risk and COE. By following Baron and Kenny (1986), partial mediation is found, when we compare the coefficient value of information quality (β= 0.0005, P<5%), information transparency (β= -0.1193, P<5%) and private information (β= 0.1499, P < 1%) in equation 15 with the coefficient value of concerned variables respectively (β = 0.0551; β=-0.2409, P< 5%) (β=0.1704, P< 5%) in equation 12. These results show that crash risk mediates the relationship between information risk and COE. Firms with more private information, opaque, and less transparent financial reporting are more disposed to crash risk. This possibility of a crash forces the investors to charge a higher premium, which leads to an increase in the COE (Liu & Ren, 2019).

4.5. Multiple Regression Analysis

Table 6 shows the multiple regression analysis among the different types of information risk and COE. The coefficient value of the interaction term between lack of quality and transparent information (β = -0.0615, P<1%) in column 4 shows that the effect of investor's interpreting ability on COE is significant when the reporting quality improves (Zhang & Li, 2014). Similarly, the coefficient value of the interaction term between quality and private information (β = 0.02995, p<1%) in column 5 shows that when firms disclose more quality information, this makes the investors more informed and decreases the role of private information on COE. Lastly, the coefficient value of the interaction term between private information and transparency (β = 0.0491, p<10%) in column 6 confirms that transparency will decrease as the information asymmetry increases among investors (Barth, Konchitchki, & Landsman, 2013).

Table 5: Effects of Stock Price Crash Risk

Variables	Quality	Trans	PVT Info
Constant	0.1160*** (0.0298)	1.3636*** (0.3298)	-0.5357*** (0.0144)
COE_{t-1}	0.0851*** (0.0110)	0.1516* (0.0638)	0.0304*** (0.0024)
Crash	0.3326** (0.1090)	0.2781** (0.0899)	0.3099*** (0.0101)
IR	0.0005** (0.0002)	-0.1193** (0.0720)	0.1499*** (0.0038)
Leverage	-0.0515 (0.1219)	0.2105 (0.2215)	0.1500*** (0.0268)
Size	-0.0069 (0.0052)	-0.0392* (0.0193)	0.0205*** (0.0003)
Beta	0.0771** (0.0241)	0.1322** (0.0389)	0.0277*** (0.0012)
AR 1	0.000	0.000	0.000
AR 2	0.121	0.166	0.212
Sargan/Hansen	0.155/0.131	0.176/0.150	0.251/0.158
No. of Instruments	134	152	155
No. of Groups	370	370	370

Table 6: Multiple Regression Analysis

Variables	AQ * Trans	AQ*PI	PI*Trans
CONSTANT	0.5622 (0.2404)	0.05408 (0.2355)	0.5570 (0.2408)
IR			
BETA	0.0250 (0.0425)	0.0354 (0.0417)	0.0264 (0.0426)
SIZE	-0.1681 (0.0136)	-0.0156 (0.0133)	-0.0170 (0.0135)
LEVERAGE	0.1816 (0.1352)	0.1712 (0.1324)	0.1895 (0.1354)
AQ * Trans	-0.0615* (0.0321)		
AQ*PI		-0.2995** (0.0056)	
PI*Trans			0.0490* (0.0326)
COEFFICIENT OF DETERMINATION	0.0314	0.0544	0.0223
F STATISTICS	2.76	6.78***	2.47

5. Conclusion

The purpose of this study is to determine the role of information risk on COE and whether the crash risk mediates the relationship. This study combines three types of information risk attributed to information asymmetry, information precision, and information transparency. This study corroborates that all these types of information risks ~~positively~~ affect COE. Results further reveal that information asymmetry entices the managers to engage in earning management behaviors and conceal negative information until the news releases in the market, causing a crash in share prices. This earning management behavior creates uncertainty in investor's minds and as a result, they demand a higher premium for compensation of increased risk.

These findings have some important implications for regulators, managers, standard setters, and investors who are concerned about the overall quality of financial reporting. First, regulars should solemnly perform its protection function by restricting the management behavior of earning management and should also penalize companies for violating the provisions. Second, disclose the pertinent information to investors in a well-timed manner and should avoid cover-up of the release of bad news intentionally. Third, policymakers should limit the choice of accounting policy for management by ensuring the adequacy and completeness of information disclosure and pay attention to the robustness of accounting estimates. Fourth, as financial reporting is a professional document based on professional standards and norms, investors need to grasp the required theoretical basis and analytical skill. The current research focuses on the period from 2008 to 2018. When more years of data are available, the topic could be re-investigated in future studies.

References

Agustini, A. T. (2016). The effect of firm size and rate of inflation on cost of capital: The role of IFRS adoption in the world. *Procedia-Social and Behavioral Sciences*, *219*, 47-54. https://doi.org/10.1016/j.sbspro.2016.04.031

Amrah, M. R., & Obaid, M. M. (2019). Effective corporate governance mechanisms, ownership structure and financial reporting quality: Evidence from Oman. *Asia-Pacific Management Accounting Journal*, *14*(3), 121-154. http://dx.doi.org/10.24191/apmaj.v14i3.967

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies*, *58*(2), 277-297. https://doi.org/10.2307/2297968

Ausubel, L. M. (1990). Insider trading in a rational expectations economy. *The American Economic Review*, *80*(5), 1022-1041. https://www.jstor.org/stable/2006759

Bae, S. M., An, H. T., & Kim, J. D. (2020). Mediators Linking Information Quality and the Cost of Equity Capital. *Asia-Pacific Journal of Financial Studies*, *49*(3), 410-437. https://doi.org/10.1111/ajfs.12299

Baimukhamedova, A., Baimukhamedova, G., & Luchaninova, A. (2017). Financial disclosure and the cost of equity capital: The empirical test of the largest listed companies of Kazakhstan. *Journal of Asian Finance, Economics and Business*, *4*(3), 5-17. http://dx.doi.org/10.13106/jafeb.2017.vol4.no3.5

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*(6), 1173. http://dx.doi.org/10.13106/jafeb.2017.vol4.no3.5

Barth, M. E., & Schipper, K. (2008). Financial reporting transparency. *Journal of Accounting, Auditing & Finance*, *23*(2), 173-190. https://doi.org/10.1177/0148558x0802300203

Barth, M. E., Konchitchki, Y., & Landsman, W. R. (2013). Cost of capital and earnings transparency. *Journal of Accounting and Economics*, *55*(2-3), 206-224. https://doi.org/10.1016/j.jacceco.2013.01.004

Bhattacharya, U., Daouk, H., Jorgenson, B., & Kehr, C. H. (2000). When an event is not an event: the curious case of an emerging market. *Journal of Financial Economics*, *55*(1), 69-101. https://doi.org/10.1016/S0304-405X(99)00045-8

Bleck, A., & Liu, X. (2007). Market transparency and the accounting regime. *Journal of Accounting Research*, *45*(2), 229-256. https://doi.org/10.1111/j.1475-679X.2007.00231.x

Botosan, C. A., Plumlee, M. A., & Xie, Y. (2004). The role of information precision in determining the cost of equity capital. *Review of Accounting Studies*, *9*(2-3), 233-259. https://doi.org/10.1023/B:RAST.0000028188.71604.0a

Bushman, R. M., Piotroski, J. D., & Smith, A. J. (2004). What determines corporate transparency?. *Journal of Accounting Research*, *42*(2), 207-252. https://doi.org/10.1111/j.1475-679X.2004.00136.x

Butt, H. A., & Sadaqat, M. (2020). The pricing of firm-specific risk in emerging markets. *Journal of Risk, 8*(4), 21-32.

Campbell, J. Y., Hilscher, J., & Szilagyi, J. (2008). In search of distress risk. *The Journal of Finance*, *63*(6), 2899-2939. https://doi.org/10.1111/j.1540-6261.2008.01416.x

Chae, S. J., Nakano, M., & Fujitani, R. (2020). Financial reporting opacity, audit quality and crash risk: evidence from Japan. *Journal of Asian Finance, Economics, and Business*, *7*(1), 9-17. https://doi.org/10.13106/jafeb.2020.vol7.no1.9

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

Dakhlaoui, H., Ruelland, D., Tramblay, Y., & Bargaoui, Z. (2017). Evaluating the robustness of conceptual rainfall-runoff models under climate variability in northern Tunisia.

Journal of Hydrology, *550*, 201-217. https://doi.org/10.1016/j.jhydrol.2017.04.032

Dasgupta, S., Gan, J., & Gao, N. (2010). Transparency, price informativeness, and stock return synchronicity: Theory and evidence. *Journal of Financial and Quantitative Analysis*, 1189-1220. https://doi.org/10.1017/S0022109010000505

Dechow, P. M., & Dichev, I. D. (2002). The quality of accruals and earnings: The role of accrual estimation errors. *The Accounting Review*, *77*(s-1), 35-59. https://doi.org/10.2308/accr.2002.77.s-1.35

DeFond, M. L., Hung, M., Li, S., & Li, Y. (2015). Does mandatory IFRS adoption affect crash risk? *The Accounting Review*, *90*(1), 265-299. https://doi.org/10.2308/accr-50859

Denis, D. J., & Xu, J. (2013). Insider trading restrictions and top executive compensation. *Journal of Accounting and Economics*, *56*(1), 91-112.

Dimitropoulos, P. E., & Asteriou, D. (2010). The effect of board composition on the informativeness and quality of annual earnings: Empirical evidence from Greece. *Research in International Business and Finance*, *24*(2), 190-205. https://doi.org/10.1016/j.ribaf.2009.12.001

Dimson, E. (1979). Risk measurement when shares are subject to infrequent trading. *Journal of Financial Economics*, *7*(2), 197-226. https://doi.org/10.1016/0304-405X(79)90013-8

Durnev, A., Morck, R., Yeung, B., & Zarowin, P. (2003). Does greater firm-specific return variation mean more or less informed stock pricing?. *Journal of Accounting Research*, *41*(5), 797-836. https://doi.org/10.1046/j.1475-679X.2003.00124.x

Easley, D., & O'hara, M. (2004). Information and the cost of capital. *The Journal of Finance*, *59*(4), 1553-1583. https://doi.org/10.1111/j.1540-6261.2004.00672.x

Easley, D., & O'Hara, M. (2003). Microstructure and asset pricing. In: M. Harris, & R. Stulz, *Handbook of the economics of finance* (pp. 1021-1051). Amsterdam: Elsevier.

Easley, D., Hvidkjaer, S., & O'hara, M. (2002). Is information risk a determinant of asset returns? *The Journal of Finance*, *57*(5), 2185-2221. https://doi.org/10.1111/1540-6261.00493

Embong, Z., Mohd-Saleh, N., & Hassan, M. S. (2012). Firm size, disclosure and cost of equity capital. *Asian Review of Accounting*, *20*(2), 119-139. https://doi.org/10.1108/13217341211242178.

Eugster, F. (2020). Endogeneity and the dynamics of voluntary disclosure quality: Is there really an effect on the cost of equity capital? *Contemporary Accounting Research, 9,* 1-10. https://doi.org/10.1111/1911-3846.12584

Fama, E. F. (1991). Efficient capital markets: II. *The Journal of Finance, 46*(5), 1575-1617. https://doi.org/10.2307/2328565

Fauzi, R., & Wahyudi, I. (2016). The effect of firm and stock characteristics on stock returns: Stock market crash analysis. *The Journal of Finance and Data Science*, *2*(2), 112-124. https://doi.org/10.1016/j.jfds.2016.07.001

Francis, J., LaFond, R., Olsson, P., & Schipper, K. (2005). The market pricing of accruals quality. *Journal of Accounting and Economics*, *39*(2), 295-327. https://doi.org/10.1016/j.jacceco.2004.06.003

Go, Y. H., & Lau, W. Y. (2014). Asymmetric information spillovers between trading volume and price changes in Malaysian futures market. *Journal of Asian Finance, Economic and Business, 1*(3), 5-16. https://doi.org/10.13106/jafeb.2014.vol1.no3.5.

Gow, I. D., Ormazabal, G., & Taylor, D. J. (2010). Correcting for cross-sectional and time-series dependence in accounting research. *The Accounting Review*, *85*(2), 483-512. https://doi.org/10.2308/accr.2010.85.2.483

Hong, P. K., Ma, T., & Zhang, G. (2019). Accruals Quality and Cost of Capital: Evidence from the Chinese Stock Market. *Journal of International Accounting Research*, *18*(1), 71-95. https://doi.org/10.2308/jiar-52216

Hu, J., Kim, J. B., & Zhang, W. (2016). Insider trading, disclosure incentives, and stock price crashes: International evidence. *SSRN, 2016,* 1-70. https://dx.doi.org/10.2139/ssrn.2359069

Huang, L., & Kang, Q. (2018). Information, investment adjustment, and the cost of capital. *Journal of Financial and Quantitative Analysis, 2017,* 1-69. https://dx.doi.org/10.2139/ssrn.2417816

Hutton, A. P., Marcus, A. J., & Tehranian, H. (2009). Opaque financial reports, R2, and crash risk. *Journal of Financial Economics*, *94*(1), 67-86. https://doi.org/10.1016/j.jfineco.2008.10.003

Jin, L., & Myers, S. C. (2006). R2 around the world: New theory and new tests. *Journal of financial Economics*, *79*(2), 257-292. https://doi.org/10.1016/j.jfineco.2004.11.003

John, K., & Lang, L. H. (1991). Insider trading around dividend announcements: Theory and evidence. *The Journal of Finance*, *46*(4), 1361-1389. https://doi.org/10.1111/j.1540-6261.1991.tb04621.x

Kamran, K., & Shah, A. (2014). The impact of corporate governance and ownership structure on earnings management practices: Evidence from listed companies in Pakistan. *The Lahore Journal of Economics*, *19*(2), 27-70. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2552570

Ke, B., Huddart, S., & Petroni, K. (2003). What insiders know about future earnings and how they use it: Evidence from insider trades. *Journal of Accounting and Economics*, *35*(3), 315-346. https://doi.org/10.1016/S0165-4101(03)00036-3

Kim, D., & Qi, Y. (2010). Accruals quality, stock returns, and macroeconomic conditions. *The Accounting Review*, *85*(3), 937-978. https://doi.org/10.2308/accr.2010.85.3.937

Kim, J. B., & Zhang, L. (2014). Financial reporting opacity and expected crash risk: Evidence from implied volatility smirks. *Contemporary Accounting Research*, *31*(3), 851-875. https://doi.org/10.1111/1911-3846.12048

Kim, J. B., & Zhang, L. (2016). Accounting conservatism and stock price crash risk: Firm-level evidence. *Contemporary Accounting Research*, *33*(1), 412-441. https://doi.org/10.1111/1911-3846.12112

Kim, J. B., Lu, L. Y., & Yu, Y. (2019). Analyst coverage and expected crash risk: evidence from exogenous changes in

analyst coverage. *The Accounting Review*, *94*(4), 345-364. https://doi.org/10.2308/accr-52280

Lambert, R., Leuz, C., & Verrecchia, R. E. (2007). Accounting information, disclosure, and the cost of capital. *Journal of Accounting Research*, *45*(2), 385-420. https://doi.org/10.1111/j.1475-679X.2007.00238.x

Leland, H. E. (1992). Insider trading: Should it be prohibited?. *Journal of Political Economy*, *100*(4), 859-887. https://doi.org/10.1086/261843

Leong, S., & Hazelton, J. (2019). Under what conditions is mandatory disclosure most likely to cause organisational change? *Accounting, Auditing & Accountability Journal, 32*(3), 1-25. https;//doi.org/10.1108/AAAJ-12-2015-2361

Levmore, S. (1982). Securities and secrets: Insider trading and the law of contracts. *Virginia Law Review*, *68*(1), 117-160. https://doi.org/10.2307/1072706

Liang, Q., & Mao, W. (2019). Crash risk exposure, diversification and cost of equity capital: evidence from a natural experiment in China. *Journal of Risk*, *22*(1), 1-32. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3478561

Liu, K., & Ren, M. (2019). Stock price crash risk and cost of equity capital. In *IOP Conference Series: Earth and Environmental Science* (Vol. 332, No. 2, p. 022017). Bristol, UK: IOP Publishing. https://doi.org/10.1088/1755-1315/332/2/022017

Liu, Y. (2018). *Corporate financing and stock price crash risk.* Doctoral thesis. The University of Manchester, United Kingdom.

Manove, M. (1989). The harm from insider trading and informed speculation. *The Quarterly Journal of Economics*, *104*(4), 823-845. https://doi.org/10.2307/2937869

Nikolaev, V., & Van Lent, L. (2005). The endogeneity bias in the relation between cost-of-debt capital and corporate disclosure policy. *European Accounting Review*, *14*(4), 677-724. https://doi.org/10.1080/09638180500204624

Ogneva, M. (2008). *Accrual quality and expected returns: The importance of controlling for cash flow shocks.* Doctoral thesis. University of Southern California.

O'Hara, M., & Easley, D. (2001). Information and the Cost of Capital. In: *EFA 2002 Berlin Meetings Presented Paper,* Nov 2001. https://dx.doi.org/10.2139/ssrn.300715

Pandey, K. K. (2005). Study of the effect of photo-irradiation on the surface chemistry of wood. *Polymer degradation and Stability*, *90*(1), 9-20. https://doi.org/10.1016/j.polymdegradstab.2005.02.009

Patton, A. J., & Verardo, M. (2012). Does beta move with news? Firm-specific information flows and learning about profitability. *The Review of Financial Studies*, *25*(9), 2789-2839.

Petrova, E., Georgakopoulos, G., Sotiropoulos, I., & Vasileiou, K. Z. (2012). Relationship between cost of equity capital and voluntary corporate disclosures. *International Journal of Economics and Finance*, *4*(3), 83-96. https://doi.org/10.5539/ijef.v4n3p83

Riyath, M. I. M., & Jahfer, A. (2015). Book to market ratio and expected stock return: An empirical study on the Colombo stock market., *Journal of Management, 12*(1), 777-780. https://doi.org/10.4038/jm.v12i1.7589

Roll, R. (1986). The hubris hypothesis of corporate takeovers. *Journal of Business*, *59*(2), 197-216. http://dx.doi.org/10.1086/296325

Roulstone, D. T. (2003). Analyst following and market liquidity. *Contemporary Accounting Research*, *20*(3), 552-578. https://doi.org/10.1506/X45Y-PMH7-PNYK-4ET1

Safdar, R., & Yan, C. (2016). Information risk, stock returns, and the cost of capital in China. *China Finance Review International*. https://doi.org/10.1108/CFRI-04-2015-0033

Saleh, I., Afifa, M. A., & Alsufy, F. (2020). Does earnings quality affect companies' performance? New Evidence from the Jordanian market. *Journal of Asian Finance, Economics and Business, 7*(11), 33-43. https://doi.org/10.13106/jafeb.2020.vol7.no11.033

Scholes, M., & Williams, J. (1977). Estimating betas from nonsynchronous data. *Journal of Financial Economics*, *5*(3), 309-327. https://doi.org/10.1016/0304-405X(77)90041-1

Seyhun, H. N. (1990). Overreaction or fundamentals: Some lessons from insiders' response to the market crash of 1987. *The Journal of Finance*, *45*(5), 1363-1388. https://doi.org/10.1111/j.1540-6261.1990.tb03719.x

Seyhun, H. N., (1992). The effectiveness of the insider-trading sanctions. *The Journal of Law and Economics*, *35*(1), 149-182. https://doi.org/10.1086/467248?journalCode=jle

Shakespeare, C. (2020). Reporting matters: the real effects of financial reporting on investing and financing decisions. *Accounting and Business Research*, *50*(5), 425-442. https://doi.org/10.1080/00014788.2020.1770928

Wang, F. A. (1998). Strategic trading, asymmetric information and heterogeneous prior beliefs. *Journal of Financial Markets*, *1*(3-4), 321-352. https://doi.org/10.1016/S1386-4181(97)00007-4

Wang, J. (1993). A model of intertemporal asset prices under asymmetric information. *The Review of Economic Studies*, *60*(2), 249-282. https://doi.org/10.2307/2298057

Wen, F., Xu, L., Ouyang, G., & Kou, G. (2019). Retail investor attention and stock price crash risk: Evidence from China. *International Review of Financial Analysis*, *65*, 101376. https://doi.org/10.1016/j.irfa.2019.101376

Wooldridge, J. M. (2002). *Econometric analysis of cross section and panel data*. Cambridge, MA: MIT Press

Xing, X., & Yan, S., (2019). Accounting information quality and systematic risk. *Review of Quantitative Finance and Accounting*, *52*(1), pp.85-103. https://doi.org/10.1007/s11156-018-0703-z

Zhang, X., & Li, X. (2014). The market pricing of information risk: From the perspective of the generating and utilizing of information. *Journal of Financial Risk Management, 3(04),* 166, https://doi.org/10.4236/jfrm.2014.34014