ABSTRACT

The relationship between information risk and cost of equity (COE) has been a subject of much debate and area of interest not only for managers but also for investors. Economic theory implies that companies not only improve their stock market liquidity by raising the degree of corporate reporting but also decrease investor estimation risk resulting from uncertainty regarding future returns and payout distributions. This study backs this discussion by considering the effect of three different variants of information risk, i.e., private information, quality of information and transparency of information, on the COE. We further examine whether crash risk mediates the relationship between the said variables. Moreover, inspired by recent theoretical discussions, this study also analyzes the role of different moderators, i.e., investment Adjustment, competitive position and investors‘ attention, on the said relationship. This study also investigates the impact of information risk on corporate investment by considering the moderating role of these channels mentioned above. To test the dynamic nature of the proposed model, a two-step system GMM dynamic panel estimator is applied to all the non-financial firms listed on PSX from 2008 to 2019.

The study finds that all three dimensions of information risk and the risk of the share price crash increase the cost of equity. The crash risk mediates the effect of information risk on the cost of equity. Also, these three dimensions of information risk are correlated with each other as the increase in information quality reduces the level of private information and improves the transparency of information, while an increase in private information decreases the transparency. Moreover, this study shows that companies with a low investment adjustment flexibility known as "value firms" cannot gain as much from information incorporated in market prices compared to firms having high flexibility in adjusting investment called "growth firms" These results are also in line with the results that growth firms demonstrate the greater investment sensitivity to information than value firms.

The results reveal that companies in a better position than their competitors in the market tend to signal their strength through enhanced disclosure. This enhanced disclosure declines the disparity of information by improving the investors‘ understanding and level of transparency, which boosts investor confidence and causes a reduction in COE. The study's findings also identify that investors‘ attention reduces information risk by increasing the stock liquidity and decreasing the crash risk, which ultimately decreases the COE. These results are supported by agency theory and signaling theory. In addition, the study results show that investors‘ attention stimulates corporate investment by increasing investor confidence and decreasing agency conflict.

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The study findings may be of great interest for practitioners, academic researchers, and regulators concerned about discerning the quality of information climate in the Pakistani context. The study results also provide the practitioners with insights regarding the role of different channels like investment adjustment, completive position, and the investor‘s attention through which information risk influences the COE.

Keywords: Information Risk, Cost of Equity (COE), Investment Adjustment, Competitive Position, Investor attention, Stock Price Crash Risk

CHAPTER-01

INTRODUCTION

A firms‘ cost of equity (COE) is essential to make various business decisions. From clinching the hurdle rate for selecting investment projects to influence the composition of the capital structure, the COE affects the company‘s operations and consequently its profitability. In this regard, information risk has gained much importance as it is believed to have a strong influence on stock prices and hence COE. There is much debate over the issue in the literature, but there exist a lack of consensus regarding the pertinent effect. Information risk was not included as a price element in traditional asset pricing models since it was thought to be diversifiable. As a result, it should not be used to calculate a risk premium (Fama, 1970; Butt & Sadaqat, 2020).

In contrast, the literature provides substantial evidence of a significant relationship between these two constructs. We contribute to this debate by empirically investigative the impact of information risk on COE. One of the earlier studies on the topic was conducted by Easley and O'Hara (2004). They found that traders are not fairly informed. Private information is dispersed into stock prices through trading. This private information creates information asymmetry and puts the incognizant investors in an unfavorable position because they are in a better position to change their portfolio weight by incorporating new information. Private information, therefore, creates a new type of systematic risk and induce the investors with low information to stipulate risk premium for asymmetric information.

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Prior work indicates that improved disclosure of information may reduce the required rate of return by broadening the firm's investor base, thus augmenting risk-sharing Merton (1987) and reducing the risk estimate (Leuz & Verrecchia, 2004). In addition, Easley and O'Hara (2004); Leuz and Verrecchia (2004); Verdi (2005); Lambert et al. (2012); He et al. (2013); Nuryaman (2014) and Natalia et al. (2018) stressed that information plays an imperative role in the determination of equity costs. He et al. (2013), using the distribution of the bid-ask as a measure of information asymmetry, reported a strong and direct association between the information asymmetry and the expected rate of return. In addition, companies with more forthcoming information disclosure practices are correlated with lower equity costs. Later on, Malau et al. (2019) also found that information asymmetry directly affects the COE.

However, Lambert et al. (2007) define another variant of information risk arises due to lack of information precision (quality). They argued that the precision of the information dictates the cost of capital (COC) rather than the availability of information across investors in the perfect

market. Here, the precision of information means quality information about the expected cash flows of the company. However, in this information age, where people from all over the world have easy access to the information they need via the Internet, social media, and print media, among other things, having more information does not imply that the information is of higher quality. If this is essentially true in all aspects of our lives, then it is also true in the financial markets. Business scandals in Pakistan, such as those involving Islamic Investment Bank, numerous Housing Companies, Taj Firm, Mehran Bank, KASB Bank, and Axact, have demonstrated this. Shareholders, regulators, financial experts, and investors couldn‘t envisage financial scandals and irregularities based on publicly available financial reports from these large corporations. Financial data's scant explanatory capacity leads to stock market infidelity (Kiernan, 2005). It can be said that, even in a modern information society, asymmetrical information exists between principal and agent, and these corporate bankruptcies and scandals are progressively diminishing the confidence of the stakeholders in the published financial information.

Likewise, Barth et al. (2013) highlight another variant of information risk labeled as transparency of information. Financial reporting transparency can be defined as the degree to which annual reports uncover the fundamentals of a business in a manner that is easily understood by those who use financial statements. The present study is mainly focused on the fact that information risk is a comprehensive and dynamic concept. This is not only limited to the disclosure of information but also linked with the perception of information by the external users of information. This describes the degree to which investors comprehend the firm's financial position and current performance by financial reports. Literature recommended that transparency in financial statements will lead to a decline in COE. However, concerning information asymmetry, companies with more complex and harder-to-read annual reports are more exposed to the risk of significant adverse selection glitches. The rationale behind this claim is that management of these companies attempts to obfuscate their weak results or hide bad news from investors by strategically structuring their annual reports (i.e., using sesquipedalian terms and long sentences) (Li,2008). Past studies have shown that the linguistic features of annual reports impact firms' long-term economic value and the COE.

On the other hand, these variants of information risk pose another grave risk faced by investors, an unexpected price collapse. Bad news hoarding theory suggests that stock market crash risk is pushed up by managers' stockpiling and accumulation of bad news due to lack of corporate transparency (Jin & Myers,2006, Hutton et al., 2009; Kim et al., 2011; DeFond et al., 2014; Kim et al., 2014; Kim & Zhang, 2016). Managers mask the bad news by manipulating the profits as they provide earnings estimates to shareholders. This earnings

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management is linked to more negative news and a higher likelihood of a crash. (Hutton et al., 2009; Zhu, 2016). However, when the stock price fluctuates considerably because of increased information asymmetry, investors will expect greater returns on this increased volatility and risk (Liu & Ren, 2019).

Furthermore, by considering all these variants of information risk (private information, quality of information, and transparency of information) which cause information asymmetry among investors and also increase the risk of crash, this study raises an interesting question: *"Is there any channel that moderates the relationship between information risk and COE*? This study scrutinizes the role of three different channels that affect the relationship between information risk and COE by making the investors more informed. These channels are investment adjustment, competitive position and investor attention.

According to the learning theory, investment adjustment decreases the risk of private information by integrating information into investment decisions as private information is expressed in stock prices by the trading of informed investors. This information embedded in stock prices provides a useful signal for the manager to make investment decisions for better performance. Investment adjustment raises the firm value by benefiting both cognizant and incognizant traders. In addition, by making investors' information outdated, investment adjustment alters the fundamentals of companies and thus reduces the risk of information being borne through incognizant investors. This adjustment in investment makes the stocks more appealing for incognizant traders and reduces COE (Huang & Kang, 2018). Taken together, information has two competing factors that affect COE. The net outcome rests on which force dominates the most, and it is based on how much investment can be adjusted,

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Specifically, following Easley and O'Hara (2004) and Huang and Kang (2018), this research establishes the following hypothesis for empirically testing the moderating role of investment adjustment. Companies with low investment flexibility known as "value firms" cannot gain as much from information incorporated in market prices compared to firms having high flexibility in adjusting investment called "growth firms." Consequently, this study argues that value stocks stipulate a higher risk premium for information risk than value firm.

Moreover, this study also investigates the effect of information risk on investment Q sensitivity by considering the varying degree of flexibility in adjusting the investment among the firms. For this purpose, it is hypothesized that the impact of information risk on Investment-Q sensitivity is more pronounced for growth firms than for value firms in a dynamic framework.

This line of study is founded on the premise that companies can learn and use their market prices to improve their corporate decisions, which is concerned with the literature that that governs the financial market's feedback effect on the real economy. For example, Baker et al. (2003) established that "equity-dependent" enterprises make investment decisions based on stock prices because they require external equity to fund their marginal investment. According to Chen et al. (2007), the quantity of private information reflected in stock prices increases the investment response to Q. Bakke and Whited (2010) endorsed managers incorporating private information into investment decisions, using an econometric approach that separates investment-related stock price swings from non-investment-related movements. Huang and Kang (2017) found that growth firms' investment adjustment effect cancels out the inverse impact of information risk on COE.

Likewise, information risk arising through less quality and transparency can be condensed by improving the firm competitive position. Similarly, signaling theory indicates that companies in a better market position than their competitors tend to signal their strength through enhanced disclosure. On the other hand, companies facing severe competition can often refuse to divulge risk information in order to avoid their position from further deterioration (Mokhtar & Mellett, 2013). However, the advocates of Agency theory argued that information asymmetry could be reduced by improving the level of disclosure, leading to increased understanding of stakeholders, transparency, and trust of investors (Jensen & Meckling, 1976). In addition, disclosure in a competitive setting may be used to gain credibility and ensure sustained access to resources (Oliveira et al., 2011). However, when the firm increases the disclosure, this will reduce the information asymmetry created due to less transparent and quality information, ultimately decreasing the COE by improving the investor‘s confidence. Furthermore, this study also hypothesizes that information on Investment-Q sensitivity is stronger for firms with a better competitive position.

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Furthermore, the important role of investor and media attention has been documented in finance literature. Investor attention is a fundamental concept in the arena of behavioral finance. It stated the investor's response to target stock in buying and selling due to the specific corporate events. Kahneman (1973) argued that a person's capacity to input and process information is constrained by attention as it is a scarce cognitive resource. On this basis, Merton (1987) came out with the ―Investor cognitive hypothesis,‖ which indicated that the attention could significantly impact market assessments by mitigating information frictions that prevent the investor from carrying the lesser-known assets. Barber and Odean (2008) concluded that unsophisticated traders are more likely to purchase salient stocks than sell due to short selling and attention restrictions. Both hypotheses predict a rise in value and

low potential returns due to positive shocks to investor attention. However, this study finds out how the investor attention reduces the information risk and decrease the COE in the following ways:

First, spending a significant span of time and effort searching the relevant information on the internet makes the investor more informed, enhances the stock liquidity, and reduces the COE (Dimpfl & Jank, 2016). This accelerates the reflection of information into stock prices and significantly decreases the information asymmetry arising due to private information. In order words, investor attention increases stock liquidity by reducing information asymmetry, which ultimately reduces COE. However, this study checks the moderating role of investor attention in the relationship of private information and COE and examines the role of investor attention in increasing stock liquidity by reducing information asymmetry.

Second, investor attention decreases the COE by reducing the risk arising due to the opaque financial reports. Thus, when the firm attracts more attention from retail investors and strongly monitors by the investors, the managers will find it quite difficult to conceal negative information through opaque reporting. This also reduces the manager‘s opportunistic behavior, ultimately reducing the information asymmetry between investors and managers, and minimizes the problem of quality reporting and the risk of stock price crashes. The firms that have low attention from investors cannot get the enough information to monitor the firm. This put less pressure on the manager to hoard the negative news by presenting the fabricated information, leading to the risk of a crash and high COE. However, this study examines the moderating role of investor attention on the relationship of information quality and COE and provides the robustness of results by investigating the impact of investor attention on crash risk by improving the information quality.

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Third, the ability of the investors to understand financial information also tends to increase when more attention is paid, which decreases the information risk resulting from less transparent information. The less transparent reports make it difficult for investors to understand the firms through financial reporting. This creates the information asymmetry between the manager and investor and provides the manager more opportunity to suppress the negative news and lead to crash risk. Therefore, this study examines the moderating role of investor attention on the relationship between the information transparency and COE. Also, the role of investor attention in reducing the crash risk by improving the information transparency.

Taken altogether, this study indicates that information risk has two competing forces influencing equity prices, and the net impact hinge on which force dominates, which rest on

how much attention investors have paid. This research scrutinizes the cumulative impact of Information risk and investor attention on COE.

However, the moderating effect of investor attention is limited to the impact of information risk on COE. This also moderates the relationship between information risk and corporate investment decisions through information intermediation and market pressure effect. According to information intermediation effect, investor attention plays an important role in reducing investor information risk, increasing investor trust and investment opportunities for the firm. Likewise, investor attention advances the firm‘s effort to divulge information under the mechanism of the Market Pressure Hypothesis. This mechanism lessens the degree of manipulative reporting and self-serving actions of the management via effective restriction on management behavior at the time of earning announcement. However, this study also hypothesizes that information on Investment-Q sensitivity is stronger for high attentive firms.

The majority of the above-mentioned literature is based on well-established capital markets, primarily in the United States. The question, however, is whether or not these theories are valid in developing economies such as Pakistan because sometimes the western theories help explain the results, but sometimes they are not (Yasin, 2019). The failure of western theories to justify the empirical findings in evolving economies is due to the micro and macro-economic disparities between advanced western and emergent eastern economies (Richardson et al., 2010). Firms with different domiciles use their domestic accounting standards to prepare financial reports, which is a problem for international datasets. Kaserer and Klingler (2008) criticized the previous research by arguing that these findings are not generalizable because they are based on different accounting procedures.

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However, exploring the role of the channels as mentioned earlier in informational risk management is meaningful in Pakistan. Even though institutional and regulatory standards have improved, weak information structures still plague Pakistan's financial markets. Poor quality of financial information, failure to report firm-specific details, and low transparency has significant consequences for COE. As a result, the investor base is also very low in Pakistan. Unfortunately, retailers and the masses remain poorly interested despite phenomenal returns, as only a few hundred investors have trading accounts. People tend to put money in banks that don‘t even cover inflation but don‘t want to invest in stocks. This lack of participation of retail investors prepares the stage for a few market players to concentrate. Therefore, this absence of retail investors paves the platform's way to remain in the hands of a few industry players. Thus, the country's stock market is controlled by institutional investors and speculators indulging in short-term trading. The lack of long-term investment and the image of a place of speculative activity has adversely affected capital formation's country

space. Therefore, examining the role of investment adjustment, competitive position and individual investor attention in cognizing and processing information can help improve the market efficiency by curtailing the effect of information asymmetry. Thus, to the best of my knowledge, no study in Pakistan considers the role of the above-said moderators in reducing the impact of information risk on COE.

1.1. Gap of Study (Grey Area)

The present research adds to existing finance literature in various ways. First, the current research backs the theoretical dispute that information risk does affect asset prices (EOH, 2004 and LLV, 2007). Earlier studies used one source of information risk as; private information (Easley et al.2002), information quality (Kim & Qi, 2008 ; Ogneva, 2008), and information transparency (Bart et al.2013); however, this study considers all three sources of information risk to conclude.

Second, this study is developing new understanding in the budding literature on asset price collapse. In contrast to Bae et al. (2020), who find out the effect of information quality on COE by considering the mediating role of market risk, liquidity risk, and information asymmetry, they fail to consider the potential source of endogeneity between them information quality and COE. This study tries to find out the mediating role of stock price crash risk between the information risk and COE. Because, in the case of developing countries like Pakistan, where financial reporting quality is poor due to the weak regulations, which makes the acquisition of factual 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 the risk premium, causing a further increase in COE.

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Third, by including private information as a dimension of information risk, this study investigates the mutual effect of information risk and investment adjustment on COE. To the best of my knowledge, Huang and Kang (2018) is the only analysis that finds out this relation by considering the role of private information. In contrast to Huang and Kang (2018), this study discovers the joint effect of information risk and the investment adjustment on COE in a dynamic framework by considering the potential issue of reverse causality. This study's main contribution is to figure out how the information-driven investment adjustment adjusts the impact of private information on COE. This relationship has been studied by hypothesizing that the impact of private information on the response of Investment to Q sensitivity is more pronounced for growth firms than for value firms.

Fourth, this research also hypothesizes the role of the company‘s competitive position in improving the quality and transparency of information. Shivaani and Agarwal (2020) only find out how the competitive position affects the quality of risk disclosure. However, this study tests the moderating role of competitive position between information risk (less quality and transparent information) on COE and investment decisions.

Fifth, by expanding Da et al. (2011) framework to a developing financial market, this research adds to the budding literature of investors‘ attention and its role in reduction of information asymmetry. Unlike Gao et al. (2018), who scrutinized the effect of investor attention on information asymmetry resulting from private information, this research analyze the moderating role of investor attention in decreasing the information asymmetry by considering three different dimensions of information risk. This study also considers the role of investor attention in reducing the other two dimensions of information risk, i.e., less reporting quality and transparency, to reduce the COE.

Sixth, this study also studied the importance of investor attention on the relationship between information risk and investment sensitivity. Seventh, this study also investigates the underlying mechanism of how the investor attention reduces the information risk, i.e., Role of investor attention in increasing the stock liquidity to reduce the effect of private information as well as the lowering the probability of stock price crash in case of less quality and transparent information.

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1.2. Problem Statement

Pakistan is an emerging market with a lot of information risk faced by investors. The information available in the market does not meet the investor investment criteria. The situation of the Pakistan Stock Market is affected by different political, social and economic conditions. Pakistan Stock Exchange (PSX), the region's largest stock exchange and once the region's most liquid equity market, bears little to no appeal to unrepresented small investors. However, the volume-starved PSX still appeals to massive and powerful share traders who draw handsome capital gains by malpractice like insider trading. More insider trading has been one of the key causes of discouraging real investors known as retail investors. Consequently, the country's stock market is dominated by professional speculators engaged in the short-term purchase and sale of shares and securities.

The lack of long-term investment activity due to the reputation of the stock markets as a place of speculative activity in the eyes of retail investors has adversely affected the rate of capital formation in the country. The quality of financial reporting in developing countries like Pakistan is poor compared to developed and mature markets. The market mechanism does not

prevent the restatement of earnings, and weak regulations would result the problems for investors (Shah et al., 2020). This mal function situation is because most of the firms operating in Pakistan have the structure of concentrated ownership (Bozec & Bozec, 2011). This weak public information system offers corporate management better latitude to suppress negative news from investors, leading to the obvious stock price collapse risks. This crash risk affects the market value of equity, leading to lower confidence among investors due to reliability issues on the stock market, resulting in in unreliable economic growth and share prices.

Keeping in view the above situation, information risk creates uncertainty in the market where investors are uninformed. However, the information is reflected in stock prices by the trading of informed investors. The information reflected in stock prices serves as a useful signal for managers to use in making investment decisions for improved performance. This investment adjustment by managers increases company worth, which helps both cognizant and incognizant traders. In addition, investment adjustment changes an organization‘s fundamentals by making cognizant traders' information stale and thus decreases the information risk borne by incognizant traders (Huang & Kang, 2017). Therefore information-driven investment changes the relationship between information risk and COE and decreases the COE. Firms operating in the market can adjust the problem of information risk through investment adjustments.

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In addition, a company's competitive position improves the quality and transparency of publicly disclosed information. The competitive position in growing market share enables the firms to be more generous and transparent in their disclosure. Such increased transparency signals to stakeholders that the organization has preserved its ethical values while gaining competitiveness (Shivani &Agarwal, 2020). This improves investor confidence and increases the trading of firm shares which reduces the COE.

However, in light of the stated importance, it is desirable to carry out an empirical study in private information, reporting quality and transparency and their impact on the firm‘s COE with reference to Pakistan. In addition, it is also important to determine whether the Pakistani firms can adjust the information into the investment to reduce the effect of information risk on COE. Moreover, it is also worthwhile to decide how the competition alters the relation between information risk and COE by improving Pakistani firms' information disclosure quality and transparency.

Furthermore, in emerging markets like Pakistan, information has long been integrated into asset prices. because the collection and processing of information are costly for investors

(Guner et al., 2004). Many investors and the media spend substantial time and effort on the internet to hunt for financially vital information to reduce information asymmetry (Dimpfl and Jank, 2016), which enhances stock market liquidity and reduces COE. Besides, online searching for information makes the investors more up-to-date about the stock market, and this searching behavior demonstrates the investor's attention. This online activity improves market efficiency by accelerating the pace of dispersal of information among investors.

So, the present research also scrutinizes the moderating role of investor attention on the relationship between information risks and cost of equity that are currently missing in the literature.

1.3. Objectives of the Study

This study has taken into account the firms listed in PSX to get a clear picture of information risk, Investment adjustment, competitive position, Investor attention and examine the influences of information risk, Investment adjustment, competitive position, and investor attention on cost of equity. The key aims of the research are as follow:

1. To determine the impact of Information risk on COE
2. To determine whether the risk of stock price crash mediates the relationship between information risk and cost of equity.
3. To determine the moderating role of investment Adjustment on the relationship between private information and COE.
4. To determine the moderating role of investment Adjustment on the relationship information risk and Corporate Investment
5. To determine whether the firm competitive position moderates the relation between lack of information quality and COE.
6. To determine whether the firm competitive position moderates the relation between lack of information quality and corporate investment
7. To determine whether the firm competitive position moderates the relation between lack of information transparency and COE.
8. To determine whether the firm competitive position moderates the relation between lack of information transparency and corporate investment

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9. To determine whether the impact of Information risk on COE is more pronounced in low investor attentive firms than high investor attentive firms.

10. To determine whether the impact of Information risk on investment decisions is more pronounced in low investor attentive firms than high investor attentive firms.

1.4. Significance of Study

This study contributes to the literature by providing evidence on the quality of the information environment in Pakistan's stock market. Since the Pakistani market is an emerging market and tremendous growth is observed in the last decade, the market has seen numerous ups and downs. It is usually referred to as a high-risk market (Ghufran et al., 2016). In developed markets such as the US, UK, Japan, etc., information is rapidly integrated into security prices and markets are deemed more efficient. Whereas the situation may vary from these developed counties in case of an emergent market like Pakistan stock market because it is unique country with many features of the common law system: Various sets of reporting requirements (accounting and tax purposes), no direct government interference in traditional settings, weak stock market, debt as a main source of finance and lower transparency in financial reporting (Baig, 1997). These unique market conditions demand to explore the dynamic of price change in detail so that investors can gain deeper insight into market dynamics. So, concerns regarding the consistency of the information environment have also been created.

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This study makes a substantial contribution to current literature and helps the manager and investors. The study broadens the theoretical span of the firm-specific determinants of COE, particularly in the context of different variants of information risk, along with recently established theories that are not analyzed from the perspective of developing countries. This study contradicts with the asset pricing theory by identifying the different variants of information risk that determine the return. For example, more information risk faced by investors, they will demand more returns which increase the COE and decrease the possibility of corporate investment as well.

Moreover, this is the first empirical study that addresses the impact of different variants of information risk on COE by incorporating the role of different moderators and the mediator and providing significant evidence. This research is an effort to add to the current literature in follows ways.

First, unlike the previous studies, this is the only study that figured out the impact of information risk on COE by considering the three different variants of information risk

simultaneously. Second, this is the only study exploring the mediating role of stock price crash risk between the different variants of information risk and COE. Third, this study examines the moderation of investment adjustment on the relationship of information risk and COE and Corporate investment in a dynamic framework. Fourth, this study explores the moderating role of the strategic dimension ‒firm competitive position‖ in reducing the risk of less quality and transparent information. Fifth, this study adds to the existing literature about the effect of investors‘ attention on the information risk in Pakistan's stock market by expanding Da et al. (2011) approach. The results confirm the pertinence of attention-driven theory (Barber and Odean, 2008) to an evolving stock market and indicate how investor attention moderates the relation between information risk and COE.

Moreover, this analysis also supports managers and investors in various ways. This study provides insight to managers about how they can reduce the negative effect of private information on the cost of equity by adjusting investments. The study's findings further imply that attempts to enhance transparency in disclosure policies may prove fruitful not only in terms of governance but also in strategic aspects, such as the competitive position of companies. Furthermore, this study highlights the role of investor attention as participants in financial markets can benefit from this online search behavior by reflecting more information into stock prices and, therefore, reducing trading uncertainty.

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CHAPTER-02

LITERATURE REVIEW

2.1. Information Risk and COE

Traditional asset pricing models recommend that information risk is completely diversifiable by investors; thus, it should not be considered a factor in the cost of equity (Fama, 1991). Numerous studies have challenged this traditional view (Leland, 1992; Wang, 1998 and EOH, 2004), emphasizing the association between information risk and COE and lack coherence in conclusions drawn. Wang (1993) developed a multi-period asset pricing model and suggested the two effects of information asymmetry on equilibrium asset prices. First, the less informed investor will demand a high return to offset for an adverse selection problem. Second, informed trading makes the prices more informative and decreases the risk for less-informed investors and 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 COE, but on average, higher share prices are commensurate with the decline in COE. Bhattacharya et al. (2000) suggested that shares traded in the Mexican Stock market (MSX) respond petite to the declaration of firm news. It is not only because companies listed in MSX are very translucent but also because the private information is fused into prices by insider trading, so there is little surprise in the announcement. Likewise, EOH (2004) elucidated another type of effect by exhibiting that information composition (private versus public) also affects investors' expected return. Informed investors can benefit from regulating their portfolios centered on private information they obtain; therefore, uninformed investors demand a greater premium. Besides, they also noticed the role of information precision, which reduces the COE by lowering the information risk faced by uninformed investors

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Second, LLV (2007) argued that information precision affects the prices and makes the information risk diversifiable, arising 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, EOH (2004) and LLV (2007) have shared a few common points as well; EOH (2004) acknowledged that information asymmetry is reduced by precision, while LLV (2007) recognized information asymmetry becomes important in the presence of an imperfect market. However, they suggested that price stability is affected by information disclosure risk, which may cause differences in the expected rate of return.

Botosan et al. (2004) argued that COE increases with the accuracy of private information while declines with the precision of public information. Francis et al. (2004) argued that inadequate reporting hinders the communication between companies and their investors concerning the capital expenditure decisions of the company, thus resulting in information risk. Anticipation of this, investors seek a higher risk premium; i.e., they are charging higher capital costs. FLOS (2005) studied the effect of disclosure, measured by the accuracy of public information, in the capital market. Whereas cash flows provide bases for valuation, current earnings are extensively supposed to be a major source of information to predict upcoming cash flows.

Additionally, the accruals contain a greater element of uncertainty as compared to the cash flows. Therefore, FLOS (2005) maintains that accruals quality increases the capacity of earnings to predict cash flows, which lessens the disclosure risk and the COE. Similarly, Francis et al. (2005) also found and further confirmed that better accruals reduce COE.

Further, FLOS (2005) divides AQ into elements that comprise managerial reporting choices (discretionary AQ) and economic fundamentals (innate AQ). Both components are related to capital costs, the latter having a greater impact. Latif et al. (2017) argued that the higher earnings quality reduces information asymmetry and systematic risk, reducing capital costs and increasing the company value. Hong et al. (2018) proposed that earnings efficiency would be inversely related to the A-B share price differential. The inverse effect would be more pronounced for firms having large information differences between markets.

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Patton and Verardo (2012) and Xing and Yan (2019) demonstrated that disclosed annual reports divulge information about the prospects of a firm and its peer and largely the entire economy. Therefore, investors can use this information to rectify their expectations about its profitability and the general economy. This learning process alters the covariance of the return of individual companies to the market across firms, resulting in a shift in the beta that affects the COE.

Generally, information risk is related to the measure of accrual efficiency (AQ) in empirical studies. Typically, the company's financial statements include accruals that are adjusted to recognize cash flows over time. In practice, financial statements under the Commonly Agreed Accounting Principles (GAAP) are not expected to report on the execution of the accruals, making it difficult to track calculation errors in the accruals. Therefore, a regression model is usually used to predict irregular accruals (e.g., Dechow & Dichev, 2002; Francis et al., 2005). The volatility of these predicted abnormal accruals indicates accruals quality (and proxy for information risk).

The relationship between information quality and COE is clarified by various theoretical perspectives, such as Capital requirements theory, Signaling theory, and Entrenchment theory. According to Signaling theory by Akerlof (1970), voluntary disclosure is seen as a form of signaling related to information asymmetry in the market, and the signaling approach may resolve this problem of disparity of information by signaling this information to others through the party having greater and accurate information (Morris, 1987). Suppose the available information in the market is not specific. In that case, share prices will represent general expectations of risk, and as a result, it can be some mispricing, combined with an adverse selection phenomenon. In such situations, firms have an opportunity to provide the investors with risk-specific information as a signal by developing high-quality systems of risk management which can be used to move the prices upward (Lev and Penman, 1990) and eventually reduce COE levels.

According to Capital requires theory, companies compete in the capital market to raise capital by selling various types of securities (Meek et al., 1995). Capital needs theory suggests that raising capital is the key reason companies provide high-quality information, as they might think that high-quality financial information would decrease confusion among investors and condense the COE levels (Choi, 1973). According to the entrenchment theory, managers with successful control of businesses have incentives and opportunities to gain private benefits at the shareholder's expense (Fama & Jensen, 1983; Morck et al.,1988; Shleifer & Vishny, 1997). Managers attempt to cover their private benefit consumption by manipulating financial statements to escape market fines (Leuz et al., 2003). This handling of financial statements is correlated with high-earning management in companies with higher private benefit intake.

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Lastly, a third stream of associated study reflects the role of earning transparency, one more source of information disclosure risk. Even though transparency has been defined as a required feature of financial reports, transparency is not precisely described in financial reporting. The current study illustrates financial reporting transparency as the degree to which financial reports uncover the fundamentals of a business in a manner that is easily graspable by those who use financial statements. This definition is based on two important concepts-underlying economics and easily understandable need to be addressed to explain the definition and its repercussions for financial reporting (Barth & Scipper, 2008). The Financial Accounting Statement Principle No. 1 of the FASB4 describes the purposes of financial reporting: to disperse the information through financial reporting to different stakeholders, which helps them in decision-making concerning the financing, investing, and other major decisions. This information should be complete and accessible to those who have a fair understanding of the company's operations (Tasios & Bekiaris, 2012). However, earlier

researchers found an inverse relationship between the COE and the transparency of earnings (Barth & Scipper, 2008; Dasupta et al., 2010; Bart et al., 2013 and Zhan & Li, 2014). Extensive literature indicates that the information asymmetric is directly related to the COC (e.g., Diamond and Verrecchia, 1991). As a result, earnings transparency would be negatively linked to the COC if transparency is negatively correlated to information asymmetry. However, earnings transparency is negatively related to the irregularity of information based on the following rationale. When the transparency of earnings is very low, useful and available at little to no expense, it does not affect the economic value of the business at a higher level. This will lead to few investors to involve in the acquisition of private information. Having details on the company's economic price beyond what is expressed in earnings is high in cost. It is possible that investors can vary in the degree to which they receive information because of the differences in the marginal acquisition costs that lead to the irregularity of information. Moreover, asymmetric information among investors can differ from firm to firm, and it is inversely related to transparency if the investors' marginal cost of information is high when the information about the firm value reflected in earning is low. The degree to which the information asymmetry shows the negative relation with earning transparency, there are more chances to find out the inverse relationship between COE and earning transparency.

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Zhan and Li (2014) argued that the degree to which investors can fully absorb the related information and try to make the right decision on the company's investment also influences the investment risk. An investor's capacity to understand the information applies 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. A low level of information interpreting capacity defines that the ability of investors to understand the firm over financial reporting is limited, which will be a drawback in the judgment and will lead to higher investment return requirements and, finally, increase the capital COE.

Previous research (e.g., Diamond and Verrecchia, 1991; Healy et al., 1999; Chen and Hsu, 2008) demonstrated that disclosure of the information is adversely and positively related to equity costs and corporate efficiency, respectively. Signal observability means that the recipients can easily decrypt information. For example, firms' financial and non-financial information can not represent the equity costs because it is difficult to easily analyze and compare the contents of the disclosed information by the external stakeholders. On the contrary, equity costs can be affected if the disclosed and non-financial details can be easily understandable and compared by investors. Therefore, information transparency allows an

organization to achieve low equity costs and thereby show its competitive advantages (Yu et al., 2019).

Furthermore, literature has recorded the one explanation behind this incomprehensibility is the writing style, which has also become an attribute of accounting reports. Prior work (Li, 2008; Biddle et al., 2009; Gray et al., 2016) found that firm performance affects information quality in annual reports and that managers use complex statements and various writing styles deliberately (Bushee et al., 2018). Initially, Bloomfield (2008) claims managers were highly motivated to hide important details they didn't want investors to know. This opportunistic managerial action, supposedly at the root of impression management, has given rise to the so-called theory of obfuscation. It implies that management is not impartial in providing accounting narratives (Sydserff & Weetman 1999: 460). The resulting bias, resulting from strong economic incentives and the opportunity to have a self-interested view of corporate results, leads to shameful failures in management and emphasizes success (Adelberg, 1979: 187).

The obfuscation hypothesis (Courtis, 1998) notes that in case of bad news, managers are especially motivated to exploit the expectations of firm success and prospects from outside parties. This results in bias reporting. This asymmetric conduct is understandable because conflicts of interest between management and shareholders emerge primarily from negative organizational outcomes (Aerts, 2005: 497). For this reason, management is only inspired to participate in 'bad news' impression management. Indeed, management obscures negative organizational results for the same reasons as management overstates profits, namely (1) enhancing understanding of firm success by market investors and (2) increasing compensation or job protection for management. The belief that managers participate in impression management to obfuscate unfavorable organizational outcomes has resulted in studies examining corporate narratives for evidence of this activity in various ways, including (1) reading ease of manipulation, (2) rhetorical manipulation, (3) thematic manipulation, and (4) narrative disclosure.

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Li's pioneer work (2008) analyzed the association between annual report readability and financial performance based on this "management obfuscate hypothesis" and argued that firms with higher profit and more sustainable earnings have easier to read annual reports. In addition, Qian and Zhu (2019) ―have also developed a similarity index for the financial report to examine the likelihood of administrative punishment and have found that greater similarity of management discussion and analysis section with the same one reported in last year, the greater possibility for fraud firms to receive administrative punishment‖.

Based on these claims, this study hypothesis that lack of clarity due to hard-to-understand financial information produces the information asymmetry that leads to increased COE.

Therefore, based on the literature mentioned above, the current study develops the following hypotheses by bearing in mind the role of information risk arises from private information, less information quality and transparency on COE as follows:

H1: Information Risk increases the Cost of Equity (COE)

H1a: Private Information positively affects the Cost of Equity (COE)

H1b: Information Quality negatively affects the Cost of Equity (COE)

H1c: Information Transparency negatively affects the Cost of Equity (COE)

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

A sudden decrease in stock prices has also been considered a grave risk faced by the investors of stock markets. Therefore, the risk of increasing decline in stock prices to a very low level to earnings ratio is subject to the risk of a crash. According to Hutton et al. (2009), crash risk is similar to the tail risk generated through normal distribution as described in statistics. Usually, investors are more concerned about the risk of a decline in stock prices than about its rises. Thus, the response of stock prices is more asymmetric in case of the disclosure of negative information (Kothari et al., 2009).

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According to traditional CAPM theory, the ratio of price-earnings is believed to connect with normal distribution and this diversification is associated with overall risk distribution. But, in the event of falling in stock prices, the price-earnings ratio tends to be distorted negatively, making it harder for the investors to overcome the related risk through diversifications (Ibragimov & Walden, 2007). Hence, stock price collapses because the tail risk in economic and financial markets is unsure and uncertain. In this situation, the price-earnings ratio moves very low that has a major impact on the theory of portfolio and asset and option pricing models (Kim & Zhang, 2015).

Huang et al. (2012) ‒examined that from 1963 to 2009, although only 1% of the shares that were listed on the US stock exchange (AMEX, NYSE, NASDAQ) had been withdrawn, the result was more than double the earnings ratio‖. It depicts that the crash risk has been a serious concern for companies and investors.

It has also been observed that the quality of information regarding financial and accounting is very poor in most developing markets. Such a weak public information system in the developing markets provides managers with better latitude to suppress negative news, leading to apparent stock price crash risk in developing markets compared to mature markets. Acquiring maximum firm-related information to reduce stock market crash risks in a fragile public information environment is significant for both investors and regulators.

Jensen and Meckling (1976) explained that a controlling shareholder is likely to behave opportunistically in an information-asymmetric environment to advance his private interests due to high agency cost. As a result, organizations with less information asymmetry are prone to a lower risk of a crash. There are several determinants of firm-level crash risk, but the most significant factor given by previous studies is the lower standard of financial reporting. This opaque financial reporting created information asymmetry and raised agency cost (Hutton et al., 2009; Kim & Zhang, 2015). If the information asymmetry between management and analysts is high, the company's negative news will not be promptly delivered to the stock exchange. Managers with more information advantage are more likely to manipulate, prolong, and withhold data to maximize their gains (Healy & Palepu, 2001; Jin & Myers, 2006). Although the managers continuously wish to store adverse information exposure, they will not stockpile adverse information beyond any critical stage. As the collection of negative information arrives at the threshold limit, it swiftly enters the market, leading to a fall in stock prices (Jin & Myers, 2006,). Hutton et al. (2009) elaborated that firms are more likely to crash risks with opaque financial statements. Liang et al. (2019) and Chae et al. (2020) have presented supporting evidence. They claimed that corporate opacity encourages bad news hoarding practices of overconfident managers, which raises the likelihood of stock price crashes.

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According to the bad new hoarding hypothesis, due to the lack of corporate transparency, stock market crash risk is triggered by managers accumulating and stockpiling bad news. Studies show that stock price crashes are lower in firms that have financial reporting and accounting information of good quality (Kim & Zhang, 2016).

Furthermore, with increased monitoring, the cost of managing the earning is higher, thereby obstructing the incentive to hoard bad news by manipulating earnings. On the contrary, it is easier for managers to mask actual organizational results without managing earnings while adjusting the narrative style of information disclosure and reducing the clarity of information provided in the annual report. This lack of transparency poses another information risk that escalates the risk of a share price collapse (Barth et al., 2013; Kim et al., 2019). Kim et al.

(2016) explained that crash risk is minimized by increasing comparability in financial statements. Ertugrul et al. (2017) explored the companies with larger 10-K file sizes, and a higher percentage of ambiguous and poor expressions are probable to experience a crash in the near future.

They contended that this outcome ropes the argument that the The readability and tone ambiguity of a company's financial reports are connected to management's information hoarding. Xue and Ying (2020) argued that enterprises in poorer financial conditions tend to mask negative information, thereby undermining the information climate and aggregating the risk of the fall of stock prices.

This lack of transparency has an impact on the investor's ability to understand the firm through financial reports, provided that the information divulged in annual reports comprises numerous professional terms and long notes, as well as a substantial quantity of non-financial information, making them more difficult to interpret in public firms, particularly those in Pakistan. This lack of transparency provides the manager with greater latitude to hide the negative news which increases the risk of stock price crash. This high risk of a crash will lead to an increase in COE. When share prices oscillate wildly due to asymmetrical information, investors will not grasp the business position promptly as it is challenging to oversee managers. As a result, investors demand compensation for this increased uncertainty, increasing the COE (Liu & Ren, 2019; Liang & Mao, 2019).

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Literature also indicates that by having private information, insiders perform successfully (Seyhun, 1990; John & Lang, 1991 and Ke et al., 2003). Insider trading returns signify a kind of reparation for managers (Roulstones, 2003 and Denis & Xu, 2013). For instance, 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 prone to struggle to increase the firm value (Levmore, 1982; Manove, 1989 and Ausubel, 1990). Therefore, crash risk can be decreased to a larger extent by controlling insider trading. The rationale runs as follows.

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, so the abrupt release of negative news stimulates the bubble to burst and crashes the share price (Jin & Myers, 2006; Hutton, Marcus et al., 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.

Failure to consider less lucrative projects early and push the manager to take relinquishment steps promptly leads to a potential risk of stock price collapse. Furthermore, the continuous investment in these money-losing projects leads the manager to conceal poor performance, leading to an increase in asset prices. When the prices of these overvalued assets burst, acutely negative returns will occur (Bleck & Liu, 2007).

Ni and Zhu (2016) argued that as investors are not fairly informed in the market, there is an information asymmetry between informed and uninformed investors. This information asymmetry places uninformed investors in a disadvantageous position, which increases the COE and surges the risk of a stock price collapse. Incognizant investors will trigger a price crash because they assume that when prices fall, cognizant investors have acquired unfavorable information, causing them to lessen their demand for assets, resulting in lower stock prices. As a result, the probability of stock price collapse is influenced by the asymmetry of information between incognizant and cognizant investors. Moreover, with the rise in information asymmetry between the company and the market, managers have more potential and opportunities to withhold bad news and speed up the release of good news. As a result, information asymmetry between managers and investors is expected to raise the likelihood of potential stock price crashes.

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These results are also supported by information blockage theory. The uptrend in market encourages well-informed investors to engage in aggressive trading. On the other hand, less informed traders try to avoid trading before the stock price drop because they are inherently suspicious about the actual existence of signals. However, when the marginal investor who is less informed enters the market and economic outlook becomes negative, price correction becomes unavoidable. Information blockage thus produces negative return skewness, resulting in price increases but positive skewness ensuing price decline.

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

H2: Information risk affect the COE through the mediation of Stock price crash risk

H2a: Private Information affect the COE through the mediation of Stock price crash risk

H2b: Lack of information quality affect the COE through the mediation of Stock price crash risk

H2c: Information Transparency affect the COE through the mediation of Stock price crash risk

2.3. Private Information and COE: Moderation of Investment Adjustment

The provision of information is one of the most crucial function of the financial market. Traders are not all uniformly well-versed; private information is propagated into stock prices through trading. As a result of the information asymmetry, ignorant traders seek a risk premium as recompense for incurring the information risk (Easley & O'Hara, 2004). This private information in stock prices, on the other hand, serves as useful metrics that managers may rely on to alter investments for better performance. Public statistics and private information on company fundamentals are widely known to represent stock prices. Via the speculators' trading practices, private information is included in the price. When management determines at a certain point in time about the amount of investment, they are seeking to increase the company's projected value, they would utilize entire information accessible to them at a particular point. It entails details about stock prices and entire information that managers have and have not yet found its way to price. In such a framework, portfolios will be more vulnerable towards equity prices if price gives managers further new information. Information that executives already had would change prices but not influence investment decisions (prior investments had affected it) and therefore minimize price investment sensitivity.

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A body of research has examined how firm managers may use the private information incorporated in stock prices to adjust investments for improving firm performance. For instance, Chen et al. (2007) discovered that private information contained in the stock price affects investment-Q sensitivity. According to Zhu and Feng (2008), stock price informativeness can decrease the sensitivity of overinvestment to free cash flow and the sensitivity of underinvestment to financing constraints. Loureiro and Taboada (2015) investigated the information shock‘s impact on the insider ability to learn from outside. For example, with the adoption of the international financial reporting standards, new outside investors from global markets with insiders are less familiar. These new foreign investors incorporate their private information into stock prices (Florou & Pope, 2012; DeFond et al., 2011). Edmans et al. (2017) recommended that the aggregate sum of information in valuing counts for real proficiency and the wellspring of information in costs whether the information is recently known to the chief. They are likewise additional powerful in circumstances where administrative gaining from stock cost is more significant (concentrated and unpredictable enterprises), as well as firms with lower pre-requirement expert inclusion (and hence a more noteworthy potential for pariah in-line to rise post-ITE) and monetary imperatives (that would

limit their capacity to answer more enlightening costs). Ouyang and Szewczyk (2019) identified that managers learn from financial markets in recognizing strategic merger investment opportunities by shifting assets from badly managed businesses to well-managed firms. Furthermore, the target's stock price, firm-specific information boosts the acquisition size, showing that well-informed acquirer managers are more inclined to make substantial merger investments. According to Chan et al. (2017), high stock price levels obstruct informed stock trading and impair price informativeness.

Therefore, when the manager adjusts this information in investment, it affects the company fundamentals, renders informed traders' information stale, and reduces the information risk carried by incognizant traders (Huang & Kang, 2018). Consequently, investment adjustments make the stock more appealing to uninformed traders while lowering the cost of equity (COE). However, the study rises whether firms have equal opportunities to make investment adjustments by employing this information? Since private information has two competing forces impacting the COE, the net effect is determined by which force dominates, which is determined by the level to which investment may be adjusted. As a result, this study examines the combined influence of information and investment adjustment on COE, theorizing that information-driven investment adjustment might change the dynamic between private information and the COE.

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This study builds a theoretical model that combines investment adjustment and information risk to motivate our empirical work. Private information raises the COE in the deficiency of investment adjustment, according to Easley and O'Hara (2004). This is credited to information risk; clueless financial backers expect bigger returns for stocks with more prominent information deviation since they have excessively hardly any "great" resources and too much "awful" resources in their portfolios. In addition to Easley and O'Hara (2004), this study believes firm managers can adjust investments based on stock price movements. Precisely, a dip in the stock price implies that informed traders may be selling the stock in response to negative news. When the stock price falls below a certain threshold, it spurs the firm manager to adjust its investment, whose goal is to maximize its worth. Uninformed investors gain from investment adjustments in two ways. In the first instance, it increases production efficiency, and in the second, it reduces information asymmetry. Therefore, the COE is reduced as a result of investment adjustments. If the investment adjustment is substantial enough, its influence on predicted stock return can outweigh the negative effect of information risk.

To put the theoretical prediction to the test, this study looks to the value premium literature for an empirical measure of the firm's investment flexibility. Value businesses, according to Zhang (2005), are riskier and provide higher returns than growth firms because value firms have a greater difficulty changing their investments, particularly when the economy is sluggish.

The book-to-market (BM) equity ratio is used in this research as a proxy for quantifying the level to which a corporation's investment can be modified. If a company's BM is low, investors believe it has strong growth potential and is betting on its future cash flows. In the literature, such a company is referred to as a growth company, and it should have a lot of investment flexibility. On the other hand, a value firm has a high BM; its growth options are constrained, and the stock return is primarily derived from cash flows from fulfilled investments. As a result, investment adjustments in reaction to stock price information do not assist value enterprises as growth firms. This disparity suggests that to attract uninformed investors, value enterprises must offer greater information risk premiums.

Following in the footsteps of Easley and O'Hara (2004) and Huang and Kang (2018), this study develops the following hypothesis for empirically assessing the moderating influence of investment adjustment. Companies with little investment flexibility, known as "value firms," can't get as much advantage from information incorporated in market pricing as firms with strong investment flexibility, known as "growth firms." As a result, this study contends that value stocks have a greater risk premium for information risk than value firms. Furthermore, this study explores the influence of information risk on investment Q sensitivity by considering the firms' varying degrees of flexibility in modifying their investments. The dynamic framework postulates that the impact of information risk on investment-Q sensitivity is more prominent for growth firms than for value firms. We develop the following two hypotheses for empirical testing based on this logic:

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> **H3**: Investment Adjustment moderates the relationship between private information and COE.
>
> **H4:** Investment Adjustment moderates the relationship between private information and Corporate Investment.

2.4. Information Risk and COE: Moderation of Competitive Position

The agency theory helps to investigate the link between information risk and COE. The relationship between the manager and the principal is at the heart of agency theory (Villiers et al., 2011). Typically, the principal (owner) delegates managing and controlling authority to

the management (agent) for the agent to serve the owner's aspirations (Oh et al., 2011). However, due to the nature of business approaches and the firm's short-term and long-term strategy, both parties have a conflict of interest. Management is driven by their short-term benefits and opportunities (Khan et al., 2013). Managers/insiders may mislead external investors by providing self-discretionary disclosures or disclosing facts. (Jo & Kim, 2007; Lang & Lundholm, 2000; Lewellen et al., 1996; Li, 2008). In underdeveloped nations like Pakistan, where inadequate regulation, ineffective law enforcement, and entrenched political influences make it difficult to prohibit, identify, and castigate opportunistic disclosures, this situation can be even more problematic (Healy & Palepu, 2001; Merkl-Davies & Brennan, 2007; Piotroski & Wong, 2011). Indeed, it is frequently claimed that Pakistani companies are quick (or hesitant) to share positive (or bad) news or deliberately announce misleading information. It is difficult to verify the disclosure quality since the information may be biased and based on random activities (Hui & Matsunaga, 2015). As a result of this weak and uncertain information environment, there is agency conflict and a high COE because investors demand a high return as reward for this information risk.

On the other hand, traditional corporate governance mechanisms have a long history of failing to shelter the benefits of smaller shareholders (e.g., Bebchuk & Fried, 2005). Despite this, due to the strong regulatory influence of product market rivalry, many businesses perform effeciently in domestic and worldwide marketplaces. (Scharfstein, 1988; Schmidt, 1997). Product market competition significantly impacts corporate decisions, particularly those related to a company's disclosure strategy. The information theory already posed by Adam Smith (1776) assumed that information could be exposed most economically by rivalry in the product market, and it is a natural and most effective enticement mechanism. Therefore, this study looks into the effects of product market competition on information risk and COE.

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Several researchers have identified the significance of an organization's competitive position in reducing information risk. Market competition, in consonance with previous researches, reduces information asymmetry and limits managers' opportunistic behavior in financial disclosure (Balakrishnan & Cohen, 2011; Laksmana et al., 2012; Marciukaityte & Park, 2009). There are fewer chances in a highly competitive market for a firm to engage in fraudulent activities. Chhaochharia et al. (2009) and Chou et al. (2011) contended that market competition defends shareholders from embezzlement as competitive markets push managers to surpass competitors or face job dismissal and eventual insolvency. Moreover, the competitive environment encourages well-managed companies to procure poorly managed companies to maximize shareholder value, putting the managers in great strain to reduce managerial slack, maximize profit, and increase efficiency (Allen & Gale, 2000; Giroud &

Mueller, 2010, 2011). Hart (1983) says that companies in a similar sector are subject to common productivity shocks and that when one firm's costs fall, so do the costs of the others. For instance, cut down of product prices by profit-maximizing firms encourage poor-performing firms in the same group/sector to reduce prices in order to minimize managerial slack. Conforming to Hart (1983), competition fosters discipline, which has ramifications for the "managerial theory of the firm" or "firm agency costs."

These studies substantiate the importance of product market competition in resolving agency conflicts. Not only does competition reduce agency conflict, but it also elevates the quality of reporting. Companies in intense competition sectors must obtain funds from the capital market at a lower cost since they are more likely to be financially restricted due to their weak product price competition. This necessitates them providing more information to funds providers, which will likely reduce information asymmetry (Lee et al., 2019). Schmidt (1997) and Holmstrom (1982) proposed that businesses under fierce rivalry are less susceptible to asymmetric information as stakeholders can readily compare a specific firm against many others in the industry, allowing them to appraise the firm's performance at a bargain. Appropriately, market competition is positively (negatively) associated with corporate disclosure. Similarly, analysts collect more statistics for assessing business efficiency and value in a more competitive environment, which ameliorates overall transparency (Lang et al., 2004). The more analysts that observe a firm (and hence the more accurate analyst projections), the more information intermediaries gather, making it tougher for the corporation to retain information secret from the public (Lang et al., 2012).

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Investors benefit from increased firm information availability and demand less return. Whereas Ali et al. (2014) document that earnings forecasts are less frequent for firms operating in more concentrated industries, horizons are shorter, disclosure ratings are lower, and information environments are opaquer.

Product market competition is likely to lower predictable profits while increasing the risk of default (Irvine & Pontiff, 2009). Indeed, companies are always competing for consumers in competitive markets, and a competitor's gain in market share causes ambiguity about forthcoming performance and, as a result, enhances the volatility of firms' business environments. Empirical manifest reveals that competition's risk-increasing effect has important consequences for business actions such as hedging (Haushalter et al., 2007), financing (Xu, 2012), and payout policies (Hoberg et al., 2014). Product market competition can also reduce a company's operational efficiency and exacerbate agency issues. Due to

increased product market pressure, managers may overstate profits to meet their estimated earnings performance (Lemma et al., 2018).

While Zheng et al. (2021) argued that having a higher competitive status gives businesses more room to deal with the negative effects of intense market competition and better adapt to changing economic conditions. Accordingly, such organizations are less prone to experience cash deficiencies, operating issues or further market retreat, and management are under less pressure to maintain a good image or suppress unfavorable facts in order to meet funding needs (Datta et al., 2013). Furthermore, the management of businesses with a higher level of competitiveness is given more attention and oversight. The cost of keeping negative information hidden or postponing its release is higher. As industry competition grows, information quality will improve, and information asymmetry will be reduced. Increased industry competition can often produce corporate governance effects such as reducing information asymmetry between managers and shareholders, improving management efficiency, lowering agency costs, and improving the quality of information disclosure for enterprises with intense competition. Increased industry rivalry diminishes cash flow creativity, raises liquidity risk, and makes external financing more difficult for businesses with a poor competitive standing. As a results, Management are more inclined to suppress bad news in order to retain its image, boost its valuation, and deal with financial restrictions (Balakrishnan & Cohen, 2011). Finally, increased industry competition will raise the entire cost of doing business, increase management motivation to keep company information hidden, and increase the accumulation of bad news, all of which will result in a higher COE for firms with low, competitive status (Francis et al., 2005; Armstrong et al., 2011; Li & Lou, 2019). Using traffic reduction as a measure of competition, Zheng et al. (2021) investigated the impact of product market completion on COE. They discovered that product market competition lowers a company's cost of equity capital, which impacts the company's capital structure, financing strategies, and long-term growth outlook.

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Another information risk emerges, though less transparent information can be mitigated by competition. According to Li & Luo (2020), competition improves the investor's ability to interpret financial data because the investor obtains information from various outside sources and gains a thorough understanding of the company by comparing different firms. Competition, on the other hand, improves not only the efficiency of information disclosure but also the ability of investors to view and comprehend it. This increases information transparency while lowering the COE. As all prior studies explain the role of competitive position in reducing information risk, this study investigated whether or not competitive

position moderates the relationship between information risk and COE. Based on the prior studies, the following hypothesis was advanced in this study:

H5: Firm competitive position moderates the relationship between lack of information quality and COE.

H6: Firm competitive position moderates the relationship between lack of information transparency and COE.

2.5. Information Risk and Corporate Investment: Moderation of Competitive Position

The situation in which a firm's managers have more information than outside capital providers is known as information asymmetry. Capital providers, unlike managers, do not have accurate information about the projected profit potential of a company's investment decisions. Furthermore, it is challenging for capital providers to accurately assess the profitability of a firm's investment decisions simply by looking at them. This information asymmetry causes outside capital providers to be unsure about the firm's investment prospects in the future. As a result of this uncertainty, the cost of capital rises, limiting the firm's borrowing capacity. Due to financial constraints, businesses miss out on several investment opportunities, leading to underinvestment (Myers & Majluf, 1984). Therefore, anticipating the manager's opportunistic behavior, the investor lessens the amount of capital available in advance, resulting in under-investment.

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The signaling theory states that a company's competitive position improves the quality of its reporting. Positive financial performance indicates a company's financial stability, which leads to an increase in its stock price (Dionne & Ouederni, 2011; Taj, 2016). On the other hand, new share issuance sends negative signals to investors by reducing the advantages and integrity of current shareholders (Mavlanova et al., 2012). As a result, organizations send signals to stakeholders through a variety of mechanisms, reducing information asymmetry. One of the best transmissions diverts is revealing information in a report (sustainability or annual report) (Ching & Gerab, 2017). Because of the signal opportunity cost, better performing firms are more motivated to send high-quality signals than low-performing firms (Connelly et al., 2011).

Besides, High-quality signals infer that stakeholders (buyers, investors, etc.) can rapidly comprehend the firm's capabilities (cost bearing and management), resulting in a rise in market share and stock price. Consequently, high-quality accounting data shows sound capital investment decisions (Biddle & Hilary 2006; Biddle et al., 2009) because a firm in a strong competitive position can easily obtain capital for investment. For instance, due to the presence

of signals, customers will choose to buy from seller A (who sells a high-quality product) over other low-quality sellers if there is no communication gap (information asymmetry). Subsequently, signaling (quality reporting) must be considered as a strategic tool in the selection of social and environmental investments by management. Furthermore, companies with strong operating results are less likely to structure their annual reports in such a way as to conceal negative information at an inopportune time. This reduces the annual report's complexity and improves investor readability, reducing information asymmetry and increasing financial flexibility (Luo et al., 2018; Jayasree & Shette, 2020). In other words, when there is a lot of competition, it's easier for investors to keep track of accounting data from multiple companies. As a result of the arguments mentioned above, the following hypothesis has been developed:

H7: Firm competitive position moderates the relationship between lack of information quality and corporate investment.

H8: Firm competitive position moderates the relationship between lack of information transparency and corporate investment.

2.6.Information Risk and COE: Moderation of Investor Attention

These different dimensions of information risk (private information, quality and transparency of information) severely damage small and medium-size investors by shaking their confidence in the stock market, ultimately affecting the firm COE. However, investors spend a substantial amount of time and effort searching the information on the internet to reduce information asymmetry (Dimpfl & Jank, 2016). This online search will help investors obtain more insight into the stock market that increases stock market liquidity and reduces equity cost. This searching attitude indicates the investor's attention and plays a key role in speeding up the dispersal of information from the public to investors and enhancing market efficiency (Gao et al., 2018).

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According to the investor attention hypothesis, individual investors are the net purchaser of shares that spark their interest. An increase in investor awareness should result in a brief period of positive price pressure. However, attention-driven price increases will fade or reverse in the long run. As more information becomes accessible, stock prices are more likely to rise as investors know a company's future cash flows and investment risks.

The impact of retail investor attention on asset pricing and stock returns has been widely examined (Jin et al., 2016; Guo et al., 2017), highlighting the stock market's relevance to investor and media attention. One of the first studies to indicate that investor attentiveness affects asset prices was Merton's (1987). Stock prices only react to new information

(Huberman & Regev, 2001). Barber and Odean (2008) demonstrated that retail investors had been net purchasers, and short-term stock price volatility is related to retail investor attention. Fang and Peress (2009) further reinforced the investor recognition theory, which discovered the no media premium, suggesting that equities with less media attention receive a higher future return. By using the search frequency from Google Trend, Da et al. (2011) demonstrated that such proxies primarily reflect retail investors' attention. Retail investors' attention is likewise favorably linked to the stock price in the short term. Bank et al. (2011), a rise in Google search traffic for a company's name is connected to an increase in trading activity and stock liquidity, at least in the short run.

According to economic psychology, economic uncertainty increases the demand for information; as a result, the author believes that agents respond to increased uncertainty by raising the number of Internet searches with the phrase "economy" as the topic (Dzielinski, 2012). Investors search behavior in the context of corporate announcements was studied by Drake et al. (2012). They looked at how changes in online searches impact how the stock market reacts to earnings. Da et al. (2014) demonstrated that the volume of online searches spikes excessively before earnings announcements and stays high for a long time after the announcement. As a result, the internet has become a mainstream platform for creating, intermediation, and sharing information in the financial sector.

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A more extensive investment base and more investor interest, according to Tang and Zhu (2017) and Yoshinaga and Rocco (2020), will lower the expected rates of return on "attention-grabbing" equities by reducing estimation risk. Lastly, Smales (2021) confirms the negative impact of the investor's attention on stock return, who concluded that during the COVID-19 crisis, increased internet searches result in a quicker flow of information into financial markets, resulting in higher volatility.

Moreover, investor attention improves the quality of information by reducing the earning management practices. Chung et al. (2002) and Jin (2013) discovered that investor attention improves information reporting quality by employing analyst coverage, institutional ownership, and Big N auditor choice as a proxy for investor attention. He found that financial analysts keep track of the firms by analyzing earnings and sharing the information with institutional and individual investors. Similarly, institutional investors have an edge in information collection and processing, allowing them to keep a closer eye on management conduct (Miranda et al., 2018). Institutional investors put pressure on management, who are rewarded for growing (decreasing) reported earnings and limiting the use of income-enhancing (income-decreasing) discretionary accruals.

Kempf et al. (2017) found that when shareholders are distracted (offer less than ideal monitoring), earning management becomes more challenging to detect due to the temporary loser monitoring caused by investor distraction. If this is the case, managers would have more leeway to manipulate accruals and fundamental operations to inflate reported earnings (Chen et al., 2020; Liu et al., 2020). All accessible stock information cannot adequately inform retail investors due to the expense of both looking for and processing the information (Ying et al., 2015). Theoretical investor attention models imply that investors with limited attention should profit from paying greater attention (e.g., Van Nieuwerburgh &Veldkamp 2010; Kacperczyk et al., 2016). Retail investors will devote greater attention to stocks about which they are particularly interested, resulting in more efficient collection and processing of these stocks. By obtaining more relevant information, individual investors improve financial reporting quality and reduce the information asymmetry problem between management and investors (Ding & Hou, 2015; Gao et al., 2018).

Furthermore, the less transparent information, which impacts the investor's capacity to comprehend and digest it, may be decreased by having more in-depth discussions with more attention. More debate with increased investor interest may also be associated with improved accounting information processing. According to psychological and cognitive research, both writing and speaking are connected to thinking and problem solving, particularly the electronic conversation, which improves the participants' critical thinking ability (Greenlaw & DeLoach 2003; Kim, 2002). Paper (2010) found evidence of investor information processing impact by examining the movement of stock prices around earnings announcements (like post-earnings announcement drift). The drifting of post-earnings reports might be attributed in part to individual investor behavior (Brown & Hana, 2000). They discovered that firms with greater transparency at the time of earnings announcements have a reduced drifting effect. According to Leong and Hazelton (2020), information sharing alone does not change unless the user can comprehend or acquire appropriate information relevant to their objective. They must be able to turn this information into action that results in a change. Based on the preceding factors, this study has suggested the following hypothesis:

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H9: The impact of Information risk on the cost of equity is more pronounced in low investor attentive firms as compared to high investor attentive firms

H9a: The impact of private Information on COE is more pronounced in low investor attentive firms as compared to high investor attentive firms

H9b: The impact of lack of information quality on COE is more pronounced in low investor attentive firms as compared to high investor attentive firms

H9c: The impact of lack of Information transparency on COE is more pronounced in low investor attentive firms as compared to high investor attentive firms.

2.7. Information Risk and Corporate Investment: Moderation of Investor Attention

Scholars have found that financing restrictions in the face of asymmetric information have been a significant factor influencing corporate investment (Zhong, 2018; Brown & Martinsson, 2019). Information asymmetry is exacerbated by information risk, making it harder for investors to accurately estimate a company's future profitability, leading to the undervaluation of investment projects. At the same time, investors' adverse selection behavior would exacerbate firms' financing restrictions and make financing more difficult, perhaps forcing companies to decrease or even forgo suitable investment opportunities. As a result, the financing constraints imposed by information asymmetry may limit a company's capacity to innovate and make an investment. Several studies have demonstrated that information asymmetry, financial constraints, and agency issues are significant variables affecting firm investment decisions (Cornaggia et al., 2015).

Investor attention influences capital market efficiency (Ben-Rephael & Israelsen, 2017; Jiang & Yuang, 2018). However, it is still unknown whether it helps the economy by decreasing information asymmetry and improving capital market efficiency. Investor attention is a crucial driver of real economic growth; however, many studies have found that agency issues and financial constraints are the primary variables that skew managers' judgments (Bernstein, 2015; Jiang et al., 2017). By paying greater attention to publicly listed firms, monitoring managers' opportunistic conduct, and relaxing corporate financing limitations, investors may assist in lowering the degree of information asymmetry with corporations, all of which influence corporate innovation and the actual economy. The dynamic search behavior decreases information asymmetry between investors, companies and market pressure to establish an external reputation limitation method (Wei & Mei, 2020).

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While investor attention used the market pressure theory to check the external reputation and ease the agency problem. The short-sighted conduct of shareholders and their management can be moderated by this theory, which encourages the active participation of other essential shareholders in corporate decision-making. In contrast, Ali and Gurun (2009) discovered that the accrual component of earnings is more significant during periods of high sentiment when investors are more involved yet pay less attention to the firm's activities. However, boosting the firm's initiative to divulge information via the market pressure theory decreases the manipulating earning effect. Li et al. (2021) looked into the impact of investors' attention on the innovative performance of the companies and came up with three conceptual

underpinnings. First, investors may minimize information asymmetry and financial constraints in business innovation operations by actively acquiring information, enhancing managers' motivation and capacity to innovate. Second, investors' ongoing emphasis on firms and their supervisory role may alleviate agency worries while employing innovation funds, leading to increased fund utilization efficiency and innovation output.

Furthermore, active information collection improves the efficiency of instant interpretation of corporate information (Li and Zu, 2011) and the quality of corporate information disclosure, increasing the transparency of information and decreasing the COE. As a result, it increases the possibility of corporate investment. Therefore, based on the arguments mentioned above, this study concluded that investment inefficiency arises through less quality, and transparency can be alleviated through investor attention. These two channels help to reduce the information risk and put forward the following Hypothesis:

H10: Compared to less attentive firms, high investor attentive firms exhibit greater investment Q sensitivity in response to information Risk

H10a: Compared to less attentive firms, high investor attentive firms exhibit greater investment Q sensitivity in response to private information

H10b: Compared to less attentive firms, high investor attentive firms exhibit greater investment Q sensitivity in the response of information quality

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H10c: Compared to less attentive firms, high investor attentive firms exhibit greater investment Q sensitivity in the response of information Transparency

2.8.How Investors' Attentions Reduce Information Risk?

Furthermore, this study also tests the role of investor attention in reducing the different types of information risk by introducing two channels: First, investor attention's role in reducing the information asymmetry by increasing the stock liquidity, which ultimately reduced the COE. Aoudi et al. (2017) argued that the demand for information only improves stock liquidity for highly informative asymmetry firms. In contrast, this relation does not hold for symmetric information firms. They strongly recommended the nonlinear relation between liquidity and information demand, which is contingent on search friction, information asymmetry, and the firm's visibility. Suppose the investors are different in term of their ability to understand the firm specific information. In that case, the GSV (google search volume) of stocks under the poor information environment can make the investor more informed and thus reduce the problem of unequal distribution of information in the stock market (Diamond & Verrecchia, 1991; Kim & Verrecchia, 1994). The reason of that when the investors face difficulty in trading security, they demand more information via the internet, which will be reflected in

more liquid stocks. Also, as Drake et al. (2015) recommended when the benefit of acquiring the information is highest, investors will be more focused on their search.

Second, the effect of investor attention in reducing the problem of less information quality and transparency causes the risk of stock price crash through monitoring and getting more information about firms. Individual investors are not well informed about all the stock information because they are constrained by the costs of searching for and processing the information (Ying et al., 2015). When the firm grasp more retail investor attention, individuals become more informed about the company (Gao et al., 2018), and the problem of information asymmetry can be mitigated (Ding & Hou, 2015). As the investor gets more information, it's become more difficult and costly for the manager to stockpile the bad news. While in the case of firms having less attention from investors, investors could not have sufficient information to monitor the manager. Consequently, bad news will hoard in case of low attention from investors, leading to increased crash risk.

2.9.SUMMARY

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The theoretical and empirical evidence suggest that information risk significantly affect the cost of equity and corporate investment. Most of the studies focus on the different variants of information risk and their effect on cost of equity but how the negative effect of information risk on COE is minimized is missing in literature. The role of theses above discussed different channels to minimize the negative effect of different variants of information risk has been studied in developed countries. However, a deficiency of good support about the significance of these channels is still available in developing countries. The efficiency and applicability of these channels can be examined by taking a developing country that how these channels are effective especially the role of investors‘ attention in context of Pakistan.

Moreover, different theoretical justification is given to examine the moderating role of moderators and mediator. Learning hypothesis is used to investigate the moderation of investment adjustment, signaling theory is used to examine the moderation of competitive position and investor cognitive hypothesis is used to provide the support for the moderation of investor attention on the relationship of information risk and COE and corporate investment. Whereas the Bad News Hoarding theory provide the support for the mediation of stock price crash risk.

CHAPTER-03

METHODOLOGY

This section discusses the methodological aspects of the research performed to test the hypothesis. For empirical analysis, panel data is used, which indicates that observations are clustered in many cross-sections and several periods (Bruderl, 2005). The degree of freedom can be escalated to many data points due to panel data, and collinearity among the explanatory variables can be reduced (Antoniou et al., 2008). The model allows the problem to be explored, which cannot only deal with time series or cross-section (Hsiao, 1986). The integration of time series and cross-sectional variables overcome the issues of omitted variables (Delcoure, 2007).

Research methodology describes the process in a way that appears appropriate to the public (Zikmund et al., 2010). It was accomplished by defining research design, data collection and analysis performed on collected data. In addition, research methodology describes approaches used to conduct research (Kombo & Tromp, 2009; Zikmund et al., 2010). This section explains why the sample companies were chosen, as well as the sample duration for the research and data collection. This section is concerned with the conceptualize and operationalize of variables. In the next segment, empirical models for testing the relationship between various kinds of information risk and equity costs are presented, taking account of the position of moderators such as investment adjustment, competitive status, investors' attention, and the mediating role of stock price crash risk. Finally, this chapter discusses the methods used to evaluate and estimate data.

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3.1. Research Philosophy

The concept that defines a certain phenomenon of how data is obtained, analysed, and applied is referred to as research philosophy. It is intertwined with two terms: epistemology and ontology (Hudson & Ozanne, 1988). What is recognised to be true or the link between reality and the researcher is epistemology. Ontology, on the other hand, refers to the essence of reality or what is held to be true. The fundamental goal of this information is to change what people think they already know.

3.2. Positivism

Positivism is a popular research paradigm for testing theories and hypotheses. It focuses on the objectivity of the research process in general (Creswell & Garrett, 2008). Quantitative research methodology is used in the positivist approach. Its goal is to develop objective and generalizable knowledge that strives to confirm universal principles governing the interaction

between designated variables. This entails gathering reliable and measurement-based scientific data, which is then evaluated using statistics with the goal of presenting the findings. To evaluate the theories and hypotheses between the variables, this study used a positivist paradigm.

3.3. Quantitative Research

To evaluate the hypothesis, the study relied on secondary data and ratios, as well as a quantitative research technique. Because it is expressed statistically through percentages, statistics, and ratios, it is often thought to be more organised and formalised. Quantitative research methods place a premium on objective measurement and statistical data analysis. It's also used to examine, analyse, and explain relationships in order to figure out what's going on behind the surface and what the pattern is. Creswell (1999) defined this approach as "an investigation into a social or human problem based on the testing of a theory through the composition of variables, measured in numbers, and analysed with statistical techniques to determine whether the theory's predictive generalisation holds true or not".

The goal of quantitative research is to develop and apply a mathematical model, hypotheses, and theories about a specific event. The researcher uses statistical tools to analyse this data in order to uncover unbiased conclusions that can be extrapolated to a broader population. Quantitative research approach is frequently employed in studies of economics, business, sociology, psychology, and demography.

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Quantitative approaches are used to answer queries such as 'to what degree, how much, how frequently, and how many'. It is a logical method for developing social ideas. It is also used to discover the truth, which a research can anticipate by determining the cause and effect link. Quantitative research is used to quantify an issue by collecting numerical data that may then be transformed into useable statistics. It assesses attitudes, behaviours, views, and other specific factors and generalises the findings over a wide population.

3.4. Population and Sample

The study's population consists of firms listed on the Pakistan Stock Exchange. There are a total of 559 firms listed there.The non-financial sector is included in the study for empirical analysis, while companies with missing values are excluded to eradicate potential bias (Frank & Goyal, 2009; Strebulaev & Yang, 2013; Keefe &Yoghoubi 2016). The financial sector is removed from the analysis based on capital reserves criteria, which distort their capital structure. The financial features and capital structure of these firms vary from those of non-financial firms. These firms are required to conform to the regulatory requirement of the

regulator by maintaining the minimum capital reserves (Arif et al., 2008). After excluding those firms, there are remaining 417 non-financial firms.

3.5. Data Collection

Secondary data is utilized to drive the financial performance of selected firms. This data is obtained from published financial reports retrieved from official websites of corresponding firms or other credible data sources. The study covers eleven years.

3.6. Data Estimation Method

For empirical estimation of hypothesis, panel regression and the GMM technique are used. The dynamic model is the one in which the response variable's lagged value is employed as the independent variable (Davidson & Mackinnon, 2004).Although the disturbance (error) term is not serially correlated, it is associated with the lagged value of the response variable in the dynamic panel model (Baltagi, 2008).Assumption of serial correlation and heteroscedasticity can be violated in the error term of dynamic panel model. Random and Fixed effect cannot resolve the issue of correlation between the lagged value of regressors and disturbance term in dynamic panel model (Wawro, 2002). The GMM is used to resolve methodological problems related to the model of the dynamic panel. The GMM theory tells us to take advantage of the two population moments to minimize the asymptotic variance. GMM, instead, weighs the two-moment conditions to achieve an asymptotically optimal estimator due to heteroscedasticity problems. It gives more substantial estimates when the model has heteroscedastic and serial correlation problems first (Baum et al., 2003; Verbeek, 2008).

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A second notable feature is that the parameter does not have a linear condition at least one moment, prevalent in advanced GMM applications. In addition, the number of cross-sections (N) should be greater than time T), and a linear functional relationship should be defined. One variable on the left side is dynamic according to its past realization. The independent variables that are not purely exogenous often mean that they are associated with past and even current error terms.

Furthermore, instrumental variables are crucial in the equation's estimation. These instrumental variables are most naturally derived using the moment‘s method. Suppose one or more independent variables are linked with the error term in the linear population model, but the analysis has certain variables omitted from the model unrelated to an error term. If the excluded variables are associated sufficiently with endogenous explanatory variables, the

analysis could use the excluded endogenous variables as instrumental variables required for the efficient estimation of the parameters.

The variable is an instrument if it satisfies two criteria. In the first place, the instrument variable must be associated with the explanatory variable and not related to the disturbance term (Wooldridge, 2009). To approximate the GMM equation, the number of groups must be greater than the number of instruments. Otherwise, the approximation equation might not have come up with a satisfactory solution. In GMM, finding the correct instrument is a difficult and crucial task. One of the most relevant and common techniques is to pick the lag value as an instrument (Anderson & Hsiao, 1981; Davidson & Mackinnon, 2004).

Difference and system GMM are two different kind of GMM estimators which are used for empirical analysis. Difference GMM as recommended by Arellano and Bond (1991) use the regressors lagged value as an instrument for the differentiated array. The unobserved firm‘s unique fixed effect are excluded by transforming the regressors at first difference. In addition, the first difference of the lag dependent variable is also used with its previous stage. But because of two conditions, it becomes less insightful. First, the escalation of unobserved fixed effect and second the variables are closed at random (Blundell & Bond, 1998). In this situation, instruments are not strongly correlated with regressors which contributes the downward bias. The great precision of time series data, however, can help to solve this difficulty (Eicher & Schreiber, 2010).

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This study used the system GMM estimator method to resolve the issue of weak instruments. The level equation was utilized in this work to get the system of two equations, one of which is a difference equation and the other of which is a level equation, while also approximating the regression model. The second equation can be used to get more instruments. As a result, the variables at the second equation's stage have their first difference (Arellano & Bover, 1995).

This improves the estimator reliability and provides efficient forecasts. The validity of the GMM framework was assessed using three specification checks. To begin with, the error term in the differential equation was correlated in the first order but not in the second. Second, the Hansen test was performed to ensure that instruments were not connected with disturbance term due to the over-identification constraint. Finally, the number of groups must outnumber the number of instruments.

The inclusion of company-specific variables may create a problem of endogeneity which could lead to partial estimates. The endogeneity problem arises because these variables are

based on accounting values and are determined at the same time (Gaud et al., 2005). Moreover, information quality and COE are endogenous variables. In previous literature, several studies regressed the information risk on the COE to investigate the cross-sectional relationship. However, this approach may lead to the presence of endogeneity bias caused by four reasons. First, omitted variables associated with the response and explanatory variable drive the relationship and cause potential endogeneity, such as disclosure cost 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 on the same group of companies over time. The interest 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 et al., 2010; Eugster, 2020).

Third, in the case of reverse causality, where 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. The increased COE leads the manager to present less quality and transparent information. Similarly, the firm with a higher risk of a crash is more likely to manipulate the information, further increasing the future risk of a crash.

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

In this situation, OLS in model equations generate biased and inconsistent estimates because the error term s_{it} is naturally correlated with lagged dependent variable and inefficient estimates due to autocorrelation generated by unobserved heterogeneity. This autocorrelation problem can be resolved by random effect, but the most severe issue of inconsistency remains. Consistent estimates can be obtained by taking the within-group average in a fixed effect structure by the data differentiation, which eliminates all time of the model's constant terms, 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. This research regulated the possible

endogeneity of the dependent variable by adding the lag value of the same variable as the instrument (Bonaime et al., 2014). To address the issue of endogeneity, the study used the two-step System GMM Dynamic Panel Estimator approach as described by Amidu and Wolfe (2013).

The GMM estimator two-step method uses residues provided by the first stage of regression to construct the covariance matrix asymptotically weighted. Antoniou et al. (2006) claim that a two-step GMM estimate is preferable. One-step and two-step variations of difference and system GMM estimators are common. The residuals from one step are used in two stages which are asymptotically more efficient than one step. The variance-covariance matrix is robust for panel specification in this estimation, and heteroscedasticity and standard errors contribute to downward bias.

The system GMM two-stage method verifies the association of errors over time and heteroscedasticity between companies. It also regulates simultaneity and measuring mistakes because orthogonal conditions are used in the variance covariance matrix. To this end, the study used the xtabond2 command in the two-step GMM framework (Roodman, 2009). The research also adopted the finite sample correction of Windmeijer (2005) to the records of standard errors in two measures without which the standard errors appear to be substantially downward. The two-stage standard errors recorded were very reliable with this correction, and the estimate seems modestly higher. It implemented finer instruments power. In estimating coefficient with lower distortion and standard errors, the two-phase method GMM performed better than one step.

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3.7. Variable Measurement

3.7.1. Independent Variables

3.7.1.1. Private Information: Firm-Specific Stock Return Variation

This study uses price informativeness to measure 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. A market-wide and industry-wide variance of stock returns accounts for private information because stock price movement is not associated with identifiable public news. It is reflected in the share price with the trading of risk arbitrageurs who collect and own private information. So, R square from the following equation can be used to approximate this:

$$ri_{i,j}=\beta_{i,O}+\beta_{i,m}r_{m,t}+\beta_{i,j}\beta r_{i,j}+2_{ij} \quad (1)$$

Unlike Roll (1986), this research adheres to Durnev et al. (2004), who considers both industry and market returns. The following model is used to calculate industry return:

$$r_{i2,w,t} = \frac{\Sigma_{k<i2} W_{k,w,t} r_{k,w,t} - W_{j,w,t} r_{j,w,t}}{J_{i2} - 1} \qquad (1.1)$$

Where, J_{i2} represents the number of firms in an industry i2 and the value weight of firm k in a particular industry in week w is depicted by $W_{k,\,w,\,t.}$ The variance of $\varepsilon_{j,\,w,\,t}$ is further deflated on the variance of dependent variable used in equation 1 to yield the given below model:

$$T_{j,t} = \frac{\Sigma_{w<t} \varepsilon^2_{j,w,t}}{\Sigma_{w<t} (r_{j,w,t} - r_{j,t})^2} \qquad (1.2)$$

Equation (1.2) 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.

Roll (1988) was the first one who suggested that ‒non-synchronicity of price be related to private information‖. This measure is supported by burgeoning line of the theoretical and empirical literature. His claim goes in such a way that prices change to new information and capitalize on prices in two ways: The first reason for revaluation of stock prices is the general release of public information such as quarterly earnings announcements or unemployment rates. The second cause is the trading practice of risk arbitrageurs who acquire and possess private information. Roll (1988) found that the latter channel is particularly effective in capitalizing firm-specific information because the firm-specific movements are unrelated to identifiable public news. He acknowledged that private information or occasional frenzy are two interpretations of his observations that are potentially possible.

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The relative value of these two possibilities is a matter of empiricism. Empirical evidence reported offers vital support to the assumption that price non-synchronicity represents more private information than noise. Durnev et al. (2003) suggest the most compelling piece of evidence. They notice that the explanatory power of stock prices to forecast the future earning is strongly correlated with stock price non-synchronicity (SPNS). This synchronicity signifies more private information rather than noise. Morch et al. (2000) explained that this firm-specific return variation is high in the well-established capital markets and low in the case of developing markets. They argued that prices reflect the more incredible firm-specific information in countries with a developed capital market because traders are more likely to have easy access to individual firms.

Durnev et al. (2004) argued that ―industries that have high variation in firm-specific return could allocate their capital more efficiently in a way that their marginal Tobin Q is near to one‖. They claimed that price informativeness improves investment efficiency. Wurgler (2000) found similar evidence by analyzing the effect of the lagged value of stock return and consequent CEO turnover in countries having low stock return synchronicity. They argued that non-synchronicity makes the prices more informative that affects the CEO turnover decision. Moreover, Bris et al. (2004) and many other studies used price non-synchronicity to measure market price quality.

Theoretically, as stock prices move in lockstep, they are less likely to reflect the finely tuned firm-specific information that management needs to make investment decisions. Such co-movement may express the different phenomena such as contagion (Barberis & Shleifer, 2003) and investment style (Barberis et al., 2005), all of these are linked to less important information reflected in stock prices.

The work of Veldkamp (2004) is nearest to our notion of informativeness. He explained when the investors confront the higher cost of getting the information regarding the individual firm, and then they rely on the signals common to many firms. Prices will show a greater co-movement when this happens and will represent less information on the fundamentals of each company. Therefore, the model predicts a negative relationship between price synchronicity and informativeness, which is the foundation of our empirical private information measure.

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3.7.1.2. Measurement of Information Quality

This study used the Accrual quality as a proxy of information quality. The degree to which the accruals are mapped in recognition of cash flows is used to measure accrual quality. This can be operationalized by taking the standard deviation of residuals of the last three years, estimated by regressing each firm's firm-specific accruals on operating cash flows of previous, current and subsequent years (Dechow & Dichev, 2002). This measure is based on Francis et al. (2005), who used the McNichols (2002) modification version of Dechow and Dichev (2002) measure to determine the efficiency of accruals. McNichols (2002) included two additional variables, i.e. current property, plant and equipment and change in revenue from the Jones (1991) model. Therefore, this study measures the accrual quality as follows:

$$TCA_{it}=\beta_O+\beta_1 CFO_{i(t-1)}+\beta_2 CFO_{it}+\beta_3 CFO_{i(t+1)}\beta_4 \Delta REV_{it}+\beta_5 PPE_{it}+\varepsilon_{it} \quad (2)$$

‖Where: total current accruals of firm j in year t are calculated by subtracting the change in current liability $\Delta CL_{j,\ t}$, changes in cash and cash equivalent $\Delta Cash_{,\ t}$ and change in short term debt $\Delta STDEBT_{j,\ t}$ from the change in current asset $\Delta CA_{j,\ t}$. $CFO_{j,t}$ is the operating cash

flows of j in year t, change in revenue from year t-1 to t and current property, plant and equipment in year t‖.

Equation (2) is estimated for each sector having at least 12 firms in each year t. This firm and year-specific residual measure of accrual quality is computed on a cross-sectional basis for each year. $AQ = \sigma_{vi,t}$ shows the S.D of residuals from year t-4 to t of firm i, and the higher value of S.D of residual depicts lower accrual quality. In this vein, if the firm has a consistently higher residual over time, then the value of S.D would be negligible. As a result, the company would enjoy relatively high accruals quality due to less uncertainty about accruals.

3.7.1.3. Information Transparency

This study operationalizes information transparency by constructing a measure that depends on the explanatory power of the relationship between returns and earnings, i.e. the degree to which earnings and change in earnings co-variate simultaneously with returns on the stock. Irrespective of the source of variation in the transparency of earning, high (low) power of earning in explaining the return would be observed in case of high (low) transparency (Barth et al., 2013; Ye & Gao, 2018). Although investors can receive information about the changes in firm valuation from earning or other sources, this measure reflects the degree to which earning and adjustment in earning or the information pertinent to earning determines the return. To develop a measure of earnings transparency, TRANS, this study used the adjusted R square from the cross-sectional regression based on the link between current annual return and earning and change in earning divided by price E/P transparency in earnings. Valuation analysis identifies a correlation between equity book value, earnings and stock prices (Ohlson, 1995). By considering the cross-sectional and inter temporal variation in our metric of information transparency, this study develops TRANS by using the two-step estimation process. This metric for each firm year is calculated by taking the explanatory powers from this regression of return earning relation in two steps. In the first phase, regression is used to assess the degree to which earnings and change in earnings co-vary with returns reflected by adjusted R square in equation (3) denoted by TRANSI for each industry in each year.

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$$RET_{i,t,t} = a_O^I + a^I \frac{E_{i,j,t}}{1P_{i,j,t-1}} + a^I \frac{AE_{i,j,t}}{2P_{i,j,t-1}} + \varepsilon_{i,j,t} \qquad (3)$$

–Where RET is firm annual return, Et/P_{t-1} is earnings divided by the price at the beginning year and ΔE changes in earnings from year t-1 to year t‖. Earnings and change in earnings are divided by price to make it consistent with the returns. This part of TRANS is the same for all companies for a particular industry year. There is a strong industry dimension to the return-

earnings relationship due to accounting practices that are likely to be identical within industries (Barth et al., 1999, 2005). However, calculating the industry-wise returns-earnings relationship is unlikely to ultimately reflect the variations that cross companies have in the returns-earnings relationship (Barth et al., 2005). First, specific accounting standards that influence the return-earnings relationship refer to companies in all sectors. Second, earnings can vary to the degree to which they represent management information and thus change the firm's economic value. Third, it isn't easy to define a firm's sector. Not only is the definition of industry not clearly described, but many businesses still operate in several industries.

In the second step, companies are divided into three portfolios from smaller to larger based on the magnitude of residual derived from equation (3). After that, regression is done in each portfolio as depicted in equation (3.1). Likewise, the adjusted R square in this phase displays the amount to which earnings and change in earnings co-vary with the returns on each firm's portfolio, which is denoted by TRANSIN.

$$RET_{i,p,t} = a_0^{IN} + a_1^{IN}\frac{E_{i,p,t}}{P_{i,p,t-1}} + a_2^{IN}\frac{AE_{i,p,t}}{P_{i,p,t-1}} + \varepsilon_{i,p,t} \qquad (3.1)$$

Finally, the adjusted R square in Equations 3 and 3.1 are added to get the earnings Transparency.

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$$TRANS_{i,t} = TRANSI_{j,t} + TRANSIN_{p,t} \qquad (3.2)$$

3.8. Dependent Variable

3.8.1. Measurement of Expected Cost of Equity

The COE can be described as the required rate of return by equity providers to jeopardize their capital in a business or, in equivalent terms, the discount rate that yields the current stock price when applied to expected cash flows (Wu & Davis et al., 1999; Francis et al., 2005). In order to compute the COE, this study follows the Leary and Roberts (2014) by extending the model with book to market, size and momentum factors given by Fama and French (1997) and Carhart (1997) as follows:

$$R_{ijt} = \alpha_{ijt} + \beta^{M}_{ijt} * MKT_t + \beta^{SMB}_{ijt} * SMB_t + \beta^{HML}_{ijt} * HML_t + \beta^{MOM}_{ijt} * MOM_t + \beta^{IND}_{ijt} (R_{-ijt} - RF_t) + \eta_{ijt,} \qquad (4)$$

–Where R_{ijt} refers to the total return on the stock of the firm i in industry j during the month t, MKT_t is the excess return on the market, SMB_t is the size factor, HML_t is the book-to-market factor, MOM_t is the momentum factor, and $(R_{-ijt} - RF_t)$ is the excess return on the equally weighted industry portfolio, minus firm i's return‖. The study includes this last factor in the model to confiscate any common stock returns variation across the industry.

Using historical monthly returns, the study estimates Eq. (4) on a rolling annual basis for each company. For this, at least 24 months of historical data are needed. To achieve the expected COE, the study first estimates Eq. (4.1) by using the monthly returns from July 2006 to June 2008. Then used the estimated coefficients obtained by Eq. (4) and the monthly factor returns from July 2007 to June 2008, the study determines the expected COE of a particular firm for a specific year by estimating the equation (4.1) as follows:

$$R_{ijt} = a_{ijt} + \hat{\beta}M_{ijt} * MKT_t + \hat{\beta}SMB_{ijt} * SMB_t + \hat{\beta}HML_{ijt} * HML_t + \hat{\beta}MOM_{ijt} * MOM_t + \hat{\beta}IND_{ijt}(\bar{R}_{ijt} - RFt \quad (4.1)$$

3.9. Mediating Variable

3.9.1. Stock Price Crash Risk

This study measures the risk of stock price crash by using the negative skewness of firm-specific weekly returns (NCSKEW) by following the Chen et al. (2001), Kim et al. (2011) and wen et al. (2019). To ensure that crash risk is a firm-specific factor rather than represent the movement in the stock market index, weekly firm-specific returns ($_{j,\ \tau}$) are used to measure the probability of a stock price collapse. This measure is operationalized by first estimating the weekly returns ($_{j,\ \tau}$) by obtaining the residual from the following extended market model:

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$$r_{j,\tau} = \alpha_j + \beta_{1,j} r_{m,\tau-2} + \beta_{2,j} r_{m,\tau-1} + \beta_{3,j} r_{m,\tau} + \beta_{4,j} r_{m,\tau+1} + \beta_{5,j} r_{m,\tau+2} + s_{j,\tau} \quad (5)$$

Where, $r_{j,t}$ is the return of firm i in week t, $r_{m,\ t}$ is the market return in week t. Lag and one week forward lag values of market returns are used to control the effect of non-synchronous trading(Dimson, 1979; Scholes & Williams, 1977). After that, the natural logarithm of one plus the residual obtained from eq (8.1) is used to figure out the weekly return (W iτ) i.e

$$W_{i\,t} = ln\ (1 + \varepsilon_{i,\,t}) \quad (5.1)$$

Finally, NSKEW is the third moment of the weekly company return for each firm-year, relative to S.D from weekly corporate returns raised to the third power, multiplied by —1, as depicted in Equation (5.2). A higher NSKEW value infers a more left-handed distribution of returns, and therefore a more "crash-susceptible" stock.

$$NCSKEW=(n-1)^{\frac{3}{2}}\ \Sigma w^{3jt}]/[(n-1)(n-2)(\Sigma w^{2jt})^{\frac{3}{2}}] \quad (5.2)$$

Where n is the number of weeks in a year i of a specific stock

3.9. Moderating Variable

3.9.1. Investment Adjustment

–Companies with low investment flexibility referred to as "value firms" cannot gain as much from information incorporated in market prices compared to firms with high flexibility in adjusting investment referred to as "growth firms"‖. Book to market ratio can be used as an indicator of investment adjustment by splitting firms into growth and value categories. The B/M ratio of less than 1 is equal to the growth firm, and higher than 1 is classified as the value firm. B/M is most widely used in determining the firm ability to adjust the investment, but one issue is that BM is generated from stock prices and, therefore, relies on the investor perception of the company activities.

3.9.2. Investor Attention

Unlike the traditional proxies used in the literature, this study uses the google search volume (GSV) as a proxy of investor attention. The traditional proxies include the price limit (Seasholes & Wu, 2007), extreme returns (Barber & Odean, 2008), trading volume (Hou et al., 2009) and advertisement expenses (Lou, 2014). These proxies are not direct measures and are based on critical assumptions that investors should pay attention when stock turnover is high or firm name has been discussed in the news. While the turnover and excessive returns are driven by investors‘ attention and affected by other factors in the stock market, media coverage won‘t guarantee attention from the investor side unless the investor reads it (Da et al., 2011). This is particularly true in the current era of information, where plenty of information has generated a lack of attention. Cohen and Frazzini (2008) report that the amount of information in the media is constantly overwhelmed by investors, and they cannot absorb it effectively. A difficulty in testing theories is to gain a direct measure of information attention from individual investors. This research is based on Da et al. (2011), who used the search frequency of company ticker symbols or company names in Google as a proxy for individual investor attention to firms. There are many explanations for why the GSV is used as a metric of attention. First, Google is the world's largest source of search queries. Indeed, Google accounted for 98% of all search queries in Pakistan by August 2020 (stat counter, 2020). The search volume identified by Google is therefore likely to reflect the general public's search behavior.

Second, GSV is a direct measure of attention because when someone is searching for stock on google, it means he is paying attention to that particular stock. Therefore, as a measure of attention, GSV is a direct and the simplest measure of attention. Third, there is clear empirical evidence available that shows the predictive power of Google Searches and how anything from travel to car sales to influenza can be predicted (Ginsberg et al., 2009).

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Therefore, this study uses the abnormal change in the GSV as a proxy of individual investor attention on firms in the spirits of Baali et al. (2014) and Chein et al. (2001), who uses the search frequency of firms‘ ticker symbols or company names called SVI for measuring the investor attention as follows:

$$ASVI_{i,t} = \frac{ASVI_{i,t} - AVGSVI_{i|t-12,t-1}}{SDSVI_{i|t-12,t-1}} \quad (6)$$

–Where, $AVGSVI_{i|t-12,t-1}$ and $SDSVI_{i|t-12,t-1}$ are the mean and standard deviation of the GSV for stock i over the past 12 months, respectively‖. A stock with an increase (decrease) in ASVI is considered to have more (less) attention relative to its past 12-month average. Companies would be divided into two parts after calculating the investor attention, i.e. high and low investor attentive companies based on the computed value of the attention variable.

3.9.3. Competitive Position

A firm's competitive position can be described as the strength of a firm relative to an industry from which it belongs (Chang & Singh, 2000). The firm market share relative to the industry is often viewed to empirically determine the firm competitive position (Nickell et al., 1992; 1996). The excess cost margin is used by Cai (2018) as a measure of competitive position. Simmonds (1986) argued that using the revenue or market share on a specific date and for a particular year is an insufficient accounting metric to determine the rise or decline in the actual position of the firm over a specific period. It is a change in the company's market share that represents the substantial benefit over the specific period and demonstrates the fundamental value of the competitive position. Hence, this study takes the cumulative growth or decrease in market share over two years as a metric to determine the firm competitive position. Thus measure can be operationalized in the following way:

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$$Competitive\ Position = \sqrt{\frac{Market\ Share_{i,t+2}}{Market\ Share_{i,t}}} - 1 \quad (7)$$

–Where the negative value means a decrease in a competitive position. The market share of the business in the‘t‘ year with the 'n' companies in the industry has been calculated as $\frac{Sales_{i,t}}{\sum_{i=1}^{n} Sales_{i,t}}$ –. Another metric of competitive position, such as industry-adjusted ROA, is used to ensure the robustness of results. This industry-adjusted ROA is determined by subtracting the average ROA from the company's ROA for the industry (Khanna and Palepu, 2000).

3.9.4. Stock Liquidity

Generally, it is challenging to compute the stock liquidity (Kyle, 1985). Relative effective spread is considered one of the crucial determinants for measuring stock liquidity (Fang et al., 2009). As the large sample size and unavailability of high-frequency data for emerging markets make it challenging to use this measure of effective spread, therefore, this study uses day to day trading volume data to estimate this metric of stock liquidity. This can be computed based on share price or trading volume because theoretically, it analyzes the cost involved in trading. This study uses the cost per volume metric developed by Amihud (2002), similar to the price effect of the stock liquidity concept given by Kyle (1985). This is the most reliable indicator of stock liquidity compared to other measures used in literature (Goyenko, 2009). This ratio is based on dividing the absolute daily returns on the daily amount of rupees trading. A natural logarithm is applied to this series of illiquidity to make this measure normal.

$$Amihudi,\ t\ Illiquidity\ Ratio = 1/n_{i,t} \sum_{d=1}^{ni,t} \frac{|Reti_d|}{Volumei_d} \qquad (8)$$

Here, $n_{i,t}$ is the number of trading days within year t for security i, $R_{i,s}$ is the absolute return on day d, and $Vol_{i,d}$ is the trading volume on that same day. This measure determines the degree of illiquidity, with a higher value indicating lower market liquidity and greater transaction costs‖.

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3.10. Control Variables

3.10.1. Firm Size (SIZE)

Firm size is determined by taking the natural log of a company‘s total assets and different studies use this measure in the context of corporate Governance (Chen et al., 2011; Embong et al., 2012; Boujelbene & Affes, 2013; Gana &Lajmi, 2013). They argued that firms could get more benefit by making the information environment more transparent than smaller firms because of the economies of scale generated by relative lower production cost and the lower propriety cost rises by the use of disclosed information competitors. The smaller has to face the risk of revealing more confidential information as the investors' required returns are not dramatically reduced. Therefore, we expect the negative relation between the size and COE because of a greater reduction in COE of larger firm‘s relative to smaller firms due to the presence of particular cost and risk.

3.10.2. Financial leverage (LEV)

Financial leverage is an indicator of a company‘s financial risk, and it is determined by the ratio of a firm‘s total debt deflated by the company's assets. According to Modigliani and Miller (1958), the firm COE rises due to an increase in financial leverage. This measure is used in various studies, such as Chen et al. (2011) and Lim et al. (2016). They advance the constructive relation between leverage and COE. These studies, therefore, predict that financial leverage is linked positively to the COE.

3.10.3. Return on Assets (ROA)

The return of assets measures a firm's profitability, and it is determined by deflating the net income by the firm‘s total assets (Tsipouridou & Spathis, 2014; Dhaliwal et al., 2014; Howe & Houston, 2016). ROA is the best indicator of COE as it reflects the degree of risk (Muiño & Trombetta, 2009). This performance metric affects the correlation between disclosure and COE; Lopes and De Alencar (2010) contested that most profitable companies would most likely divulge information and have a lower capital cost. Therefore, better performing firms are likely to resolve asymmetries in information, creating more trust with their current and future shareholders. This explanation leads one to expect a negative association between profitability and COE.

3.10.4. Market-to-Book Ratio

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By following Hail and Leuz (2006), this study used the market to book ratio to control the differences in growth opportunities among firms. Gardham and Mishra (2009) argued that higher prices and longer-term cash flow growth are supposed to lower capital costs for high-growth firms. This study uses the market value of equity to book equity as a measure of growth opportunities.

3.10.5. Beta

Beta is a metric of systematic risk that influence the cost of equity. Alouj et al. (2012) found that firms with a high beta value have substantially higher equity cost. The conventional approach for estimating the betas of an investment is used by regressing the return on investment against the return on the market index (in practice, we tend to use a stock such as PSX 100 index as a proxy for the market portfolio). The standard approach for calculating the betas is to regress stock return (Rj) against market returns (Rm):

$$R_{\mathbf{j}} = a + bR_m$$

Where

a = (intercept from the regression,

b = slope of the regression = $\frac{covariance\ (R_j, R_m)}{\sigma_m^2}$

The slope of the regression correlates to the stock beta and calculates the risk of the stock. The regression intercept provides a precise measure of the investment output over the regression period, which is calculated against the expected returns from the CAPM.

3.11. Empirical Models

3.11.1. Information Risk and Expected Cost of Equity

In this section, the study focused on the empirical estimation of developed models related to the impact of information risk on the cost of equity. COE is an important corporate financing decision that is essential to a variety of other business decisions. Different dimensions of information risk and control variables are used to test the impact on Pakistani firms' COE directly. Moreover, the study tests the relationship between concerned variables by considering the role of one mediator and three different moderators.

In previous literature, several studies regressed the information risk on the COE to investigate the cross-sectional relationship. However, this approach may lead to the presence of endogeneity which is ignored by previous studies. For example, omitted variables associated with the response and explanatory variable drive the relationship and causes the potential endogeneity such as business risk and cost of disclosure (Nikolaev & van lent, 2005). This unobserved heterogeneity determines the overall information environment for each firm each year.

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This study uses the dynamic panel model to avoid the issue of endogeneity in corporate finance. Hence, the following regression model is developed to test the effect of information risk on COE, and the COE function is represented as follows

$$COE_{i,t}=\beta_O+\beta_1 COE_{t-1}+\beta_2 IR_{i,t-1,\tau}+\beta_3 Size_{i,t-1}+\beta_4 Lev_{i,t-1}+\beta_5 \beta eta_{i,t-1}+\varepsilon \quad (9)$$

–Where IR denotes information risk, the subscript τ equals 1 for private information and equal to 2 and 3 in case of less quality and transparency of information, respectively‖. Size is measured by taking the natural logarithm of a firm‘s total assets. Lev is the ratio of long term debt to total asset, Beta indicates the market risk faced by firms and BM is the ratio of BV of equity to MKT value of equity.

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

Furthermore, this study considers whether the crash risk mediates the relation between COE and information risk by following the procedure of Baron and Kenny (1986). According to

this method, three conditions need to be satisfied to prove the existence of the mediation effect. First, information risk must significantly predict the cost of equity in the first regression. Second, crash risk needs to be predicted by information risk. Third, crash risk must predict the dependent variable. Lastly, the cost of equity must be affected by information risk and crash risk. Partial mediation reveals when the effect of information risk on COE is less in the last equation than the first one. Perfect mediation is shown if the information risk has no effect when the crash risk is controlled.

Crash risk is determined as an endogenous variable because the simultaneity bias exists between information risk and crash risk. In the case of reverse causality, independent variables and dependent variables affect each other simultaneously, and reciprocal causal effects arise (Wooldridge, 2002). For example, a firm with more risk of a crash is more likely to disclose less quality and transparent information to hide the negative news, increasing the chances of future stock price crashes. To resolve this issue of causality, mediating role of crash risk is determined by making all the equations in the model dynamic as follow:

$$COE_{i,t}=\beta_O+\beta_1 COE_{t-1}+\beta_2 IR_{i,t-1,\tau}+\beta_3 Size_{i,t-1}+\beta_4 Lev_{i,t-1}+\beta_5 \beta eta_{i,t-1}+\varepsilon \quad (10)$$

$$CRASH_{i,t}=\beta_O+\beta_1 Crash_{i,t-1}+\beta_2 IR_{i,t-1,\tau}+\beta_3 Size_{i,t-1}+\beta_4 Lev_{i,t-1}+\beta_5 BM_{i,t-1}+\varepsilon \quad (11)$$

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

$$COE_{i,t}=\beta_O+\beta_1 Coe_{i,t-1}+\beta_2 IR_{i,t-1,\tau}+\beta_3 Crash_{i,t-1}+\beta_4 Size_{i,t-1}+\beta_5 Lev_{i,t-1}+\beta_6 \beta eta_{i,t-1}+\varepsilon \quad (13)$$

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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 used to display the different dimensions of 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. The lagged value of the response variable is incorporated as an independent variable to form the dynamic panel model. The model is made dynamic to determine the potential effect of the previous risk of share price crash on the speed of adjustment of the current risk of stock price collapse during the sample period.

3.11.3. Asset Return and Information: Growth versus Value Firms

Easley et al. (2002) shows that stocks with more private information measured by (1- R2) have generated greater returns from 1983 to 1998. Our study add to this body of knowledge by demonstrating that the impact of private information on COE varies from company to company when considering investment adjustment. Private information raises COE for value companies in particular, but the effect for growth companies can be reversed. This rationale

indicates that to establish the cross sectional gap between the returns of growth and value firm, private information must be reflected in stock prices that are prerequisites for investment adjustment. This relationship is found out by constructing a dynamic model where the lagged value of the response variable is used as an independent variable as follow:

$$ECOE_{i,t} = R_{i,t} - R_{f,t} = Y_0 + y_1 ECOC_{i,t-1} + Y_2 BETA_{i,t-1} + Y_3 INFO_{i,t-1} + Y_4 Size_{i,t-1} + Y_5 In(BM)_{i,t-1} + Y_6 INFO_{i,t-1} * DUM_{G_{i,t-1}} + Y_7 INFO_{i,t-1} * DUM_{V_{i,t-1}} + Y_7 DUM_{G_{i,t-1}} + Y_8 DUM_{V_{i,t-1}} + n_t \quad (14)$$

‖Here, ECOE is the expected cost of equity, Y_0 is the intercept, INFO is private information measured by 1-R^2, Beta is a factor of market risk in CAPM, Size is the natural logarithm of firm‘s total assets, and ln (BM) is the natural logarithm of the ratio of BV of equity to MKT value of equity, as we are interested in determining the effect of private information on COE that vary from growth firm to value firm‖. For that, firms are sorted into two quartiles based on their value of B/M ratio and generated two dummy variables: value firm denoted by DUM-V is created by assigning 1 when the firm lies in the top quartile of BM and 0; otherwise, the growth Dummy, DUM-G is equal to 1 when the firm B/M ratio lies in the bottom quartile. Further, this study has created the two interaction terms based on these two Dummies, such as INFO × DUM V and INFO × DUM G.

3.11.4. Investment-Q Sensitivity and Private Information: Growth versus Value Firms

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As it is supposed in the first hypothesis, growth firms have greater flexibility in adjusting the private information reflected in share prices in investment than the value firm. This study builds on Chen et al. (2007) to figure out whether the influence of private information on investment-Q sensitivity differs across value and growth firms.

$$I_{i,t} = \beta_0 + \beta_1 I_{i,t-1} + \beta_1 Q_{i,t-1} + \beta_2 INFO_{i,t-1} + \beta_3 INFO_{i,t-1} * Q_{i,t-1} * DUM_{G_{i,t-1}} + \beta_4 INFO_{i,t-1} * Q_{i,t-1} * DUM_{V_{i,t-1}} + \beta_6 * DUM_{G_{i,t-1}} + \beta_7 * DUM_{V_{i,t-1}} + \gamma CONTROLS + a_t + \mu_t + s_{i,t} \quad (15)$$

–The dependent variable, $I_{i,t}$ is firm i‘s investment in year t; capital investment is used to measure corporate investment, Independent variables α_t and μ_i reflect year-fixed and firm-fixed effects respectively, Qi, t−1 is Tobin's Q, INFOi, is a measure of private information on the stock price; according to our asset pricing studies, this analysis used 1−R^2 as a proxy for this measure‖. The array of control variables (CONTROLS) includes the log of the company's total assets as a measure of the total assets, the cash flow (CFi, t) of the firm i in year t, Beta as a measure of corporate investment. Chen et al. (2007) concentrated on the effect of private information on investment-Q sensitivity by generating the interaction term, INFO × Q. This study takes a step further to investigate whether the influence of private information on

Investment-Q sensitivity is dependent on the firm's flexibility in changing corporate investment. For that reason, this study created the triple interaction term by interacting the INFO × Q with two Dummy variables, DUM-G and DUM-V. These tripartite interaction terms are denoted by INFO × Q × DUM -V and INFO × Q × DUM-G to determine the distinct impact of investment adjustment between the impact of private information on Investment-Q sensitivity, and parameters of β3 and β4 represent this effect.

3.11.5. Information Risk and Cost of Equity: Role of Competitive Position

Firms in a better position relative to their competitors have a greater incentive to disclose more firm sensitive information related to risk and risk management. This disclosure improves the information quality and decreases the COE. Therefore, to determine the role of competitive position between the relationship of information quality and COE, model equation (16) is analyzed. This moderating role of the firm competitive position is investigated by using the two measures of competitive position such as market share and ROA. Therefore, the role of competitive position in concerned variables is first determined by using the Market share as proxy of Competitive position as follow:

$$COE_{i,t} = \beta_o + \beta_1 COE_{i,t-1} + \beta_2 AQ_{i,t-1} + \beta_3 AQ_{i,t-1} * Marketshare_{i,t-1} + \beta_4 Marketshare_{i,t-1} + \beta_5 Size_{i,t-1} + \beta_6 BM_{i,t-1} + \beta_7 \beta eta_{i,t-1} + s \quad (16)$$

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–Where, dependent variable COE is the cost of equity of firm i over the time, AQ is a measure of information quality of firm i at time t, $AQ_{i,\ t-1,r}$*Market share is the interaction term, Market share is a measure of competitive position of firm i at time t, and rests are the control variables. To avoid the issue of endogeneity, the model is made dynamic where the dependent variable's lag value is employed as an independent variable.

Moreover, firms are segregated into two parts based on the median value of the Market share. Firms that fall below the median value of Market share are considered low, competitive firms and high competitive firms in case of above the median value. After dividing the firms into high and low competitive firms, equation (17) is applied in both groups. The negative coefficient value of AQ in high competitive firms and positive value of magnitude in low, competitive firms shows that an increase in market share induces the manager to disclose more to get legitimacy to ensure continued access to resources. This increase in disclosure reduces the asymmetry of information and COE.

$$COE_{i,t} = \beta_o + \beta_1 COE_{i,t-1} + \beta_2 AQ_{i,t-1} + \beta_3 Marketshare_{i,t-1} + \beta_4 Size_{i,t-1} + \beta_5 BM_{i,t-1} + \beta_6 \beta eta_{i,t-1} + s \quad (17)$$

3.11.6. Information Risk, Competitive position (Market share) and Corporate Investment

Furthermore, the effect of a firm competitive position concerning less information quality and corporate investment is determined. For that purpose, how the lack of information quality effect the corporate investment is first analyzed as follow:

$$I_{i,t-1} = \beta_o + \beta_1 I_{i,t-1} + \beta_2 Q_{i,t-1} + \beta_3 AQ_{i,t-1} * Q_{i,t-1} + \beta_4 AQ_{i,t-1} + \beta_5 Size_{i,t-1} + \beta_6 \beta eta_{i,t-1} + \beta_7 CF + s \quad (18)$$

The dependent variable, $I_{i,t-1}$, is firm i's investment in year t; CAPX i,t is used to measure corporate investment. The independent variables are $Qi_{,\ t-1}$ is Tobin's Q and $AQ_{i,\ t-1}$ is a measure of information quality. The coefficient value of the interaction term describe the sensitivity of Investment-Q sensitivity to accrual quality, AQ × Q. Poor accrual quality may intensify the conflict of interest between shareholders and decision-makers or other stakeholders. The poor accrual quality directly relates to the investment rates of overinvestment firms while it has negatively correlated with the investments rates of underinvestment firms (Carvalho & Kalatzis, 2018). The array of control variables (CONTROLS) includes the cash flow (CFi, t), *Size* is the natural logarithm of' firm i's total assets at time, Beta as a measure of systematic risk.

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This model further explores whether firm's competitive position also influences the relationship between Investment-Q sensitivity and opaque information. For this reason, this study interacted the INFO × Q with the firm's competitive position by using two proxies: Market Share and industry adjusted ROA. The parameter of our interest is the value of interaction term Q*AQ* Market share, which shows the effect of competitive position between the relationship of Investment-Q sensitivity and information quality.

$$I_{i,t-1} = \beta_o + \beta_1 I_{i,t-1} + \beta_3 Q_{i,t-1} + \beta_4 AQ_{i,t-1} + \beta_5 Q_{i,t-1} * A * Marketshare_{i,t-1} + \beta_6 Size_{i,t-1} + \beta_7 \beta eta_{i,t-1} + \beta_8 CF + s \quad (19)$$

3.11.7. Information Risk, Competitive position (Industry adjusted ROA) and COE

Similarly, the role of competitive position between the relationship of information quality and COE is determined by using the industry adjusted ROA as follow

$$COE_{i,t} = \beta_o + \beta_1 COE_{i,t-1} + \beta_2 AQ_{i,t-1} + \beta_3 AQ_{i,t-1} * ROA_{i,t-1} + \beta_4 ROA_{i,t-1} + \beta_5 Size_{i,t-1} + \beta_6 BM_{i,t-1} + \beta_7 \beta eta_{i,t-1} + s \quad (2O)$$

Where dependent variable, COE is the cost of equity of firm i over the time, AQ is a measure of information quality of firm i at time t, $AQ_{i,\ t-1,}$ *ROA is the interaction term, industry adjusted ROA is a measure of competitive position of firm i at time t, and rests are the control variables. To avoid the issue of endogeneity, model was made dynamic where COE's lag value is employed as an independent variable.

In addition, firms are prorating into two parts based on the median value of Industry adjusted ROA. Firms that fall below the median value of industry adjusted ROA are considered low, competitive firms and highly competitive firms in case of above the median value. After dividing the firm into high and low competitive firms, equation (21) is applied in both groups. The negative coefficient value of AQ in high competitive firms and positive value of magnitude in low, competitive firms shows that an increase in profitability compared to industry plays a vital role in management decisions regarding the quantity and quality of disclosure (Ntim et al., (2013).

$$COE_{i,t} = \beta_o + \beta_1 COE_{i,t-1} + \beta_2 AQ_{i,t-1} + \beta_3 ROA_{i,t-1} + \beta_4 Size_{i,t-1} + \beta_5 BM_{i,t-1} + \beta_6 \beta eta_{i,t-1} + s \quad (21)$$

3.11.8. Information Risk, Competitive position (Industry adjusted ROA) and Corporate Investment

Also, the impact of information quality on corporate investment in high and low industry adjusted ROA firms is investigated. For that purpose, first, the effect of opaque information environment on corporate investment has been determined by using the following model:

$$I_{i,t-1} = \beta_o + \beta_1 I_{i,t-1} + \beta_2 Q_{i,t-1} + \beta_3 AQ_{i,t-1} + \beta_4 Q_{i,t-1} * AQ * ROA_{i,t-1} + \beta_5 Size_{i,t-1} + \beta_6 \beta eta_{i,t-1} + \beta_7 CF + s \quad (22)$$

The dependent variable, $I_{i,1-t}$, is firm i‘s investment in year t; $CAPX_{i,t}$ is used as a measure of corporate investment. The independent variables are $Qi,_{t-1}$ is Tobin‘s Q and $AQ_{i,\ t-1}$ is a measure of information quality. The array of control variables (CONTROLS) includes the cash flow (CFi, t), *Size* is the natural logarithm of‘ firm i‘s total assets at time, Beta as a measure of systematic risk.

This model examined whether the response of Investment-Q sensitivity on Accrual quality is also affected by the firm‘s competitive position. For this reason, this study interacted the INFO × Q with a firm‘s competitive position by using industry adjusted ROA as a measure of firm competitive position. The parameter of our interest is the value of interaction term

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Q*AQ* ROA, which shows the effect of competitive position between accrual quality and Investment-Q sensitivity.

3.11.9. Information Risk (Information Transparency), Competitive Position (Market Share) and COE

Li (2006) found that it is more difficult to read companies with lower earnings (i.e., they have higher Fog and are longer). In addition, the positive earnings of companies with easier-to-read annual reports are more enduring. This indicates that managers can choose the readability of annual reports in an opportunistic way to conceal adverse information from investors. Cong et al. (2020) also supported the Li (2006) finding by arguing that the manager manipulates causal language to mask the adverse information effectively. Causal language can make information more difficult to conceal and combine negative information, thus raising information asymmetry. This increased information asymmetry as a result of less transparent information applied to the COE. However, Huang et al. (2016) established a correlation between competition and transparency. They argued that companies that are willing to compete are more generous and clear in their disclosure because they want to signal their strength to manage the risk and maintain their good reputation to ensure continual access to critical financial and human capital. This transparency is in accordance with the theory of uncertainty avoidance. Therefore, the role of competitive position between information transparency and COE is analyzed by estimating the following model:

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$$COE_{i,t} = \beta_o + \beta_1 COE_{i,t-1} + \beta_2 Trans_{i,t-1} + \beta_3 Trans_{i,t-1} * Marketshare_{i,t-1} + \beta_4 Marketshare_{i,t-1} + \beta_5 Size_{i,t-1} + \beta_6 BM_{i,t-1} + \beta_7 \beta eta_{i,t-1} + s \quad (23)$$

Where dependent variable, COE is the cost of equity of firm i over the time, Trans is a measure of information transparency of firm i at time t, $Trans_{i,\ t-1}$ *Market share is the interaction term, the Market share is a measure of the competitive position of firm i at time t, and rests are the control variables. To avoid the issue of endogeneity, a model was made dynamic when a dependent variable's lag value is employed as an independent variable

Moreover, firms are segregated into two parts based on the median value of a Market share. Firms that fall below the median value of Market share are considered low, competitive firms and high competitive firms in case of above the median value. After dividing the firm into high and low competitive firms, equation (24) is applied in both groups. The higher coefficient value of transparency in high competitive firms than in low, competitive firms shows that competition improves information transparency by making annual reports more readable and decreasing the problem of information asymmetry, thus declining the COE.

$$COE_{i,t} = \beta_o + \beta_1 COE_{i,t-1} + \beta_2 Trans_{i,t-1} + \beta_3 Trans_{i,t-1} + \beta_4 Size_{i,t-1} + \beta_5 BM_{i,t-1} + \beta_6 \beta eta_{i,t-1} + s \quad (24)$$

3.11.10. Information Risk, Competitive position (Market Share) and Corporate Investments

Furthermore, the effect of information transparency on corporate investment is investigated. For that purpose, lack of transparency in terms of financial information affect the corporate investment has been determined by using the following model:

$$I_{i,t-1} = \beta_o + \beta_1 I_{i,t-1} + \beta_2 Q_{i,t-1} + \beta_3 Trans_{i,t-1} + \beta_4 Trans * Q_{i,t-1} + \beta_5 Size_{i,t-1} + \beta_6 \beta eta_{i,t-1} + \beta_7 CF + s \quad (25)$$

The dependent variable, $Ii_{,1-t}$, is firm i‘s investment in year t; CAPX i,t is used to measure corporate investment. The independent variables are $Qi_{,\ t-1}$ is Tobin‘s Q and $Trans_{i,\ t-1}$ is a measure of transparency. The response of Investment-Q sensitivity to less transparent information is characterized by the coefficient value of interaction term, Trans × Q. This lack of transparency makes it difficult for investors to read the annual report to understand the company's results since most investors in the stock market are retail investors who lack technical expertise, contributing to a lower rate of information used in the annual report. Managers can change the narrative style to mislead the true company situation and enhance information asymmetry, which has a detrimental effect on the gain of small investors and hampers the stock market's efficiency. This rise in information asymmetry shakes investor trust and, as a result, calls for more return on the capital they have provided, which raises the COE and decreases corporate investment (Kong et al., 2020). The array of control variables (CONTROLS) includes the cash flow (CFi, t), *Size* is the natural logarithm of‘ firm i‘s total assets at time, Beta as a measure of systematic risk.

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This model further examined whether the impact of information transparency on Investment-Q sensitivity is also affected by a firm‘s competitive position. For this reason, we interact INFO × Q with the firm‘s competitive position by using two proxies: Market Share and industry adjusted ROA. The parameter of our interest is the value of interaction term Q*Trans* Market share, which shows the effect of competitive position on the relation between information transparency and Investment-Q sensitivity. This lack of transparency is exacerbated by the fact that managers shield bad results from investors, but firms' competitive position allows firms to improve transparency its act as a competitive advantage for firms. Firms boost their credibility and create investor trust in uncertain times by releasing 'rich' and more detailed' disclosures (uncertainty reduction theory). This improved investor trust decreases the agency cost and allows companies to access external, increasing investment.

$$I_{i,t-1} = \beta_o + \beta_1 I_{i,t-1} + \beta_3 Q_{i,t-1} + \beta_4 Trans_{i,t-1} + \beta_5 Q_{i,t-1} * Trans * Marketshare_{i,t-1+} + \beta_6 Marketshare_{i,t-1+} + \beta_7 Size_{i,t-1} + \beta_8 \beta eta_{i,t-1} + \beta_9 CF + s \quad (26)$$

3.11.11. Information Risk, Competitive position (Industry adjusted ROA) and COE

Similarly, the role of competitive position between the relationship of information transparency and COE is determined by using the industry adjusted ROA as follow:

$$COE_{i,t} = \beta_o + \beta_1 COE_{i,t-1} + \beta_2 Trans_{i,t-1} + \beta_3 Trans_{i,t-1} * ROA_{i,t-1} + \beta_4 ROA_{i,t-1} + \beta_5 Size_{i,t-1} + \beta_6 BM_{i,t-1} + \beta_7 \beta eta_{i,t-1} + s \quad (27)$$

Where dependent variable, COE is the cost of equity of firm i over the time, Trans is a measure of information Transparency of firm i at time t, $Trans_{i,\ t-1,}$ *ROA is the interaction term, industry adjusted ROA is a measure of the competitive position of firm i at time t, and rests are the control variables. To avoid the issue of endogeneity, the model is made dynamic where the COE's lagged value is employed as an independent variable.

In addition, firms are prorating into two parts based on the median value of Industry adjusted ROA. Firms that fall below the median value of industry adjusted ROA is considered low, competitive firms and high competitive firms in case of above the median value. After dividing the firm into high and low competitive firms, equation (28) is applied in both groups. The high coefficient value of Trans in high competitive firms than in low, competitive firms shows that increase in profitability as compared to industry plays an essential and significant role in management decision on the quality and quantity of disclosure (Ntim et al., 2013).

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$$COE_{i,t} = \beta_o + \beta_1 COE_{i,t-1} + \beta_2 Trans_{i,t-1} + \beta_3 ROA_{i,t-1} + \beta_4 Size_{i,t-1} + \beta_5 BM_{i,t-1} + \beta_6 \beta eta_{i,t-1} + s \quad (28)$$

3.11.12. Information Risk, Competitive position (Industry adjusted ROA) and Corporate Investments

Furthermore, the effects of information transparency on corporate investment in high and low industry adjusted ROA firms are investigated. For that purpose, First, the impact of information transparency on corporate investment has been determined by using the following model:

$$I_{i,t-1} = \beta_o + \beta_1 I_{i,t-1} + \beta_2 Q_{i,t-1} + \beta_3 Trans_{i,t-1} + \beta_4 Q_{i,t-1} * Trans * ROA_{i,t-1} + \beta_4 ROA_{i,t-1} + \beta_5 Size_{i,t-1} + \beta_6 \beta eta_{i,t-1} + \beta_7 CF + s \quad (29)$$

Where, the dependent variable, $I_{i,\ t,}$ is firm i's investment in year t; $CAPX_{\ i,t}$ is used as a measure of corporate investment. The independent variables are $Qi,_{\ t-1}$ is Tobin's Q and $Trans_{i,\ t-1}$ is a measure of information transparency. The response of Investment-Q sensitivity to less transparent information is characterized by the coefficient value of interaction term, Trans × Q. The array of control variables (CONTROLS) includes the cash flow (CFi, t), *Size* is the natural logarithm of‟ firm i's total assets at time, Beta as a measure of systematic risk.

This model further explores whether a firm's competitive position also influences the association between Investment-Q sensitivity and information quality. For this reason, we respectively interact INFO × Q with a firm's competitive position by using industry adjusted ROA as a proxy of the firm competitive position. The parameter of our interest is the value of interaction term Q*Trans* ROA, which shows the effect of competitive position between information transparency and Investment-Q sensitivity.

3.11.13. Information Risk and Cost of equity: Role of Investor Attention

In order to test the role of investor attention between the nexus of information risk and cost of equity, following dynamic expected cost of equity function is used:

$$COE_{it} = \beta_0 + \beta_1 COEi, t-1 + \beta_1 IR_{i,t-1,r} + \beta_2 IR_{i,t-1,r} * Attenti, t-1 + \beta_3 Attent_{i,t-1} + \beta_4 Lev_{i,t-1} + \beta_5 Beta_{i,t-1} + \beta_6 In(BM)_{i,t-1} + \beta_6 ROA_{i,t-1} + \beta_6 Size_{i,t-1} s_{it} \quad (30)$$

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–Where dependent variable, COE is the cost of equity of firm i over the time, IR is measure of information risk of firm i at time t, the subscript equal to 1 when there is risk of private information, 2 for less transparent information and 3 for information quality; $IR_{i,t-1,r}$*Attent is the interaction term, Attent is a measure of investor attention of firm i at time t, and rests are the control variables‖. However, in order to resolve the issue of possible causality, dynamic panel model is developed. In order to make the model dynamic, the response variable's lagged value is employed as an independent variable.

Moreover, firms are segregated into two parts based on the median value of GSV. Firms that fall below the median value of GSV are considered as low attentive firms and the high attentive firms in case of above the median value. After that, the following equation (31) are regress on both high and low attentive firms to find the influence of information risk on COE.

$$COE_{it} = \beta_0 + \beta_1 COE_{i,t-1} + \beta_2 IR_{i,t-1,r} + \beta_3 Attent_{i,t-1} + \beta_4 Lev_{i,t-1} + \beta_5 Beta_{i,t-1} + \beta_6 In(BM)_{i,t-1} + \beta_6 ROA_{i,t-1} + \beta_6 Size_{i,t-1} s_{it} \quad (31)$$

Furthermore, one can consider whether the investor attention moderates the relationship between corporate investment and information risk by the following model:

$$Invest_{it} = \beta_0 + \beta_1 Invest_{i,t-1} + \beta_2 IR_{i,t-1,r} + \beta_3 IR_{i,t-1,r} * Q + \beta_4 Attent_{i,t-1} + \beta_5 Q_{i,t-1} + \beta_6 CF_{i,t-1} + \epsilon \quad (32)$$

$$Invest_{it} = \beta_0 + \beta_1 Invest_{i,t-1} + \beta_2 IR_{i,t-1,r} + \beta_3 IR_{i,t-1,r} * Q * Attenti, t-1 + \beta_4 Attent_{i,t-1} + \beta_5 Q_{i,t-1} + \beta_6 CF_{i,t-1} + \beta_7 Size_{i,t-1} + s_{it} \quad (33)$$

Where dependent variable, Invest is the fixed capital expenditure of firm i over the time, The independent variables are: *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 less information transparency, $Q_{i,\ t-1}$ is Tobin's Q, Attent is a measure of investor attention of firm i at time t. the lag value of dependent variables is used as an independent variable to make the model as dynamic. This dynamic investment model is developed to identify the possible impact of previous investment decisions on the speed of adjustment of current investment during the sample period. The dynamic investment model shows the mean reversion behavior of investment. Investor attention is also driven by major investment decisions such as merger and acquisition and other corporate events, dividend payouts, earnings announcements, etc. (yang et al., 2020). Furthermore, the assumption of heteroscedasticity and serial correlation can be easily violated under dynamic panel model. Size is the natural logarithm of total assets of firm i at time t; $CF_{i,\ t-1}$ is the cash flow of firm i at time t are the control variables, and ϵ_{it} is the residual of firm i at time t.

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3.12. Diagnostic Test

A valid model is required to meet the validity and reliability of instrumental variables (Arellano & Bond, 1991) and is normally distributed. First, this study applied the test of serial correlation in the first level and second level to ensure the absence of serial correlation between the disturbance terms. Specifically, the differentiated residuals should have a substantial negative value without proof of the second degree of serial correlation in the first order of serial correlation. Second, the analysis has checked the exogeneity of instruments without the restrictions of over-identification that ensure the consistency of estimates. This test ensures that instrument validity and error correlation were not identified.

The research also tested heteroscedasticity, indicating that the error term variance is inconsistent across different observations. It describes circumstances in which the variability of one variable is irregularly distributed throughout the range of values of the second variable

that predicts it. The Sargan test is a noteworthy version of the Hansen test that is based on conditional heteroscedasticity assumptions. (Baum et al., 2003). It investigates the correlation between independent variable residues and the instruments utilized, and uses the chi square test criteria to derive an asymptotic null distribution for the scaled covariance vector.

Simply, in order to verify the absence of association between instrument variable and disturbance term, Sargan and Hansen test is used. This study has applied the correlation analysis and VIF test to check the issue of Multicollinearity among independent variables. The findings of the correlation study revealed that all independent variables are moderately associated with one another, and Multicollinearity is not an issue.

By rejecting the null hypothesis that there is no first-order serial correlation among the disturbance terms, the significant value of AR (1) demonstrates the existence of first-order serial correlation. However, the absence of second-order serial correlation among disturbance terms in the level equation is also endorsed by the insignificant value of AR (2). Furthermore, the insignificant/negligible value of the Sargan/Hansen test also validates the validity of instruments and demonstrates that they are not over-identified. Overall, the AR (1), AR (2), and Sargan/Hansen tests revealed that GMM was accurately defined, with no identification problems.

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3.13. SUMMARY

A central task in science is the appropriateness and adequacy of the research methods for empirical estimation of hypotheses and objectives. A systematic procedure is required to perform proper research for this reason. This chapter shows a detailed description of the methods selected for the analysis. The positivism research philosophy and quantitative research were introduced to test the hypothesis.

Validity of study depends on data sources, methods of sampling, determination and formula of dependent and explanatory variables and more importantly, the model specification in the form of the dynamic regression equation and estimation. Based on COE and Corporate Investment, 14 different regression equations were created. The independent variables in these model specifications are private information, lower information quality and transparency. Whereas Adjustment of investment, competitive position and investors' attention are moderators, and the possibility of stock price crashes is used as a mediator. Data on these variables were gathered from the financial statements of companies listed on the Pakistan Stock Exchange for 2008-2018.

The study focused primarily on non-financial companies listed on the Pakistan Stock Exchange. The study uses the balanced panel dataset to explore the direct effect of the information risk on the COE of non-financial companies listed on the Pakistan Stock Exchange. This has been shown by the most modern econometric instruments and techniques (GMM). In reality, the study used the dynamic panel models in hypothesis testing, as the theoretical and empirical evidence was used to construct all the models.

CHAPTER 4

RESULTS AND DISCUSSION

4.1. Introduction

This part covers the study's findings and discussions. These outcomes are based on the balanced panel with 370 non-financial firms listed on the Pakistan Stock Exchange from 2008 to 2019. This illustrates the behavior of several independent variables and their explanatory power in explaining the COE of firms listed on PSX. The results are obtained through Two-step system GMM.

The first Section 4.2 begins with a detailed descriptive statistics analysis, while Section 4.3 shows the correlation analysis of the research. Subsequently, Section 4.4 discusses the effect of information risk on COE. Similarly, the mediating role of stock price crash risk (SPCR) between the nexus of information risk and cost of equity is discussed in Section 4.5. Section 4.6 shows the impact of information risk on COE by considering the moderating role of investment adjustment. Section 4.7 and 4.8 test the moderating role of competitive position between information risk and COE. Section 4.9 reports the results related to role investor attention between the relation of information risk and COE.

However, the impact of information risk on investments is explained in Section 4.10. The summary of key findings is discussed in Section 4.11.

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4.2. Descriptive Statistics

Descriptive statistics explain and summarize the data in a meaningful way, which is easier to understand. It explains the basic features of the data and describes the sample and measurements. ‒These summaries are the mean, standard deviation, minimum and maximum values of each variable used in the analysis‖. Table 4.1 provides the summary statistics on the variables used in this analysis for 2007-2019.

The descriptive statistics noted that the private information (PVTINFO) shows an average value of 0.9207 with a standard deviation of 0.3806. This indicates that the market and industry predictability power of firm-specific returns is low, and 92% of the variation in firm-specific returns is explained by private information (Rasheed et al., 2018). On average, the information quality is 23%, and the transparency levels 24% are moderately low. This depicts that earning information content is highly sensitive to opportunistic earning management in Pakistan, while the low value of transparency highlights the lack of clarity of Pakistani firms. The high difference in minimum and maximum value of information quality and transparency

confirms that firms listed on PSX are different in terms of disclosure and clarity of information. They are not following the disclosure standard, and their earning does not truly reflect the future returns. Despite growing calls for greater transparency and accountability, we discover evidence of middling disclosures.

Nevertheless, market to book ratio signifies growth opportunities with a mean value of 1.48. This indicates that equity is performing well in the market, and firms are experiencing growth opportunities. Accordingly, the mean value of the book to market is 0.7649. This shows that firms listed on PSX are mostly growth firms. As a measure of systematic risk, Beta shows the mean value of 0.4151 with a standard deviation of 0.8115.

The mean value of leverage indicates that, on average, 17% of the firm‘s assets are financed by long term debt. The cash flow ratio shows the mean value of 0.0775 with a standard deviation is 0.1374.

Profitability has an average value of 0.046 with a standard deviation of 0.1324 and accounts for 4.60 percent of the total assets of enterprises listed on PSX. The results show that, on average, companies listed in Pakistan are profitable. Investments with positive NPVs are productive and produce high profits. It gives an alarming picture compared with companies in Ghana that maintain average profitability of 37% (Abor, 2005) and the US; on average, profitability is 26%; (Gill et al., 2011). Firm size has an average value of 17.526 with a standard deviation of 3.161% and is measured as a log of total assets. The average values of firm size in the low and high percentile of firm size are 9.14 and 24.46, respectively.

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The average CRASH value is -0.1831.This implies that the likelihood of a firm encountering an unconditional collapse event within a year is 18.3 percent on average. The mean CRASH in this study is greater than that reported by Kim et al. (2011a) (16.1 percent) and Kim and Zhang (2012) (12 percent). It does, however, imply that the firms in my analysis are, on average, more crash-prone than the firms in these two studies. One of the possible reasons for this crash risk is a relatively low value of information transparency. Thus, managers have more freedom to take a short-term approach. The average value of attention is 5.8321, consistent with Wei and Mei's study (2020). The average liquidity value is -13.5068, which shows that shares of firms listed on PSX are liquid.

Moreover, the firm's competitive position has a mean value of 0.023 with a standard deviation of 0.2707. The industry adjusted ROA has an average value of -0.01561 with a standard deviation of 0.2585. The mean value of COE is about 23%, with a standard deviation of 0.8288. The minimum and maximum values show a significant gap in the cost of equity

among the firms listed on PSX. The firm investment has an average value of 0.0645 with a standard deviation of 0.1066.

Table-4.1: Descriptive Statistics

Variables	Mean	Std.Dev.	Minimum	Maximum
Private Info	0.9207	0.1221	0.1392	1
Transparency	0.2429	0.3806	0.1054	1.7095
Quality	0.2375	0.3303	0.0005	0.6832
Market to book ratio	1.488	2.2465	-9.5677	12.7334
Book to Market	0.7649	1.3636	-5.8088	5.9944
Beta	0.4151	0.8115	-1.4301	1.4033
Leverage	0.1208	0.1691	0.00098	0.4587
CF	0.0775	0.1374	-0.3071	0.5763
ROA	0.0463	0.1324	-0.3267	0.4689
Size	17.5267	3.1618	1.1281	25.2733
Crash Risk	-1.1381	0.3350	-2.2277	1.0772
Attentions	5.8321	0.5962	2.3978	7.8716
Liquidity	-13.5068	3.4751	-3.3155	-20.6932
Market Share (Sale)	0.02397	0.27072	-0.7573	0.6557
Market Share (ROA)	-0.01561	0.08910	-0.3545	0.2585
Cost of Equity	0.2364	0.8288	0.0471	0. 5033
Capital Expenditure	0.0645	0.1066	0.001025	0.19044

4.3. Correlation Analysis

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Correlation analysis is a statistical assessment method used to determine the direction or strength of the association between the two variables. There could be no correlation, partial correlation, perfect positive correlation and perfect negative correlation. This analysis also confirms that there is no issue of multicollinearity between the explanatory variables as they are partially correlated.

Private information positively correlates with COE (0.08) and negatively correlates with corporate Investment (-0.04). Less information quality has a positive partial correlation with COE (0.091), private information (-0.04), while it has a negative correlation with corporate investment (-0.092). Information transparency has a negative correlation with COE (-0.086), private information (-0.08), less information quality (-0.049), while it has a negative correlation with corporate Investment.

Firm competitive position measured by market share has a negative correlation with COE (-0.167), less information quality (-0.327) and while it is partially positively correlated with corporate investment (0.054) and information transparency (0.036). Industry adjusted ROA has a negative correlation with COE (-0.038), less information quality (-0.068), and while it is

partially positively correlated with corporate investment (0.22), information transparency (0.011) and competition (0.752).

Investor attention has a negative correlation with COE (-0.07) and private information (-0.069), while it has a positive correlation with corporate investment (0.037), less information quality (0.039), information transparency (0.048), Competitive position (0.031), and industry adjusted ROA (0.161).

Book to market ratio has a negative correlation with COE (-0.079), private information (-0.034), less information quality (-0.053) while it is positively correlated with corporate investment (0.020), transparency (0.010), competitive position (0.090), industry adjusted ROA (0.063) and investor attention (0.023). Market to Book ratio has a negative correlation with COE (-0.139), Private information (-0.083) and BM (-0.224). On the other hand, it has a positive correlation with corporate investment (0.123), less information quality (0.088), transparency (0.037).

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Table-4.2: Correlation Analysis

	COE	Invest	PVT Info	Quality	Trans	Market share	IndAROA	Attent	BM	MB	Size	Beta	Liquidity	CF	ROA	Crash
COE	1.000															
Investment	0.036	1.000														
Private Info	0.083	-0.04	1.000													
Quality	0.091	-0.092	0.04	1.000												
Trans	-0.086	0.046	-0.08	-0.049	1.000											
Competition	-0.167	0.054	0.034	-0.327	0.036	1.000										
Market share	-0.038	0.22	0.026	-0.068	0.011	0.052	1.000									
IndAROA	-0.070	0.037	-0.069	0.039	0.048	0.031	0.161	1.000								
Investor Attention	-0.079	0.020	-0.034	-0.053	0.010	0.090	0.063	0.023	1.000							
BM Ratio	-0.139	0.123	-0.083	0.088	0.037	0.053	0.107	.0.012	-0.224	1.000						
MB Ratio	-0.032	0.079	0.019	-0.065	0.108	-0.029	-0.079	0.003	0.044	-0.138	1.000					
Size	0.063	-0.046	0.293	0.032	-0.016	0.098	0.143	0.055	0.045	-0.043	-0.04	1.00				
Beta	0.039	-0.194	0.121	0.039	-0.145	-0.127	-0.026	0.177	0.004	0.214	-0.125	0.289	1.000			
Liquidity	-0.166	0.134	-0.138	0.158	0.102	0.285	0.022	0.003	0.059	0.311	-0.107	0.028	-0.289	1.000		
CF	-0.153	0.104	-0.166	-0.143	0.108	0.052	0.435	0.025	0.080	0.304	-0.108	0.035	-0.345	0.443	1.000	
ROA	0.079	-0.054	0.234	0.076	-0.125	0.016	0.083	0.020	0.066	-0.191	-0.037	-0.061	0.261	-0.019	0.08	1.000
Crash Risk																

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4.4. Information Risk and Cost of Equity

The results related to the effect of information risk on the cost of equity are presented in this part of the study. To determine the cross-sectional relation between the concerned variables, there is a need to consider the endogeneity bias due to omitted variables and simultaneity bias. The omitted variables associated with information risk and COE derive the relation and cause the potential endogeneity such as business risk and cost of disclosure (Nikolaev & Van lent, 2005). These variables cause the independent variable to correlate with the error term and determine the overall information environment of each firm in each year. Similarly, the high cost of equity will reduce the optimal level of disclosure and increase the information risk, which causes the current COE to increase. Therefore, to control endogeneity issues, a two-stage system GMM estimation technique is applied in a dynamic panel model for empirical hypothesis testing.

Nevertheless, the system GMM method surpasses the difference GMM and fulfils GMM's fundamental assumptions in a better way. System GMM is used to estimate the partial adjustment model to resolve the endogeneity problem that could occur in the dynamic model (Ting, 2016). To recognize the probable impact of previous COE on current COE, a dynamic model was developed. As an explanatory variable, the lagged value of the response variable is incorporated in the dynamic model.

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Column (2) of Table 4.3 displays the results of GMM regression analysis related to the effect of information risk on COE. The positive and significant coefficient value of lagged dependent variable, 0.1402, confirms the dynamic nature of the model. This demonstrates the mean reversion behavior of COE where the previous COE affects the current COE. The coefficient value of private information (β= 0.1704 P<1%) in the second column of Table 4.3 indicates that private information has a significantly positive association with COE, consistent with EOH (2004) and Huang and Kang (2018) and confirms the hypothesis Ha. This shows that stocks with comparatively more private information put uninformed investors at greater risk, who cannot re-adjust their portfolios to reflect the full information available on the market. This poses a kind of systemic risk that uninformed investors may not be able to diversify. They, therefore, expect higher returns to offset this risk of information.

In column (3), the study runs the GMM regression between lack of information quality and COE. The lagged value of COE demonstrated a positive (0.6521) and significant effect on the current value of COE of the firms listed on PSX, which confirms the model's dynamic nature. The coefficient value of information quality (β =0.0551, P< 1%) illustrates that information's

imprecision increases the COE. These results are in line with the results of Safdar and Yan (2016), Dakhlaoui et al. (2017), and Hong et al. (2018) as well as lead to the acceptance of Hypothesis H1b. These results confirm that information quality as a proxy of information risk is a type of systematic risk that clinch the firm COE. However, a drop in the quality of firm-specific information affects the degree of uncertainty regarding potential cash flows and increases the risk of adverse selection for liquidity providers. As a result, they demand greater compensation and expand the bid-ask spread, reducing the liquidity and escalating the COE.

Moreover, the coefficient value of information transparency (β=-0.2409, P<10%) in column 4 indicates that information transparency has a significant inverse relation with COE. These results are in accordance with Barth et al. (2013); Zhang and Li, (2014), and Kim et al. (2019) and endorse hypothesis H1c. This shows that firms with higher financial statement transparency as measured by the covariance between earning and return have lower expected returns. These results also support the signaling theory. Accordingly, signals are designed to obtain capital market information to lessen the widespread asymmetry between social and economic information. The quality of signal such as the quality of the information disclosure, depends on the extent to which the information disclosed related to earnings reflects the actual economic value of the business and is easily decipherable by investors. However, if it is not easy for investors to interpret the information material, they charge a higher premium that increases COE.

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As far as control variables are concerned, size negatively relates to COE, showing that larger firms have a lower COE (Agustina, 2015). Beta, as a measure of systematic risk, is directly correlated with COE. This shows that investors become more skeptical about the firm‘s potential cash flows in an ambiguous information environment. This uncertainty increases the covariance between firm cash flow and the cash flows of the stock in the market, thereby increasing the beta and COE (Xing & Yan, 2020). Leverage has a direct and significant relationship with the COE (Riyath & Jahzfer, 2015). Large debt can induce greater financial risk; therefore, an investor will demand more return on their investment.

Estimation Results of Impact of Information Risk on Cost of Equity

Table 4.3: Information Risk and Cost of Equity

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*** (0.0127)
AR 1	0.000	0.000	0.000
AR 2	0.134	0.155	0.344
Sargan/Hansen	0.133/0.112	0.459/0.174	0.194/0.187
No. of Instruments	139	173	155
No. of Groups	370	370	370

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–Note: Table 4.3 depicts the results relevant to the Two-Step GMM approach for evaluating the effects of information risk on COE, The cost of equity is the return of the stock above the risk-free rate in the year t; IR is the information risk included TRANS, earnings transparency consists of industry element TRANSI and portfolio (industry neutral) element TRANSIN, TRANSI (TRANSIN) is calculated by taking the adjusted R square from the yearly regression of returns on earning divided by the lagged share price $\frac{\Delta_{E_{i,j,t}}}{P_{i,j,t-1}}$ and the change in earnings divided by the lagged share price $\frac{\Delta_{E_{i,j,t}}}{P_{i,j,t-1}}$ by the industry as well as the portfolio, PI is measured by one minus R square; information quality is measured by accrual quality, stock beta (BETA), SIZE (firm size) is measured by taking the natural log of the firm‘s total assets, Lev is calculated as total long-term debt deflated by total assets, The significance level of the AR (1) indicates a serial correlation of the first order that rejects the null hypothesis that no first difference serial correlation exists among the error term, Moreover, AR (2) shows insignificantly no second-order serial association between error terms in level regression. Sargan / Hansen test overvalue insignificantly, indicates the instrument's reliability, and are not excessively identified, ultimately, the GMM is properly defined without any validation issue, and this is revealed by the outcomes of Sargan/Hansen, AR (1) and AR (2), Ramsey Test is used to determine the existence of a nonlinear relationship while developing the dynamic panel model, The lack of significance of the Ramsey test confirm the linearity of a model without any issue of model specification, omitted variable and results are reliable‖.

–Furthermore, ignoring the cross-sectional correlation in the estimation of the dynamic panel model will lead to highly biased results, inference will be invalid, To measure whether or not the residuals from the dynamic regression model's fixed effect estimate are partially independent, the null hypothesis stated that there are no cross-sectional association residuals among the residuals, The Pearson test is used to check the dependence of cross-sectionals, and the test's insignificance value confirms the cross-sectional independence of residuals in estimating a fixed effect, Standard errors are represented in parenthesis, and significance levels at 1%, 5%, and 10% have shown in terms of –***‖, –**‖ and –*‖ respectively‖.

4.5. Mediation of Stock Price Crash Risk

In order to determine the mediation of stock price crash risk between the relation of information risk and COE, there are two paths to the information risk. First, information risk must predict the COE and second the information risk must predict the crash risk. Mediation is performed by estimation of three equation: information risk predicting the COE, information risk predicting the crash risk and information risk and crash risk predicting the COE. The estimation results of the impact of information risk on COE has given in table 4.3. The effect of information risk on crash risk is given in table 4.4. Column (2) of Table 4.4 exhibits the GMM regression results between private information and firms' cost of equity listed on PSX. The significant lagged value of the response variable confirms the dynamic nature of the model and its influence on the current value of crash risk. Firm in a dynamic model of crash risk follows the mean reversion behavior of crash risk where the previous risk of share price crash affects the current crash risk. This indicates that the firms with more risk of a crash are more likely to hide the information from the public, which causes the firm stock to hold less firm-specific information. This less specific information in stock prices induce the manager to withhold information and increase the crash risk (Song, 2015)

The coefficient value of private information ($\beta = 0.0559$, $p<10\%$) in the first column of Table 4.4 demonstrates the positive and significant relation with crash risk, consistent with Barley and Veronese (2003) and Ni and Zhu (2016). As investors are not fairly informed in the market, there is an information asymmetry between informed and uninformed investors. This information asymmetry places uninformed investors in a disadvantageous position, which increases the COE and surges the risk of a stock price collapse. Incognizant investors will precipitate a price collapse because as prices decline, they believe that cognizant investors have received negative information, which causes them to reduce their desire for assets and lower stock prices. As a result, the probability of stock price collapse is influenced by the asymmetry of information between incognizant and cognizant investors. Moreover, with the rise in information asymmetry between the company and the market, managers have more potential and opportunities to withhold bad news and speed up the release of good news. As a result, information asymmetry between managers and investors is expected to raise the likelihood of potential stock price crashes.

These results are also supported by information blockage theory. The upward market trend encourages favorably informed investors to participate in active trading. On the other hand, less informed traders try to avoid trading before the stock price drop because they are inherently suspicious about the actual existence of signals. However, when the marginal investor who is less informed enters the market and economic outlook becomes negative,

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price correction becomes unavoidable. Information blockage thus produces negative return skewness, resulting in price increases but positive skewness ensuing price decline (Zhu, 2016).

Column (3) shows the results related to the impact of less quality information on the risk of share price collapse. The significant lagged value of the response variable ensures the dynamic nature of the model. Firms with a higher risk of a crash are more likely to manipulate the earning, further raising the future risk of a crash. The coefficient value of information quality (β =0.0852, P<1%) confirms that lower quality leads to a higher risk of a crash (Jin & Myers, 2006, Chae et al., 2020). The logic behind this finding is that opaque financial reporting environments allow and empower managers to withhold negative news for prolonged periods, which can increase the likelihood and severity of potential crashes. Liang et al. (2019) have presented supporting evidence. They claimed that corporate opacity encourages bad news hoarding practices of overconfident managers, which raises the likelihood of stock price crashes.

Furthermore, with increased monitoring, the cost of managing the earning is higher, thereby obstructing the incentive to hoard bad news by manipulating earnings. On the contrary, it is easier for managers to mask actual organizational results without managing earnings while adjusting the narrative style of information disclosure and reducing the clarity of information provided in the annual report. This lack of transparency poses another information risk that escalates the risk of a share price collapse. However, the relation between information transparency and crash risk is presented in column 4. The lagged significant value of the response variable illustrates the dynamic nature of model and it has the positive influence on current value of COE.

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Firms with more chance of crash encourage managers to conceal negative information by managing information disclosure material, which does not boost the company's potential efficiency and makes the information environment less clear. This results in investor pricing bias and a stock price bubble. Once the accumulation of adverse information exceeds a threshold, this bad news is emancipating on the stock market, triggering share price crashes (Li, 2008). `

The coefficient value of information transparency (β =-0.1173, p<5%) indicates a negative relation, meaning more transparent firms are less exposed to crash risk. (Barth et al., 2013; Kim et al., 2019). While the lack of transparency has an impact on the investor's ability to understand the firm through financial reports, provided that the information divulged in the annual reports contains many professional terms and extended notes, as well as a large

amount of non-financial information which makes them more complicated to understand in listed companies, especially those in Pakistan.

In addition, the expense of searching the information limits the investor from being fully informed, making it difficult for retail investors to notice the actions of the firm‘s management. As a result, managers in such companies are likely to suppress bad news, leading to a high risk of a crash for firms (Hutton et al., 2009). Although high information transparency limited managerial bad news hoarding, minimizing the probability of potential crash risks. In other words, poor readability can lead to severe earnings fabrication issues, poor earnings persistence, less quality analyst‘s prediction, weak market reactions to annual reports, and a greater risk of share price collapse (Ertugrul et al., 2017; Kim et al., 2017a, 2017b; Lang & Stice-Lawrence, 2015).

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

Estimation Results of Information Risk and Stock Price Crash Risk

Table-4.4: Information Risk and Stock Price Crash Risk

Variables	Information Quality (AQ)	Information Transparency (Trans)	Private Information (PI)
Constant	-0.7813*	-0.3380*	-1.2689***
	(0.0310)	(0.1341)	(0.2760)
Crash$_{t-1}$	0.0527***	0.1743***	0.1949**
	(0.0086)	(0.0269)	(0.0597)
IR	0.0852***	-0.1173**	0.0559*
	(0.00008)	(0.0347)	(0.0302)
Leverage	0.1556***	-0.0965	0.2484*
	(0.0275)	(0.0796)	(0.1001)
Size	0.0129***	0.0543***	0.0054
	(0.0019)	(0.0075)	(0.0132)
BM	-0.1397***	0.0753***	-0.0842*
	(0.0046)	(0.0203)	(0.0448)
Beta	0.0615***	0.0228**	0.0678***
	(0.0011)	(0.0067)	(0.0138)
AR 1	0.021	0.000	0.000
AR 2	0.182	0.172	0.109
Sargan/Hansen	0.507/ 0.118	0.998/ 0.114	0.194/0.192
No. of Instruments	45	112	166
No. of Groups	370	370	370

–Notes: Table 4.4 depicts the results relevant to the Two-Step GMM approach for evaluating the effects of information risk on crash risk, Ultimately, the GMM is properly defined without any validation issue, and this is revealed by the outcomes of Sargan/Hansen, AR (1) and AR (2), Ramsey Test is used to determine the existence of a nonlinear relationship while developing

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the dynamic panel model, The lack of significance of the Ramsey test confirm the linearity of a model without any issue of model specification, omitted variable and results are reliable, Furthermore, ignoring the cross-sectional correlation in the estimation of the dynamic panel model will lead to highly biased results, inference will be invalid, To measure whether or not the residuals from the dynamic regression model's fixed effect estimate are partially independent, the null hypothesis stated that there are no cross-sectional association residuals among the residuals, The Pearson test is used to check the dependence of cross-sectionals, and the test's insignificance value confirms the cross-sectional independence of residuals in estimating a fixed effect, Standard errors are represented in parenthesis, and significance levels at 1%, 5%, and 10% have shown in terms of ‒***‖, ‒**‖ and ‒*‖ respectively‖.

4.6. Stock Prices Crash Risk and Cost of Equity

Table 4.5 shows the impact of crash risk on COE after applying the two-step system GMM to deal with potential sources of 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 a crash will lead to an increase in COE. When share prices oscillate wildly due to asymmetrical information, investors will not grasp the business position promptly as it is challenging to oversee managers. As a result, investors demand compensation for this increased uncertainty, increasing the COE (Liu & Ren, 2019; Liang & Mao, 2019).

Estimation Results of Stock Prices Crash Risk and Cost of Equity

Table-4.5: Stock Prices Crash Risk and Cost of Equity

Variables	**Crash Risk**
Constant	1.4581*
	(0.5779)
COE_{t-1}	0.1477*
	(0.0620)
Crash	0.6181***
	(0.1205)
Leverage	-0.0999*
	(0.2445)
Size	-0.0227*
	(0.0316)
Beta	0.2362***
	(0.0582)
AR 1	0.000
AR 2	0.108
Sargan/Hansen	0.635/0.219
No. of Instruments	52
No. of Groups	370

‒Note: Table 4.5 depicts the results relevant to the Two-Step GMM approach for evaluating the effects of stock price crash risk on COE, Standard errors are represented in parenthesis, and significance levels at 1%, 5%, and 10% have shown in terms of ‒***‖, ‒**‖ and ‒*‖ respectively‖.

4.7. Mediation of Stock Price Crash Risk between Information Risk and Cost of Equity

Table 4.6 shows the mediating role of crash risk between information risk and COE. Following Baron and Kenny, 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%) and (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 crash forces the investors to charge a higher premium, leading to increased COE (Liu & Ren, 2019).

Estimation results of Mediation of Stock Price Crash Risk between Information Risk and Cost of Equity

Table-4.6: Mediation of Stock Price Crash Risk between Information Risk and Cost of Equity

Variables	Quality	Trans	PVT Info
Constant	0.1160***	1.3636***	-0.5357***
	(0.0298)	(0.3298)	(0.0144)
COE_{t-1}	0.0851***	0.1516*	0.0304***
	(0.0110)	(0.0638)	(0.0024)
Crash	0.3326**	0.2781**	0.3099***
	(0.1090)	(0.0899)	(0.0101)
IR	0.0005**	-0.1193**	0.1499***
	(0.0002)	(0.0720)	(0.0038)
Leverage	-0.0515	0.2105	0.1500***
	(0.1219)	(0.2215)	(0.0268)
Size	-0.0069	-0.0392*	0.0205***
	(0.0052)	(0.0193)	(0.0003)
Beta	0.0771**	0.1322**	0.0277***
	(0.0241)	(0.0389)	(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

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–Table 4.6 depicts the results relevant to the Two-Step GMM approach for evaluating the mediating role of crash risk between the relation of information risk on COE by considering all the three dimensions of information risk, The cost of equity is the return of the stock above the risk-free rate in the year t; IR is the information risk included TRANS, earnings transparency consists of industry element TRANSI and portfolio (industry neutral) element TRANSIN, TRANSI (TRANSIN) is calculated by taking the adjusted R square from the yearly regression of returns on earning divided by the lagged share price $\frac{\Delta E_{i,j,t}}{P_{i,j,t-1}}$ and the change in earnings divided by the lagged share price $\frac{\Delta E_{i,j,t}}{P_{i,j,t-1}}$ by the industry as well as the portfolio, PI is measured by one minus R square; information quality is measured by accrual quality, stock beta (BETA), SIZE (firm size) is measured by taking the natural log of the firm‘s total assets, Lev is calculated as total long-term debt deflated by total assets, The significance level of the AR (1) indicates a serial correlation of the first order that rejects the null hypothesis that no first difference serial correlation exists among the error term, Moreover, AR (2) shows insignificantly no second-order serial association between error terms in level regression, Sargan / Hansen test overvalue insignificantly, indicates the instrument's reliability, and is not excessively identified, Ultimately, the GMM is properly defined without any validation issue, and this is revealed by the outcomes of Sargan/Hansen AR (1) and AR (2), Ramsey Test is used to determine the existence of a nonlinear relationship while developing the dynamic panel model, The lack of significance of the Ramsey test confirm the linearity of a model without any issue of model specification, omitted variable and results are reliable‖.

–Furthermore, ignoring the cross-sectional correlation in the estimation of the dynamic panel model will lead to highly biased results, inference will be invalid, To measure whether or not the residuals from the dynamic regression model's fixed effect estimate are partially independent, the null hypothesis stated that there are no cross-sectional association residuals among the residuals, The Pearson test is used to check the dependence of cross-sectionals, and the test's insignificance value confirms the cross-sectional independence of residuals in estimating a fixed effect‖. Standard errors are represented in parenthesis, and significance levels at 1%, 5%, and 10% have shown in terms of –***‖, –**‖ and –*‖ respectively.

4.8. Moderation of Investment Adjustment

Table 4.7 exhibits the effect of private information on COE by considering the moderating role of investment adjustment. The lagged value of COE was introduced as an explanatory variable in all the models, and it is statistically significant, showing the dynamic nature of the model. (Arellano & Bond, 1991). This shows the mean reversion behaviour of COE where the previous COE affects the current value COE. ln the second column of Table 4.7, the coefficient value of private information shows the significant and positive association with COE. These results are consistent with the findings of Easley and O Hara (2004). This finding argues that differences in the composition of private and public information affect the COE because investors seeking higher return for holding the stock with more private and congruently less publicly available information. This greater return is reflected in the fact that private information escalates the risk of incognizant investors holding stocks because cognizant investors are better positioned to adjust their portfolios by integrating new information. While the incognizant investors are unaware of reality, they are, therefore unable to regenerate the optimal weights and turn out to be maintaining a portfolio different from the cognizant investors. As the cognizant and incognizant investors experience different risk and return, thus the basic separation theorem does not fit this scenario. Hence, Private information contributes toward a new type of systemic risk, and as a result, investors need compensation for bearing this risk in equilibrium.

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The coefficient value of the book to market ratio has a positive and significant relationship with COE. Companies with lower stock prices appear to have low income, higher financial leverage, greater profit volatility and are more likely to reduce dividends than low BV/MV. These companies are undervalued, and this mispricing is expected to be more prevalent in companies with a higher level of information asymmetry, where fair arbitration is less likely to be successful. Companies with high BV/MV receive high premiums because of the higher risk of distress (griffin et al., 2002). The other justification is the clientele effect. Older investors prefer high capital returns over high dividends. Firms with a high book/market ratio generally attract the stockholders and pay more dividends.

Furth more, the coefficient value of a firm‘s size has a positive and negative association with COE. Larger corporations may benefit more from the disclosure of information than from smaller businesses. Cognizant investors have access to private information, can make all decisions, and attempt to sustain an incognizant loss. By improving the quality of transparency, an investor's attempt to obtain access to private information is expected to decline as information asymmetry decreases, meaning that investors will demand less

expected returns. As capital costs are the least anticipated, they will fall (Embang et al., 2012; Rezael & Abbas, 2015).

Similarly, Beta as a measure of systematic risk shows a positive association with COE. These results support the capital asset pricing model (CAPM) and predict that investors will demand more return when there is more uncertainty in the economy and high systematic risk. This increased compensation in a premium will increase the COE (Gupta et al., 2018).

Whereas in the 3rd column of table 4.7, the value of private information has interacted with growth firms dummy DUM_G. The estimated coefficient on (1-R^2) *DUM_G equals (-0.185<10%) shows a significant negative association with COE. These results indicate that growth firms with more private information earn lower returns than growth firms with less private information. Similarly, in the 4th column of table 4.7, the private information interacts with value firm dummy DUM_V. The estimated coefficient on (1-R^2) *DUM_V equal to (0.5600< 5%) demonstrates the positive association with COE at a level of 5%. These findings depict that value firms with more firm-specific information in share price earn a significantly higher return than those with less private information. Thus, these results approve our first hypothesis, which hypotheses that private information on the return of value and growth firms are different. The reasoning behind this disparity in return is firms' ability to adjust firm-specific information in stock prices into investment as private information disseminates in prices through the trading of informed investors. This information in stock price serves as a valuable indicator that managers can rely on to adjust the investment to improve performance. This investment adjustment increases firm value, benefiting both informed and uninformed investors. Moreover, investment adjustment changes a firm's fundamentals by making the information of informed investors stale and thus alleviating the information risk borne by uninformed investors (Huang & Kang, 2018).

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Estimation Results of Private Information, Investment Adjustment and COE

Table-4.7: Private Information, Investment Adjustment and COE

Variable	PVT Info	PVT Info (Growth Firms)	PVT Info (Value Firms)
Constant	-2.05125***	-2.2577***	-1.9688***
	(0.3228)	(0.4902)	(0.3336)
COE t-1	0.1571***	0.0519**	0.1299**
	(0.0417)	(0.1999)	(0.0457)
(1-R^2)	0.4016***	0.5118***	0.1521*
	(0.0540)	(0.1135)	(0.9185)
(1-R^2) *DUM_G		-0.1851*	
		(0.1702)	
(1-R^2) *DUM_V			0.5600**
			(0.1636)
DUM_G		-0.4885*	
		(0.2481)	

DUM_V			0.8207***
			(0.2126)
Book to Market	-0.0412**	-0.0527	-0.0468**
	(0.0189)	(0.0434)	(0.0230)
Size	0.1001***	0.0968***	0.1147***
	(0.0174)	(0.2319)	(0.2008)
Beta	0.1097***	0.0915**	0.1338***
	(0.0281)	(0.0301)	(0.0319)
AR1	0.000	0.000	0.000
AR2	0.860	0.738	0.994
Sargan/Hansen	0.167/0.134	0.231/0.141	0.234/0.145
No. of Instruments	149	224	174
No. of Groups	370	370	370

–Table 4.7 depicts the results relevant to the Two-Step GMM approach for evaluating the moderating role of investment adjustment between private risk and COE, The cost of equity is the return of the stock above the risk-free rate in the year t; IR is the information risk included private information (PI), PI measured by one minus R square, Investment adjustment is based on the Book value of equity to Market value of equity (BTM), The firms are divided into two groups based on the median value of BTM, such as Growth firms and Value firms, The firms that fall below the median value of the BTM ratio are assigned to 1 and otherwise 0 to create the growth dummy variable DUM_G, The firms that BTM ratio are above the median value of the BTM ratio are assigned to 1 and otherwise 0 to generate the growth dummy variable DUM_V $(1\text{-}R^2)$ *DUM_V and $(1\text{-}R^2)$ *DUM_G are the interaction terms, Stock beta (BETA), SIZE (firm size) is measured by taking the natural log of the firm's total assets; Lev is calculated as total long-term debt deflated by total assets, The significance level of the AR (1) indicates the presence of a serial correlation of the first order that rejects the null hypothesis that no first difference serial correlation exists among the error term.

–Moreover, AR (2) shows insignificantly no second-order serial association between error terms in level regression. Sargan / Hansen test overvalue insignificantly, indicates the instrument's reliability, and is not excessively identified, Ultimately, the GMM is properly defined without any validation issue, and this is revealed by the outcomes of Sargan/Hansen, AR (1) and AR (2), Ramsey Test is used to determine the existence of a nonlinear relationship while developing the dynamic panel model, The lack of significance of the Ramsey test confirms the linearity of a model without any issue of model specification, omitted variable and results are reliable.

–Furthermore, ignoring the cross-sectional correlation in the estimation of the dynamic panel model will lead to highly biased results, inference will be invalid, To measure whether or not the residuals from the dynamic regression model's fixed effect estimate are partially independent, the null hypothesis stated that there are no cross-sectional association residuals among the residuals, The Pearson test is used to check the dependence of cross-sectionals, and the test's insignificance value confirms the cross-sectional independence of residuals in estimating a fixed effect. Standard errors are represented in parenthesis, and significance levels at 1%, 5% and 10% have shown in terms of –***‖, –**‖ and –*‖ respectively‖.

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4.9. Private Information, Investment Adjustment and Corporate Investment

Table 4.8 shows the results related to the effect of private information on corporate investment by applying the two-step system GMM dynamic estimator to confront a possible endogeneity problem. The dependent variable is capital expenditure as a measure of corporate investment, while the private information is included as an independent variable. The lagged value of a corporate investment is incorporated as an explanatory variable, and it is statistically significant, indicating that the model is dynamic (Arellano & Bond, 1991). This shows the mean reversion behavior of investment where previous investment affects the current investment. The results in column 1 show that firm investment is positively associated with Tobin Q and investment Q sensitivity positivity depends on private information. This positive association supports the Chen et al. (2007) finding that firms use the information gleaned from the stock market to direct their investment decisions.

These findings also confirm the learning hypothesis, which means that Managers learn from private information in equity markets while making a corporate investment decision. Since

stock prices include both private and public information about the company's fundamentals, private information is embedded in stock prices by speculator trading. However, suppose managers decide on the level of investment at some point in time to boost firm value. In that case, they will consider all the information available in stock prices and other information new to the managers. Thus, based on this rationale, the direct relation between investment Q sensitivity and private information embedded by speculators implies that managers look at the prices while making the investment decisions to learn about the information new to managers.

However, in the second and third columns, when this interaction of Tobin Q and private information interacts with growth firms as shown by the interaction term $(1-R^2)$ *Q *DUM_G, it shows the economically significant and positive association with growth firms. In contrast, when this interaction of Tobin Q and private information interacts with value firms as presented by the interaction term $(1-R^2)$ *Q *DUM_V, investment Q sensitivity does not respond to private information contained in share prices for value firms. The results support our third hypothesis and are consistent with the findings of (Huang & Kang, 2018).

The theoretical reasoning behind these findings is that the ability of managers to integrate this information into investment or the flexibility of investment adjustment differs across firms. Growth firms have a high degree of flexibility in adjusting investment based on information incorporated in share prices, and the resultant positive effect on the COE balances out the negative impact of the information risk, thus creating information discounts. On the other hand, in the case of value firms that lack such flexibility, the investment adjustment cannot significantly favor them, and thus they have to compensate uninformed investors with an information premium.

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Moreover, Leverage has an economically significant and negative association with investment. These results support the findings of Vo (2019) and Ali et al. (2019). This gives legitimacy to agency theories of leverage and finds that firm leverage offers a specific disciplinary position by limiting management decisions on investment decisions with lower growth potential. In other words, inefficient investment increases due to the risk of default from "underinvestment" or "debt overhang."

Similarly, cash flow has a significant negative association with corporate investment after managing the investment opportunities for the firm. Cash flow is a crucial investment determinant for firms that require external funds. Since the companies have two sources of finances: internal and external. Thus, firms try to fund long-term investments with long-term debt, whereas current investment with cash flows and short-term debt (Ghafoor, 2018).

Furthermore, the sensitivity of the relationship between private information and investment is further determined by segregating the firms into high and low growth firms based on their ability to adjust the information. The positive coefficient value of private information of growth firms is (0.1791) at a significance level of (p< 1%) and negative value of coefficient (-0.2396, p<1%) of value firms also confirm theoretical explanation that growth firms show greater Investment-Q vulnerability in response to private information found in stock prices.

Estimation Results of Private Information, Investment Adjustment and Corporate Investment

Table 4.8: Private Information, Investment Adjustment and Corporate Investment

Variable	Investment	(Growth Firms)	(Value Firms)
Constant	-0.5013***	-0.5648***	0.2389***
	(0.0621)	(0.0791)	(0.0134)
Investment$_{t-1}$	0.1485***	0.1012***	0.0055***
	(0.1299)	(0.0224)	(0.0003)
Q	0.1412**	0.6515***	0.0748***
	(0.0477)	(0.1362)	(0.0076)
(1-R^2)	-0.0287	0.0982	0.0291
	(0.0237)	(0.1834)	(0.0070)
(1-R^2) *Q	0.2162***		
	(0.0122)		
(1-R^2) *Q *DUM_G		0.1791***	
		(0.0439)	
(1-R^2) *Q*DUM_V			-0.2396***
			(0.0124)
DUM_G		2.6446***	
		(0.2789)	
DUM_V			-0.4226***
			(0.0113)
Leverage	-0.8632***	-0.4288***	-0.1719***
	(0.1970)	(0.8898)	(0.0561)
CF	0.0789***	0.1003***	0.0987***
	(0.0047)	(0.0014)	(0.0005)
AR1	0.028	0.002	0.032
AR2	0.165	0.208	0.273
Sargan/Hansen	1.000/0.703	0.125/0.409	0.999/0.498
No. of Instruments	159	141	103
No. of Groups	370	370	370

-Table 4.8 depicts the results relevant to the Two-Step GMM approach for evaluating the moderating role of investment adjustment between relation of private risk and corporate investment; Results are obtained by separating the sample firms into high and low adjustment firms as well as on full sample, Where the capital expenditure are used as a measure of corporate investment in the year t; IR is the information risk included private information (PI), PI measured by one minus R square, Investment adjustment is based on ratio of Book value of equity to Market value of equity (BTM) where the firms are divided into two groups based on the median value of BTM such as Growth firms and Value firms, The firms that fall in below the median value of BTM ratio are assign to 1 and otherwise 0 to create the growth dummy variable DUM_G, The firms that BTM ratio are above the median value of BTM ratio are assign to 1 and otherwise 0 to create the growth dummy variable DUM_V, (1-R^2)*Q *DUM_V and (1-R^2) *Q*DUM_G are the interaction terms, Stock beta (BETA), SIZE (firm size) is measured by taking the natural log of firm's total assets, Lev is calculated as total long-term debt deflated by total assets; 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 term in level regression, Sargan / Hansen test overvalue is insignificant, indicates the reliability of the instrument, and is not excessively identified, Ultimately, the GMM is properly defined without any validation issue and this is revealed by the outcomes of Sargan/Hansen, AR (1) and AR (2), To determine the existence of nonlinear relationship while developing the dynamic panel model, Ramsey Test is used, The lack of significance of the Ramsey test

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confirm the linearity of model without any issue of model specification, omitted variable and results are reliable, Furthermore, ignoring the cross-sectional correlation in the estimation of dynamic panel model will lead to extremely biased results, inference will be invalid, To measure whether or not the residuals from the dynamic regression model's fixed effect estimate are partially independent, the null hypothesis stated that there are no cross sectional association residuals among the residuals, Pearson test is used to check the dependence of cross-sectionals, and the test's insignificance value confirms the cross sectional independence of residuals in the estimation of fixed effect; Standard errors are represented in parenthesis and significance level at 1%, 5% and 10% have shown in terms of –***‖, –**‖ and –*‖ respectively‖.

4.10. Moderation of Competitive Position

Table 4.9 exhibits the effect of lack of information quality and information transparency on COE by considering the moderating role of firm competitive position. Results are obtained by applying the two-step system GMM to deal with the potential issue of endogeneity. First, in Panel A, the association between lack of information quality and COE is determined. The lagged value of COE is introduced as an explanatory variable in all the models, and it is statistically significant, showing the dynamic nature of the model. (Arellano & Bond, 1991). This shows the mean inversion behavior of COE where the previous COE influence the current value of COE.

In the first column of Panel A, this relationship is presented by taking the full sample. The coefficient value of information quality interaction with investor competitive position shows the negative association with COE. These results confirm our fourth hypothesis and support the findings of Li and Luo (2020). They argued that Product market competition allows comparison between the performances of companies in the same sector, minimizes the disparity of information between management and external users of information by making the consequences of management decisions more observable. External investors can therefore obtain more details on the working capacity and the management efforts. These all escalate the cost of concealing the negative news and persuade the management to decrease the deception of earnings to present the false image of a firm. Fierce competition in the product market also increases the external monitoring by shareholders. The threat of dismissal and the credibility mechanism provides the management more incentive to divulge more company-specific information and perform their fiduciary responsibility to gain confidence, which reduces the behavior of stockpiling the bad news and improves the quality of the information that ultimately reduces the COE.

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Furthermore, extreme market competition would also minimize corporate profit margin, resulting in insufficient internal funding. External funding is also needed for new business areas and external market mergers. Management also chooses to increase the disclosure of information and reduce the concealment of negative news activity in order to build a positive market picture and reduce the cost of financing. In summary, the more severe the competition on the market, the more likely it is to minimize management behavior of bad news hiding,

which increases the quality of information and makes information more visible, thus reducing the COE.

These results are also confirmed by the third and fourth columns of table 4.10, where firms are segregated into two groups based on their competitive position measured by ROA. Firms are divided into high and low competitive firms. The results displayed in the 3rd and 4th columns of table 4.9 indicate that the coefficient value of accrual quality in highly competitive firms is negative and significant while positive in low, competitive firms. These results suggest that firms in highly competitive industries experience less COE because the firms that do well in the product market demonstrate their resilience through enhanced transparency to preserve their reputation and stakeholders trust (Shivani &Agarwal, 2020).

In addition, BOD will preclude the managers from acting opportunistically with better supervision, and the issue of investor advance capital reduction or high compensation may be addressed by reducing the information asymmetry (Biddle et al., 2009). Although managerial slack occurs under less competitive circumstances, the managers of such firms appear to enjoy a 'quiet life.' However, market competition serves as an external mechanism for disciplinary management and places the management of companies in a competitive sector under continuous pressure to minimize slackness and increase performance (Giroud & Mueller, 2010). These results contradicts with the study of Lemma et al.2018 who argued that high competitive environment decrease the quality of financial reporting as the managers may overstate profits in order to meet their estimated earnings performance (Lemma, et al., 2018).

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Furthermore, the moderating role of competitive position on the relation between information transparency and COE is also checked. Results are obtained by applying the two-step system GMM dynamic estimator to deal with the potential issue of endogeneity. First, in Panel B, the association between lack of information transparency and COE is determined. The lagged value of COE is introduced as an explanatory variable in all the models, and it is statistically significant, showing the dynamic nature of the model. (Arellano & Bond, 1991). This shows the mean inversion behavior of COE where the previous COE influences the current value of COE.

In the first column of Panel A, this relationship is first determined by taking the full sample. The coefficient value of information transparency interaction with investor competitive position shows that greater information transparency and strong market competition decrease COE. These results are consistent with legitimacy theory, signaling theory and resource-based theory. According to the signaling principle, companies in a competitively advantageous

position may wish to demonstrate their efficiency and effectiveness by increased disclosure. Agency theory proponents argued that this enhanced disclosure could minimize information asymmetry, leading to greater stakeholder awareness, a degree of accountability and trust in investors.

However, this relationship is also confirmed by dividing the whole sample into high and low competitive firms. The results in the 6th and 7th columns of table 4.9 indicate that the coefficient value of information transparency in high competitive firms is highly negative and significant in low, competitive firms. These results suggest that high competitive firms experience less COE because of the competition; when an investor gains information from various sources outside the business and gets a deep understanding of the company by comparing the different firms, it increases the capacity of the investors to understand financial information. However, competition improves the disclosure quality of information and improves the investors' interpreting and understanding ability. This enhances information transparency and reduces the COE.

Estimation Results of Information Risk, Competitive Position and COE

Table-4.9: Information Risk, Competitive Position and COE

	Panel A: Quality			Panel B: Transparency		
Variable	**COE**	**High ROA**	**Low ROA**	**COE**	**High ROA**	**Low ROA**
Constant	3.7476**	1.0578** (0.4806)	-0.8856** (0.4090)	-0.6973 (0.9437)	-0.4115 (1.1595)	-0.8193 (0.6209)
COE_{t-1}	-0.4461*** (0.1049)	0.1302*** (0.0191)	-0.2238** (0.0714)	0.5674** (0.2712)	0.2171 **(0.1076)	-0.2548* (0.1386)
Quality	0.0151** (0.0060)	-0.0213** (0.0006)	0.0275* (0.0869)			
Quality* ROA	-0.0711*** (0.0271)					
Transparency				-0.5910* (0.3134)	-0.2196 **(0.1058)	-0.1643** (0.0823)
Trans* ROA				-0.0348* (5.5165)		
ROA	0.4580 (0.6448)	-0.4828* (0.2470)	0.6661*** (0.3918)	-0.6617* (1.5764)	-0.8073* (0.4307)	0.5746*** (0.7172)
Beta	0.1579* (0.0643)	0.1262** (0.0453)	0.1224*** (0.0289)	-0.1347 (5.5165)	0.1765** (0.0585)	0.0627 (0.1061)
Size	-0.1980** (0.0648)	-0.0512* (0.0283)	0.0897*** (0.0240)	0.0313 (0.0452)	0.0374 (0.0683)	0.0709** (0.0354)
AR 1	0.008	0.027	0.030	0.003	0.008	0.002
AR 2	0.131	0.405	0.741	0.125	0.197	0.493
Sargan/Hansen	0.105/0.219	0.745/0.603	0.415/0.442	0.304/ 0.174	0.863/ 0.657	0.505/ 0.691
No. of Instruments	122	83	83	121	82	81
No. of Groups	370	370	370	370	370	370

Table 4.9 depicts the results relevant to the Two-Step GMM approach for evaluating the moderating role of firm competitive position between relation of information risk and COE. Results are obtained by separating the sample firms into high and low

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competitive firms as well as on full sample. Panel A illustrate the findings pertained to the effect of less information quality and its interaction with industry adjusted ROA on COE, Panel B demonstrates the results linked to the impact of information transparency and its interaction with industry adjusted ROA on COE. –Where the firm competitive position is measured by industry adjusted ROA and the COE is the return of the stock above the risk-free rate in the year t; IR is the information risk included less information quality measured by accrual quality, TRANS, earnings transparency consists of industry element TRANSI and portfolio (industry neutral) element TRANSIN, TRANSI (TRANSIN) is calculated by taking the adjusted R square from the yearly regression of returns on earning divided by the lagged share price $\frac{\Delta E_{i,j,t}}{P_{i,j,t-1}}$ and the changed in earning divided by the lagged share price $\frac{\Delta E_{i,j,t}}{P_{i,j,t-1}}$ by the industry as well as the portfolio, stock beta (BETA), SIZE (firm size) is measured by taking the natural log of firm‘s total assets, 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 term in level regression, Sargan / Hansen test overvalue is insignificant, indicates the reliability of the instrument, and is not excessively identified, Ultimately, the GMM is properly defined without any validation issue and this is revealed by the outcomes of Sargan/Hansen, AR (1) and AR (2), To determine the existence of nonlinear relationship while developing the dynamic panel model, Ramsey Test is used, The lack of significance of the Ramsey test confirm the linearity of model without any issue of model specification, omitted variable and results are reliable, Furthermore, ignoring the cross-sectional correlation in the estimation of dynamic panel model will lead to highly biased results, inference will be invalid, To measure whether or not the residuals from the dynamic regression model's fixed effect estimate are partially independent, the null hypothesis stated that there are no cross-sectional association residuals among the residuals, The Pearson test is used to check the dependence of cross-sectionals, and the test's insignificance value confirms the cross-sectional independence of residuals in estimating a fixed effect; Standard errors are represented in parenthesis, and significance levels at 1%, 5%, and 10% have shown in terms of –***‖, –**‖ and –*‖ respectively‖.

4.11. Information Risk, Competitive Position and COE (Market share)

Table 4.10 exhibits the effect of lack of information quality and information transparency on COE by considering the moderating role of firm competitive position. Here, the market share is used as another measure of competitive position. Results are obtained by applying the two-step system GMM dynamic estimator to deal with potential sources of endogeneity. First, in Panel A, the association between lack of information quality and COE is determined. The lagged value of COE is introduced as an explanatory variable in all the models, and it is statistically significant, showing the dynamic nature of the model. (Arellano & Bond, 1991). This illustrates the mean inversion behavior of COE where the previous COE influences the current value of COE.

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In the first column of Panel A, this relationship is determined by taking the full sample. The coefficient value of information quality interaction with investor competitive position shows the negative association with COE. The reason behind this association is that strong competition improves the standard and reliability of accounting information (Kim & Sohn, 2011; Ryu et al., 2013; Cheng et al., 2013). This infers that financial information quality improves as investors' ability to track accounting information for multiple companies is effortless when there is strong competition.

These results are also confirmed by the third and fourth column of table 6, where firms are segregated into two groups based on their competitive position measured by Market share. Firms are divided into high and low competitive firms. The results displayed in the 3rd and 4th columns of table 6 indicate that the coefficient value of accrual quality in highly competitive firms is negative and significant while positive in low, competitive firms. This

result indicates that firms in highly competitive industry experience less COE because firm with strong competitive position increases the quality of accounting information, while companies with weak competition prefer to build an opaque information atmosphere to maintain their competitive position (Cheng et al., 2013).

Furthermore, by using the market share as a proxy of competitive position, the effect of information transparency on COE by considering the moderating role of firm competitive position. Results are obtained by applying the two-step system GMM dynamic estimator to deal with the potential issue of endogeneity. First, in Panel B, the association between lack of information transparency and COE is determined. The lagged value of COE was introduced as an explanatory variable in all the models, and it is statistically significant, showing the dynamic nature of the model. (Arellano & Bond, 1991). This confirms the mean inversion behavior of COE where the previous COE affects the current value of COE.

In the first column of Panel B, this relationship is first determined by taking the full sample. The coefficient value of information transparency interaction with investor competitive position shows that greater information transparency and intense market competition decrease COE.

Similarly, the results are corroborated by segregating the firms into high and low transparent firms based on their market position in a particular industry. The higher positive coefficient value of transparency in high competitive firms than in low competitive firms shows that competition improves information transparency by making annual reports more readable and decreasing information asymmetry, thus declining the COE.

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Estimation Results of Information Risk, Competitive Position and COE

Table-4.10: Information risk, competitive position and COE

	Panel A: Quality			Panel B: Transparency		
Variable	**COE**	**High Market share**	**Low Market share**	**COE**	**High Market share**	**Low Market share**
Constant	1.4176** (0.6045)	1.7867** (0.2596)	0.9589*** (0.2628)	0.7271 (0.5242)	8.7270*** (2.2644)	0.4948 (0.3983)
COE_{t-1}	-0.4543*** (0.1018)	-0.7523*** (0.0214)	0.0078** (0.0355)	0.2915** (0.2414)	-0.4940** (0.1795)	-0.0955** (0.0460)
Quality	0.0031** (0.0015)	-0.0626 (0.0692)	0.0097** (0.0035)			
Quality*Market share	-0.084*** (0.0036)					
Transparency				-0.0659** (0.3404)	0.3815** (0.1300)	0.3006* (0.2179)
Trans* Market				-		

share				0.1764*** (0.2097)		
Market share	-0.1211*** (0.0298)	0.0736*** (0.0076)	0.4553* (0.2449)	-0.0021* (0.1583)	0.0390* (0.0227)	0.0238** (0.2002)
Beta	0.2409*** (0.0496)	0.3563*** (0.0066)	0.0337 (0.0253)	-0.0867 (0.1529)	-0.2553** (0.0959)	-0.0502** (0.0230)
Size	-0.0516 (0.0339)	-0.0734*** (0.0171)	-0.0310* (0.0177)	-0.0197 (0.0272)	-0.4848*** (0.1354)	-0.0173** (0.0214)
AR 1	0.004	0.024	0.055	0.007	0.002	0.012
AR 2	0.203	0.169	0.272	0.351	0.668	0.253
Sargan/Hansen	1.000/ 0.395	0.241/ 0.599	0.388/ 0.305	0.238/0.185	0.122/ 0.392	0.639/ 0.675
No. of Instruments	120	186	192	118	184	186
No. of Groups	370	370	370	370	370	370

–Table 4.10 depicts the results relevant to the Two-Step GMM approach for evaluating the moderating role of firm competitive position between relation of information risk and COE. Results are obtained by separating the sample firms into high and low competitive firms as well as on full sample. Panel A illustrate the findings pertained to the effect of less information quality and its interaction with Market share on COE, Panel B demonstrates the results linked to the impact of information transparency and its interaction with Market share on COE. –Where the firm competitive position is measured by Market share and the COE is the return of the stock above the risk-free rate in the year t; IR is the information risk included less information quality measured by accrual quality, TRANS, earnings transparency consists of industry element TRANSI and portfolio (industry neutral) element TRANSIN, TRANSI (TRANSIN) is calculated by taking the adjusted R square from the yearly regression of returns on earning divided by the lagged share price $\frac{\Delta E_{i,j,t}}{P_{i,j,t-1}}$ and the changed in earning divided by the lagged share price $\frac{\Delta E_{i,j,t}}{P_{i,j,t-1}}$ by the industry as well as the portfolio, stock beta (BETA), SIZE (firm size) is measured by taking the natural log of firm‘s total assets, 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 term in level regression, Sargan / Hansen test overvalue is insignificant, indicates the reliability of the instrument, and is not excessively identified, Ultimately, the GMM is properly defined without any validation issue and this is revealed by the outcomes of Sargan/Hansen, AR (1) and AR (2), To determine the existence of nonlinear relationship while developing the dynamic panel model, Ramsey Test is used, The lack of significance of the Ramsey test confirm the linearity of model without any issue of model specification, omitted variable and results are reliable, Furthermore, ignoring the cross-sectional correlation in the estimation of dynamic panel model will lead to extremely biased results, inference will be invalid, To measure whether or not the residuals from the dynamic regression model's fixed effect estimate are partially independent, the null hypothesis stated that there are no cross sectional association residuals among the residuals, Pearson test is used to check the dependence of cross-sectionals, and the test's insignificance value confirms the cross-sectional independence of residuals in the estimation of a fixed effect; Standard errors are represented in parenthesis, and significance levels at 1%, 5%, and 10% have shown in terms of –***‖, –**‖ and –*‖ respectively‖.

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4.12. Information Risk, Competitive Position and Corporate Investment

Table 4.11 exhibits the results related to the effect of information risk on corporate investment after using the two-step system GMM dynamic estimator to deal with possible endogeneity issues. The dependent variable is capital expenditure as a measure of corporate investment. Two types of information risk, such as less quality and transparency of information, are considered. First, in Panel A, the association between opaque information and corporate investment is determined. Second, the role of competitive position in the concerned relationship is checked.

The lagged value of a corporate investment is included as an explanatory variable, and its significant value suggests the dynamic nature of the model (Arellano & Bond, 1991). This shows the mean inversion behavior of investment where previous investment decisions influence the current investment. Results in column 1 show that firm investment is positively

associated with Tobin Q and investment Q sensitivity negatively correlated with opaque information. This opaque information also has a negative association with corporate investment. This is because low information quality aggravates asymmetry between manager and investor, which may result in underinvestment. After all, investors foresee the manager‘s unscrupulous behaviors and reduce the amount of the capital in advance, which would inevitably decrease the investment.

Moreover, the moderating effect of firm competitive position on the relation between opaque information and corporate investment is analyzed. This effect is checked by using two proxies of competitive position: Industry adjusted ROA and Market share. In the 3rd column of table 4.11, where the industry adjusted ROA is used as a proxy to determine the firm‘s competitive position, the coefficient value of interaction term (Quality* ROA) is economically and statistically significant (β=0.1529, $p<0.05$). This coefficient value suggests that a firm's competitive position is negatively associated with opaque information to increase investment. The rationale behind this finding is that disclosure quality is higher because the degree of competition influences voluntary disclosure and limits the manager's ability to exploit earnings (Li, 2010). Greater the competition, the more earnings will fluctuate and the less profits the industry will generate (Lev, 1983). It is difficult to generate steady excess earnings in a highly competitive market, so firms have to innovate and reduce cost to survive in the market. If it makes unnecessary capital investment or lowers the market share, it loses competitiveness and has a high liquidation risk (Grullon & Michaely, 2007). As a result, efficiency in a highly competitive market appears to be high since poor output in a high competition sector can lead to a business being targeted for acquisition (Kruse & Rennie, 2006). As a result, companies are motivated to grow their market share by constantly developing new products and investing resources in a highly competitive industry.

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Similarly, in the 3rd column of table 4.11, the effect of competitive position between the relation of lack of quality information and corporate investment is analyzed using the second proxy, market share. The coefficient value of interaction term Quality*Q*Market share (β=0.0063, $p<1\%$) also shows a positive association with investment. The coefficient value of the Market share is smaller but positive compared to the coefficient value of adjusted ROA.

Furthermore, the effect of information transparency on corporate investment is determined by considering the moderating role of investor attention. Lagged value of the corporate investment is significant at 1%, which shows that the mean reversion behaviour of the previous year investment affects the current year corporate investment (Arellano & Bond, 1991). The coefficient value of transparency (β = 0.2054, $p<5\%$) show a positive and significant relation with corporate investment. These results indicate that information

transparency increases corporate investment. Moreover, when the coefficient value of transparency interacts with ROA as denoted by Trans* Q*ROA, the increased coefficient value of this interaction term (β = 0.6655, p<5%) indicates that a firm with a strong competitive position increases disclosure, as disclosure in a competitive market may be used as a weapon to win over the credibility and to make certain the continuing access to financial means (Oliveira et al., 2011). This access to resources entails external capital assistance, which enhances the opportunity for investment with improved information quality.

Similarly, the increased coefficient value of trans*Q*sale (β = 0.5752, p<1%) is highly competitive firms as compared to the coefficient value of Trans ((β = 0.4998, p<1%) in low, competitive firms demonstrate that companies with rising market share are committed to greater transparency to improve operational sustainability by ensuring ongoing access to key resources. Such increased accountability signals to stakeholders that the company has preserved its ethical principles while gaining a competitive position. This improved investor trust and increased their willingness to provide finance, thereby raising corporate investment (Shivani &Agarwal, 2020).

Estimation Results of Information Risk, Competitive Position and Corporate Investment

Table 4.11: Information Risk, Competitive Position and Corporate Investment

	Panel A: Information Quality			Panel A: Information Transparency		
Variables		**ROA**	**Market share**	**Investment**	**ROA**	**Market share**
Constant	-9.4079*** (1.3775)	-0.1559 (0.1085)	-0.6625*** (0.1634)	-7.0304*** (0.2394)	0.5505*** (0.1501)	-7.8646*** (0.3196)
Expenditures	0.0208** (0.0085)	0.0038*** (0.0022)	0.0101*** (0.0007)	0.0153*** (0.0012)	0.0004*** (0.0008)	0.0206*** (0.0014)
Q	0.2082** (0.0870)	0.0115*** (0.0092)	0.0209*** (0.0105)	0.0696*** (0.0118)	0.1074*** (0.0063)	0.0872*** (0.0121)
Quality	-0.1664*** (0.0497)	-0.0026 (0.0009)	0.0024*** (0.0004)			
Quality*Q	-0.5858*** (0.1853)					
Trans					0.2054** (0.0900)	0.4998*** (0.0552)
Trans* Q				0.4890*** (0.0510)		
Quality* Q*ROA		0.1529** (0.0448)				
ROA		0.3329** (0.1361)			0.2621 (0.2123)	
Trans*Q*ROA					0.6655**	

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					(0.2856)	
Market Share			0.0838**			0.0401***
			(0.0160)			(0.0095)
Quality*Q*Market share			0.0063***			
			(0.0004)			
Trans*Q* Market Share						0.5752***
						(0.0110)
CF	0.0952***	0.0467***	0.0990***	0.2769***	0.0100**	0.2768***
	(0.0117)	(0.0045)	(0.0044)	(0.0032)	(0.0048)	(0.0040)
AR 1	0.742	0.007	0.009	0.009	0.005	0.006
AR 2	0.934	0.204	0.262	0.234	0.481	0.220
Sargen/Hansen	1.000/ 0.817	1.000/0.836	1.000/0.171	0.128/0.114	1.000/0.999	0.223/0.241
No. of Groups	124	124	123	123	123	122
No. of Instruments	370	370	370	370	370	370

Table 4.11 depicts the results relevant to the Two-Step GMM approach for evaluating the moderating role of firm competitive position between relation of information risk and corporate investment. Panel A illustrate the findings pertained to the effect of less information quality and its interaction with Market share as well as Industry adjusted ROA on corporate investment, Panel B demonstrates the results linked to the impact of information transparency and its interaction with Market share as well as industry adjusted ROA on Corporate Investment. -Where the firm competitive position is measured by Market share and the COE is the return of the stock above the risk-free rate in the year t; IR is the information risk included less information quality measured by accrual quality, TRANS, earnings transparency consists of industry element TRANSI and portfolio (industry neutral) element TRANSIN, TRANSI (TRANSIN) is calculated by taking the adjusted R square from the yearly regression of returns on earning divided by the lagged share price $\frac{\Delta E_{i,j,t}}{P_{i,j,t-1}}$ and the changed in earning divided by the lagged share price $\frac{\Delta E_{i,j,t}}{P_{i,j,t-1}}$ by the industry as well as the portfolio, CF is firm cash flow, Q is TOBIN 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 term in level regression, Sargan / Hansen test overvalue is insignificant, indicates the reliability of the instrument, and is not excessively identified, Ultimately, the GMM is properly defined without any validation issue and this is revealed by the outcomes of Sargan/Hansen, AR (1) and AR (2); To determine the existence of nonlinear relationship while developing the dynamic panel model, Ramsey Test is used, The lack of significance of the Ramsey test confirm the linearity of model without any issue of model specification, omitted variable and results are reliable, Furthermore, ignoring the cross-sectional correlation in the estimation of dynamic panel model will lead to highly biased results, inference will be invalid, To measure whether or not the residuals from the dynamic regression model's fixed effect estimate are partially independent, the null hypothesis stated that there are no cross-sectional association residuals among the residuals, Pearson test is used to check the dependence of cross-sectionals, and the test's insignificance value confirms the cross-sectional independence of residuals in the estimation of fixed effect, Standard errors are represented in parenthesis, and significance levels at 1%, 5%, and 10% have shown in terms of -***‖, -**‖ and -*‖ respectively‖.

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4.13. Moderating of Investor Attention

This part of the study presents the role of investor attention between the relation of information risk and COE. Column (2) of Table 4.12 shows the GMM regression results of how the investor attention moderates the impact of private information and COE of firms listed on PSX. The lagged value of COE is introduced as an explanatory variable in all the models, and it is statistically significant, showing the dynamic nature of the model. (Arellano & Bond, 1991). This indicates the mean inversion behavior of COE where the previous COE influence the current value of COE.

ln the 2nd column of table 4.13, the coefficient value of private information interaction with attention shows a significant positive association with COE, which support the findings of (Gao et al., 2018). This indicates that investors' interest plays a vital role in speeding up public information transfer to investors and improving business performance. However, when the investor spends considerable time and effort in searching the relevant information on the

internet, it enhances the stock market liquidity, reducing the information asymmetry among investors and ultimately reducing the COE. These result are contract with the study of cheng et al.(2020) and Barber and Odean (2008) who argued that Retail investors attention has an instant and favorable influence on stock liquidity, but the effect is not long-lasting. The favorable impact progressively fades and, finally, reverses. Attention induced net-buys by individual investors are mostly responsible for the observed short term increase in stock liquidity. Taking advantage of retail investors' varying attention to equities, professional traders with greater knowledge appear to trade against ordinary investors.

In the 3rd and 4th columns of table 3, this relation is investigated in detail by providing a robust analysis where firms are divided into high and low attention firms. The coefficient value of private information in high attentive firms shows a negative association with COE. This result indicates that high investor attentive firms experience low information asymmetry costs and uncertainty compared to low attentive firms (Aoudi et al., 2017). These results support the Merton (1987) theoretical justification as the firms that can capture the investor attention can increase the liquidity and lower COE. While the positive effect in less attentive firms exhibits that lack of recognition often has a higher cost of capital (Kempf et al., 2017).

Furthermore, in the 5th column of table 4.12, the negative association between information transparency and COE shows that more attention from the investor side increases their understanding of financial information, which speed up the adjustment in stock prices and make the prices more informative, as a result, reduce the COE arisen through information asymmetry. Similarly, in the 6th and 7h columns of Table 4.12, information transparency shows a significant and negative association with COE in high investor attentive firms while insignificant in low attentive firms. This depicts that greater discussion with more investor attention may also be related to improved processing of accounting information which reduces the risk of less transparent information on COE.

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Estimation Results of Information Risk, Investor Attention, and COE

Table 4.12: Information Risk, Investor Attention, and COE

	Panel A: Private Information			Panel B: Information Transparency		
Variable	**COE**	**High Attentive firms**	**Low Attentive firms**	**COE**	**High Attentive firms**	**Low Attentive firms**
Constant	-0.7635**	-0.9837**	1.1156	-0.1150	1.1213	1.9853*
	(0.3648)	(0.4176)	(1.2733)	(0.3377)	(0.7595)	(1.1191)
COE_{t-1}	0.1604**	0.0612***	0.0444***	0.1465**	0.0109***	-0.011***
	(0.0668)	(0.0189)	(0.4125)	(0.0686)	(0.0369)	(0.0304)
PVT Info	0.2498**	-0.305***	0.2723***			
	(0.1266)	(0.0577)	(0.0796)			
PVT Info*Attent	-0.0386*					
	(0.0022)					
Transparency				-0.7663*	-0.657***	-0.1121*
				(0.4178)	(0.1700)	(0.0653)
Trans* Attention				-0.046***		
				(0.0069)		
Attention	-0.0278	-0.001***	-0.009***	-0.015***	0.0102***	-0.008***
	(0.0023)	(0.0008)	(0.0031)	(0.0030)	(0.0012)	(0.0021)
Beta	-0.0451	-0.0036	0.0819	-0.0322	0.3639***	-0.1742
	(0.0337)	(0.0847)	(0.0905)	(0.0284)	(0.5216)	(0.0624)
ROA	-0.591***	-1.724***	-0.4674	-0.764*	0.5699	-0.8962
	(0.5094)	(0.5998)	(0.6060)	(0.4518)	(0.9795)	(0.5797)
Size	0.0574***	0.0961***	-0.0358	0.0406***	-0.104***	-0.0563
	(0.0193)	(0.0239)	(0.0692)	(0.0170)	(0.0359)	(0.6519)
Leverage	-0.0051	-0.2336**	0.3113	-0.1134	-0.7817	0.4387
	(0.1626)	(0.5437)	(0.4119)	(0.2115)	(0.6304)	(0.4387)
Tobin Q	-0.0096	0.1266**	-0.1024	-0.0132	0.1706*	0.0877
	(0.0148)	(0.0495)	(0.0674)	(0.0199)	(0.0943)	(0.0877)
AR 1	0.000	0.104	0.032	0.000	0.028	0.041
AR 2	0.161	0.857	0.654	0.863	0.254	0.737
Sargen/Hansen	0.147/0.65	0.981/0.957	0.892/0.986	0.373/0.317	0.334/0.656	0.815/0.998
No.of Instruments	249	67	56	249	65	57
No. of Groups	370	185	185	370	185	185

–Note: Table 4.12 depicts the results relevant to the Two-Step GMM approach for evaluating the effects of information risk on corporate investment based on the moderating role of investor attention, Where the cost of equity is the return of the stock above the risk-free rate in the year t; IR is the information risk included TRANS, earnings transparency consists of industry element TRANSI and portfolio (industry neutral) element TRANSIN, TRANSI (TRANSIN) is calculated by taking the adjusted R square from the yearly regression of returns on earning divided by the lagged share price $\frac{\Delta E_{i,j,t}}{P_{i,j,t-1}}$ and the changed in earning divided by the lagged share price $\frac{\Delta E_{i,j,t}}{P_{i,j,t-1}}$ by the industry as well as the portfolio, PI measured by one minus R square, Investor attention is proxied by Google search volume of stock tickers, stock beta (BETA), SIZE (firm size) is measured by taking the natural log of firm‘s total assets, Lev is calculated as total long-term debt deflated by total assets, ROA is measured by dividing the net income by total assets, BM is measured by the book value of equity to the market value of equity, Results are obtained by separating the sample firms into high and low attention firms as well as on full sample Panel A illustrate the findings pertained to the effect of private information and its interaction with attention on COE, Panel B demonstrates the results linked to the impact of information transparency and its interaction with attention on COE, 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 term in level regression, Sargan / Hansen test overvalue is insignificant, indicates the reliability of the instrument, and is not excessively identified, Ultimately, the GMM is properly defined without any validation issue and this is revealed by the outcomes of Sargan/Hansen, AR (1) and AR (2), To determine the existence of nonlinear relationship while developing the dynamic panel model, Ramsey Test is used, The lack of significance of the Ramsey test confirm the linearity of model without any issue of model specification, omitted variable and results are reliable, Furthermore, ignoring the cross-sectional correlation in the estimation of dynamic panel model will lead to extremely biased results, inference will be invalid, To measure whether or not the

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residuals from the dynamic regression model's fixed effect estimate are partially independent, the null hypothesis stated that there are no cross sectional association residuals among the residuals, Pearson test is used to check the dependence of cross-sectionals, and the test's insignificance value confirms the cross sectional independence of residuals in the estimation of fixed effect, Standard errors are represented in parenthesis and significance level at 1%, 5% and 10% have shown in terms of –***‖, –**‖ and –*‖ respectively‖.

4.14. Information Quality, Attention, and COE

Table 4.13 shows the effect of information quality on COE by considering the role of Investor attention. Column (2) of Table 4.13 shows the GMM regression results of how the investor attention affect the sensitivity of less information quality and COE of firms listed on PSX. The lagged value of COE was introduced as an explanatory variable in all the models, and it is statistically significant, showing the dynamic nature of the model. (Arellano & Bond, 1991). This illustrates the mean inversion behavior of COE where the previous COE impacts the current value COE.

First, in column 2 of Table 4.13, this relationship is determined by taking the full sample where the coefficient value of information quality interaction with investor attention shows the negative association with COE. The results are consistent with the finding of (hope, 2003), which indicates that when investor faces a poor firm information environment, they increase their accounting information acquisition and processing effort, making them more informed and reducing the information asymmetry and COE.

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However, this relationship is confirmed by segregating the whole sample into highly attentive and low attentive firms. The results in the 3rd and 4th columns of Table 4.13 imply that the coefficient value of private information in high attentive firms is negative and significant while positive in low attentive firms. The result indicates that highly attentive firms experience less COE because less quality and inferior information environment trigger the investors to expand their analysis to addition non-accounting and private data instead of the accounting information, which makes them more informed and reduces the uncertainty arises less quality information.

Estimation Results of Information Risk, Investor Attention, and Cost of Equity

Table 4.13: Information Risk, Investor Attention, and Cost of Equity

	Information Quality		
Variables	**Whole sample**	**High Attentive**	**Low Attentive**
Constant	2.0852	2.9656**	3.8828
	(0.0271)	(0.2029)	(1.2072)
COE_{t-1}	-0.0628 ***	-0.2305***	-0.2157 ***
	(0.0008)	(0.0016)	(0.0148)
Qualityt-1	0.0274	-0.0119***	0.0317
	(0.0013)	(0.0000)	(0.0041)
Quality *Attention	-0.0356		
	(0.0032)		
STDEV	0.02730***	0.0060***	-0.0135***
	(0.0027)	(0.0011)	(0.0094)
Beta	0.0991***	0.2659***	-0.2365***
	(0.0030)	(0.02857)	(0.1616)
ROA	-0.5997***	0.6043**	1.0286
	(0.0063)	(0.2228)	(0.7173)
Size	-0.1659***	-0.1564**	-0.2034***
	(0.0019)	(0.0113)	(0.0675)
Leverage	0.08621***	-0.5932**	-0.5607***
	(0.0281)	(0.2077)	(2.3915)
Book to Market	0.0319	0.6631**	0.5448**
	(0.0009)	(0.0443)	(0.2544)
Tobin-Q	0.0037***	-0.0046	-0.1065***
	(0.0005)	(0.0074)	(0.0257)
AR1	0.002	0.011	0.006
AR2	0.602	0.249	0.716
Sargan/Hansan Test	0.038	0.615	0.681
No. of Instruments	149	51	75
No. of Groups	370	185	185

Notes: –Where the cost of equity is the return of the stock over risk-free rate in the year t; IR is the information risk included AQ: accruals quality is based on the of SD of residuals calculated from the regression of the model (5); Results are obtained by separating the sample firms into high and low attention firms as well as on full sample. Panel C illustrates the findings pertained to the effect of information quality and its interaction with attention on COE. 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 term in level regression. Sargan / Hansen test overvalue is insignificant, indicates the reliability of the instrument, and is not excessively identified. Ultimately, the GMM is properly defined without any validation issue and this is revealed by the outcomes of Sargan/Hansen, AR (1) and AR (2). To determine the existence of nonlinear relationship while developing the dynamic panel model, Ramsey Test is used. The lack of significance of the Ramsey test confirm the linearity of model without any issue of model specification, omitted variable and results are reliable. Furthermore, Furthermore, ignoring the cross-sectional correlation in the estimation of dynamic panel model will lead to extremely biased results, inference will be invalid. To measure whether or not the residuals from the dynamic regression model's fixed effect estimate are partially independent, the null hypothesis stated that there are no cross sectional association residuals among the residuals. Pearson test is used to check the dependence of cross-sectionals, and the test's insignificance value confirms the cross-sectional independence of residuals in the estimation of a fixed effect. Standard errors are represented in parenthesis, and significance level at 1%, 5% and 10% have shown in terms of –***‖, –**‖ and –*‖ respectively‖.

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4.15. Information Risk, Investor Attention and Corporate Investment

Table 4.14 depicts the results related to the effect of information risk on a corporate investment after using the GMM dynamic two-step system estimator to deal with potential endogeneity problems. The dependent variable is capital expenditure as a measure of corporate investment. Three different types of information risk are considered. First, in Panel

A, the association between private information and corporate investment is determined. Second, the role of investor attention in the concerned relationship is checked, and third, the sample is separated into high and low attention sub-sample firms, and then the concerned relation has been estimated.

The lagged value of the corporate investment was introduced as an explanatory variable, and it is statistically significant, showing the dynamic nature of the model. (Arellano & Bond, 1991). This indicates the mean reversion behavior of investment where previous investment influences the current investment decision. The results in the 2nd column of table 4.14 display the positive relationship between corporate investment and Tobin q, and the positivity of investment q sensitivity is dependent on private information. This positive association supports Chen et al. (2007) finding that firms direct their investment decisions using the information gleaned from the stock market.

In the third column, when this interaction of Tobin q and private information interact with investor attention, the increased value of magnitude shows that investor attention also increased the investment q sensitivity. One interesting question about whether private information has a different impact on corporate investment for high attentive and low attentive firms. Columns 4-5 show that private information's estimated coefficient value is positively significant in high attentive firms while significantly negative in low attentive firms. The results support the outcomes of Wei and Mei. (2020) indicates that investor attention decreases information asymmetry, increases investor readiness to invest in stocks, and offers substantial external financial aid by increasing information efficiency. In other words, investors' attention plays a key role in reducing the asymmetry of information, alleviating investment risk, and increases the possibility of corporate investment by improving confidence.

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Similarly, in panel C of Table 4.15, the role of investor attention between the relation of the opaque information environment and COE is determined. Results show that the model is dynamic in nature as the lagged value of the dependent variable is statistically significant at the level of 1%. This shows the mean inversion behavior of investment where previous investment influence the current investment.

The coefficient value of Quality*Attention *Q also shows that information quality is associated with investment Q sensitivity in a favorable and substantial manner. This relationship is also confirmed in columns 7-8, where the coefficient value of information quality in a highly attentive firm is greater than in those of low attentive firms. The results indicate that investor attention reduces manipulating earning effect by improving the level of

firm effort to reveal information through the market pressure hypothesis. This also restricts management earning announcement timing behavior by controlling the manager's self-interest and promoting innovative investment for sustainable and balanced business growth (Ali & Gurun, 2006; Wei & Mei, 2020).

Likewise, in panel B, the coefficient of Trans *attention*Q is positive and statistically significant, inferring that greater discussion with more investor attention may also be related to improved processing of accounting information. This makes the investor more informed and confident by reducing information asymmetry and uncertainty that arises through less transparent information. As a result, an investor is more eager to invest in the company stock, increasing the possibility of investment. This relationship is also confirmed by columns 11 and 12, where the firms with high investor attention experienced more investment than low investor attention firms.

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Table 4.14: Information Risk, Attention and Corporate Investment

	Panel A: Private Info				Panel B: Transparent Info				Panel C: Quality Info			
Variables	**PVT INFO and Invest (1)**	**PVT Info and Atten (2)**	**High attentive (3)**	**Low attentive (4)**	**Trans with Invest (5)**	**Trans and Atten with Invest (6)**	**High attentive (7)**	**Low attentive (8)**	**Quality and Investments (9)**	**Quality and Atten with Invest (10)**	**High attentive (11)**	**Low attentive (12)**
Constant	-4.6933	-6.7844	1.6470	0.2788	-3.3968	-5.2655	-1.4082	-0.2826***	-5.1047	-5.8621	-0.8863***	0.1125
	(.3656)	(0.6181)	(0.1043)	(0.0232)	(0.0199)	(0.0167)	(0.0396)	(0.012)	(4.9469)	(4.1248)	(0.0214)	(0.1559)
Invest(t-1)	-0.8694	3.0715	0.6616	0.1253	-0.7961	0.0157*	1.8319	1.0679***	0.9435	0.9338	0.6961***	-0.9317***
	(0.0392)	(0.1635)	(0.1465)	(0.0661)	(0.0149)	(0.0115)	(0.2335)	(0.067)	(1.1086)	(1.3072)	(0.0222)	(0.1410)
PVT Info	-0.0806*	-1.1930	0.0460*	-0.1670								
	(0.0178)	(0.0141)	(0.0125)	(0.0104)								
PVT Info *Q	0.0218*		0.04359***	-0.01592								
	(0.0029)		(0.0063)	(0.0296)								
PVT INFO* Atten*Q		0.0801**										
		(0.0003)										
Trans					0.2677	0.1985***	0.1871**	0.1509***				
					(0.0050)	(0.0053)	(0.0056)	(0.011)				
Trans *Q					0.1922		0.3453***	0.2728***				
					(0.0008)		(0.0092)	(0.040)				
Trans *Atten*Q						0.2865***						
						(0.00038)						
Quality									-0.1195	-0.0961***	0.0425***	-0.00455*
									(0.0430)	(0.0386)	(0.0038)	(0.0025)
Quality *Q									0.5747	0.0157***	0.0814***	0.0067**
									(0.0958)	(0.0017)	(0.0001)	(0.0067)
Quality *atten*Q										0.354**		
										(0.0041)		
STDEV		-0.0113*	0.0037**	0.0011**		0.0262*	-0.0055**	0.0030***		0.0318***	0.0384***	-0.00056
		(0.0010)	(0.0002)	(0.0002)		(0.0000)	(0.0003)	(0.000)		(0.0015)	(0.0003)	(0.0003)
Size	0.2860	0.5409	-0.0580*	-0.0093**	0.2323	0.2373	0.1108***	0.0073***	0.3132	0.3637	0.04138***	-0.0046
	(0.0225)	(0.0411)	(0.0039)	(0.0021)	(0.0011)	(0.0009)	(0.0031)	(0.006)	(0.2841)	(0.2335)	(0.0009)	(0.0087)
CF	0.0572*	0.0981*	-0.0016**	0.0005***	0.0844*	0.0845*	-0.02887***	0.0002***	-0.1138	-0.1891	0.0022	-0.00054**
	(0.0007)	(0.0000)	(0.0001)	(0.0000)	(0.06)	(0.0000)	(0.0000)	(0.000)	(0.0408)	(0.0473)	(0.00900	(0.0001)
Tobin-Q	-0.0167*	-0.9242	-0.1480	0.0618*	-0.3457	-0.1314	-0.0331***	0.0777***	-0.1779	-0.1533	0.06105***	0.0234**
	(0.0032)	(0.0145)	(0.0117)	(0.0064)	(0.0007)	(0.0014)	(0.0052)	(0.0048)	(0.0909)	(0.0827)	(0.0016)	(0.0086)
AR1	0.286	0.079	0.047	0.088	0.245	0.21	0.032	0.028	0.000	0.046	0.045	0.023
AR2	0.177	0.188	0.158	0.245	0.194	0.927	0.184	0.79	0.07	0.346	0.209	0.71
Sargan/Hansan Test	0.974	0.171	0.111	0.889	0.48	0.181	0.207	0.853	0.445	0.325	0.296	0.985
No. of Instruments	73	52	58	50	72	72	35	60	17	17	62	51
No. of Groups	122	105	59	66	123	106	60	66	123	106	34	23

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4.16. Robust Analysis

4.16.1. PVT Info, Attention, and Liquidity

To checking the robustness of outcomes, various estimation methods have been applied. First, it is determined how the investor attention increases the stock liquidity by reducing the information asymmetry. Second, the effect of investor attention in reducing the stock price crash arises through less quality and transparent information.

Table 4.15 shows the impact of private information on stock liquidity after applying the two-step system GMM to confront potential endogeneity. The lag value of the liquidity is significant, showing the dynamic nature of the model. (Arellano & Bond, 1991). This indicates the mean reversion behavior of liquidity where the previous value of liquidity affects the current liquidity value. This dynamic model reveals that an increase in stock liquidity decreases information asymmetry and reduces the transaction cost, increasing stock liquidity (Hassani, 2014).

In the second column of Table 4.15, the coefficient value of private information (β=0.0545, $p<1\%$) shows that private information increases the stock illiquidity because greater information asymmetry escalates the risk of adverse selection for market participants, which makes the trading costly and as a result decrease the liquidity.

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Moreover, when the private information interacts with stock liquidity as shown by the coefficient value of PVT Info* Attention (β=0.04872, $p<10\%$) in the third column of Table 4.15, it displays the negative association with stock illiquidity. These results suggested that when investors capacity to comprehend particular business information varies, a Google search volume of stocks with poor information environments can lead to more-informed investors, lessening information asymmetry in financial markets (Diamond & Verrecchia, 1991; Kim & Verrecchia, 1994; Aouadi et al., 2017). Thus, this confirms our results that investor attention decreases the risk of private information by increasing the stock liquidity.

Table-4.15: PVT Information, Attention, and Liquidity

Variables	PVT Info with Liquidity	PVT Info with Attentions and Liquidity
Constant	0.1099*** (0.0081)	0.1363 (0.0011)
Liquidity(t-1)	0.7923*** (0.0166)	0.5951*** (0.0287)
PVT Info	0.0545*** (0.0015)	-0.0465** (0.0006)
PVT Info*Attention		-0.04872* (0.0000)
Crash	0.0553***	0.08169***

	(0.0045)	(0.0019)
Attention		0.08592*** (0.0000)
Size	-0.0180 (0.0001)	-0.0732*** (0.0084)
AR1	0.04	0.045
AR2	0.122	0.156
Sargan Test	0.966	0.966
Hansan Test	0.365	0.412
No. of Instruments	143	134
No. of Groups	370	370

“ Note: Table 4.15 depicts the results related to the two-step system GMM to examine the impact of private information on stock liquidity. Column 2 shows the effect of private information, and it interacted with investor attention on stock liquidity. Ultimately, the GMM is properly defined without any validation issue, and this is revealed by the outcomes of Sargan/Hansen, AR (1) and AR (2). To determine the existence of a nonlinear relationship while developing the dynamic panel model, Ramsey Test is used. The lack of significance of the Ramsey test confirms the linearity of a model without any issue of model specification, omitted variable and results are reliable.Furthermore, ignoring the cross-sectional correlation in the estimation of dynamic panel model will lead to highly biased results, inference will be invalid. To measure whether or not the residuals from the dynamic regression model's fixed effect estimate are partially independent, the null hypothesis stated that there are no cross-sectional association residuals among the residuals. The Pearson test is used to check the dependence of cross-sectionals, and the test's insignificance value confirms the cross-sectional independence of residuals in estimating a fixed effect. Standard errors are represented in parenthesis, and significance levels at 1%, 5%, and 10% have shown in terms of –***‖, –**‖ and –*‖ respectively‖.

4.16.2. Quality/Transparency, Attentions, and Crash Risk (CR)

Table 4.16 shows the results associated with the effect of investor attention in curtailing the risk of share price crash arising through less quality and transparent information, which causes to increase in the COE. These results are estimated after applying the two-step system GMM to deal with the potential issue of endogeneity. The lag value of the liquidity is significant, showing the dynamic nature of the model. (Arellano & Bond, 1991). This indicates the mean reversion behavior of crash risk where the previous value of liquidity affects the current value of crash risk. This dynamic model reveals that an increase in the risk of share price crash induces the manager to present less quality and transparent information to hide the negative news, which escalates the future risk of share price crash (Zhang & Nam, 2016).

In the 2nd column of Table 4.16, the coefficient value of information quality(β=0.0253, p<10%) shows the positive association with crash risk, which implies that less quality and precision of information increase the crash risk, but in the third column, the interaction term of quality and attention shows the negative relation with crash risk showing that when the firm attracts more individual investor attention, then individual investors gets more information about the firm that makes it difficult for the manager to withhold the news from shareholders through manipulation (Gao et al., 2018). Similarly, in the fourth column, the coefficient value of information transparency exhibits the inverse relation with crash risk.

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This shows that information transparency decreases crash risk. However, in the fifth column, the increased negative coefficient value of interaction term Trans*Attent shows that investor attention along with transparent information not only improves the investor ability to understand the financial information but also make it costly for the manager to hide the news from the public by monitoring the action of the manager

Table 4.16: Quality/Transparency, Attentions and Crash Risk (CR)

Variables	Quality * Crash	Quality * Atten	Trans*Crash	Trans*Atten
Constant	-1.8648 (0.2504)	-0.6907 (0.0684)	-0.6911 (0.0111)	-0.8358 ** (0.0392)
NSKEW(t-1)	0.3044 (0.0734)	0.1531 (.0183)	0.0112 (0.0179)	0.0404 (0.0158)
Trans			-0.1068** (0.0167)	-0.199 * (0.0182)
Trans*Atten				-0.3300** (0.0004)
Quality	0.0253 ** (0.0001)	0.0891 * (0.0012)		
Quality* Atten		-0.091** (0.0023)		
Atten		-0.065 (0.0008)		-0.031** (0.0003)
Beta	0.1491*** (0.0098)	0.1224*** (0.0148)	0.1946*** (0.0251)	0.1132*** (0.0419)
ROA	-0.1369 *** (0.1409)	-0.7010 (0.0326)	-0.2317 (0.2427)	-0.1338*** (0.2018)
Size	-0.0206 (0.0031)	-0.0258 (0.0029)	-0.0222 (0.0004)	-0.0186 (0.0012)
CF			0.00096*** (0.0009)	0.0009*** (0.0001)
Leverage	1.2405 (0.3565)	-0.0907 (0.0478)	0.1855 (0.1593)	0.3017* (0.1656)
Book to Market	0.0157 (0.0037)	0.0197*** (0.0044)	-0.0750 (0.0548)	0.00425 (0.0092)
Tobin-Q	0.0102 (0.0034)	-0.0047 (0.0033)	0.0019 (0.0036)	0.00494 (0.0033)
Liquidity	0.2182*** (0.1345)	0.1641*** (0.1417)	-0.7264** (0.2378)	-0.5442*** (0.315)
AR1	0.00	0.000	0.000	0.000
AR2	0.126	0.352	0.237	0.438
Hansan Test/Sargan Test	0.000	0.118	0.005	0.038
No. of Instruments	234	214	243	224
No. of Groups	370	370	370	370

-Note: Table 4.16 depicts the results related to the two-step system generalized method of moments to examine the impact of information quality and transparency on stock price crash risk. Column 1 shows the effect of information quality on crash risk and column 2 exhibits the information quality and it's interacted with investor attention on crash risk. Similarly, column 3 illustrates the effect of information transparency on crash risk and column 4 shows the effect of information transparency and its interaction with attention on crash risk. Ultimately, the GMM is properly defined without any validation issue and this is revealed by the outcomes of Sargan/Hansen, AR (1) and AR (2). To determine the existence of nonlinear relationship while developing the dynamic panel model, Ramsey Test is used. The lack of significance of the Ramsey test confirm the linearity of model without any issue of model specification, omitted variable and results are reliable. Furthermore, Furthermore, ignoring the cross-

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sectional correlation in the estimation of dynamic panel model will lead to extremely biased results, inference will be invalid. To measure whether or not the residuals from the dynamic regression model's fixed effect estimate are partially independent, the null hypothesis stated that there are no cross sectional association residuals among the residuals. Pearson test is used to check the dependence of cross-sectionals, and the test's insignificance value confirms the cross sectional independence of residuals in the estimation of fixed effect. Standard errors are represented in parenthesis and significance level at 1%, 5% and 10% have shown in terms of –***‖, –**‖ and –*‖ respectively‖.

4.17. Hypothesis Summary

Table-4.17: Summary of Relationship Tested through Hypothesis17

Hypothesis	Description	Expected Sign	Empirical Findings	Status
H_{1a}	Private Information is positively affects the COE	**Positive**	**Positive**	**Supported**
H_{1b}	Information Quality is negatively affects the COE	**Positive**	**Positive**	**Supported**
H_{1c}	Information Transparency is negatively affects the COE	**Negative**	**Negative**	**Supported**
H_{2a}	Stock price crash risk mediates the relationship between private information and COE.	**Positive**	**Positive**	**Supported**
H_{2b}	Stock price crash risk mediates the relationship between lack of information quality and COE.	**Positive**	**Positive**	**Supported**
H_{2c}	Stock price crash risk mediates the relationship between lack of Information transparency and COE.	**Negative**	**Negative**	**Supported**
H_{3a}	Investment Adjustment moderates the relationship between private information and COE	**Positive**	**Positive**	**Supported**
H_{3b}	Investment Adjustment moderates the relationship between private information and Corporate Investment.	**Positive**	**Positive**	**Supported**
H_{4a}	Firm competitive position positively moderates the relation between lacks of information quality on COE.	**Negative**	**Negative**	**Supported**
H_{4b}	Firm competitive position positively moderates the relation between lacks of information quality on Corporate Investment.	**Positive**	**Positive**	**Supported**
H_{5a}	Firm competitive position positively moderates the relation between lacks of information transparency on COE.	**Positive**	**Positive**	**Supported**
H_{5b}	Firm competitive position positively moderates the relation between lacks of information transparency on Corporate Investment.	**Positive**	**Positive**	**Supported**
H_{6a}	The impact of private Information on COE is more pronounced in low investor attentive firms as compared to high investor attentive firms.	**Negative**	**Negative**	**Supported**
H_{6b}	The impact of lack of information quality on COE is more pronounced in low investor attentive firms as compared to high investor attentive firms.	**Negative**	**Negative**	**Supported**
H_{7a}	Compared to less attentive firms, high investor attentive firms exhibit greater investment Q sensitivity in response of private information.	**Positive**	**Positive**	**Supported**
H_{7b}	Compared to less attentive firms, high investor attentive firms exhibit greater investment Q sensitivity in response of information quality.	**Positive**	**Positive**	**Supported**
H_{7c}	Compared to less attentive firms, high investor attentive firms exhibit greater investment Q sensitivity in response of information Transparency.	**Positive**	**Positive**	**Supported**

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CHAPTER-05

CONCLUSION

The focus of this section is to present the findings of this research. Specifically, in answering the questions and objectives posed in the introduction section about the information risk and its influence on equity costs by considering the effect of different moderators and a mediator. The summary and conclusion about key findings are presented in Section 5.2, followed by practical implications in Section 5.3 before concluding the remarks about limitations of the study and future research directions.

5.1. Summary and Conclusion

This study examines the role of information risk on the cost of equity of firms listed on the Pakistan Stock Exchange. For this purpose, data is collected from all the non-financial firms listed on PSX from 2007 to 2019. From the outlook of the dimensions of information risk, this study combines three types of information risk arising from private, imprecision and less transparent information and checks their effect on cost of equity of firms listed on PSX. Results are estimated by employing the Two-Step System GMM to confront potential endogeneity issues in models.

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Moreover, the first objective of this study is to investigate the effect of information risk on COE. This study corroborates that asymmetric information among investors, less reporting quality and investor interpreting ability are all inversely correlated with COE. First, the result of private information on COE shows that investors charge the premium for bearing the risk of information disadvantage because they cannot shift their portfolio according to the total information exiting in the market. Here, private information means change in firm return due to the firm-specific information not explained by market and industry return. So, when the uninformed investor does not have this information, they charge the premium for bearing this risk.

Moreover, the financial results are also the most significant outputs of the financial system. The main aim of these financial reports is to publicize and disperse the financial information that is useful and valuable for stakeholders in making decisions. It is apparent in the literature that the income figures are the most critical part of these financial reports. Nevertheless, accounting irregularities and misrepresentation are significant issues all over the world and most common in Pakistan. In this study, the effect of less reporting quality on a firm‘s COE is determined. Where accrual quality is used to measure information quality and poor accrual

quality shows the less quality of information available to investors. The result indicates the positive relationship between lower information quality and COE. This shows that firms that indulge in manipulating their earning, their equity costs are high because the manipulated information decreases investors' trust in the basic information of enterprises and ultimately, they demand a high rate of return (llyas et al., 2019).

Likewise, firms engage in earnings manipulation and present their annual report in a complex language for the investor to understand. This difficulty in interpreting the financial information also presents another risk. Investors cannot completely digest the information content and assess the company's investment value correctly, impacting the investment risk. Low ability to interpret information means that investors' ability to understand the firm through financial statements is limited, which would disadvantage decision-making and induce higher investment return expectations, thereby raising equity costs. The study's finding shows that as the annual reports are the primary source of information for investors, these reports are not as transparent to help the investor in making the decision; as a result, they demand higher investment returns.

The second objective of this study is to examine the mediating role of crash risk between the relationship of these three variants of information risk, and the cost of equity has also been determined. The study's findings show that all three types of risk, such as private information, opaque and less transparent information, increase the risk of stock price crash. This increased risk of a crash increases uncertainty, and as a result, investors demand more compensation for bearing this risk. This is because information asymmetry entices the managers to engage in earning management behaviors to mask adverse information until the bad news releases in the market, causing the crash in prices. This high fluctuation in share price creates uncertainty in investors‘ minds, and as a result, they demand high returns for the compensation of increased risk.

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Moreover, this study's third objective is to determine how the investment adjustment plays the moderating role between private information and COE. As shown in the literature, stock prices provide details that can be both retrospective in disclosing the firm's past success and forward-looking in shaping future investment-related decisions. This study investigates the collective effect of private information and investment adjustment on the COE. Using the company's book-to-market equity ratio to measure investment adjustment, this study found that private information has qualitative different effects on growth stocks than value stocks. Growth companies are more susceptible to investment than value companies in reaction to stock market information. The larger impact of investment adjustment on COE wipes out the inverse effect of information risk on COE among growth firms; consequently, while value

firms demand an information risk premium, growth stocks discount it. Similarly, the fourth objective is to determine the moderating role of investment adjustment on the relation of information risk and corporate investment. This study concludes that private information and investment Q sensitivity is significant in growth firm than the value firm.

Furthermore, the fifth objective of this study is to explore the moderating role of firm competitive position between the less information quality and COE. This relationship is checked by using the two proxies of competitive position such as industry adjusted ROA and Market share. Results of both proxies show that competitive position improves the information quality and reduce the COE.

That intense market competition allows comparison between the performance of companies in the same sector comparable, minimizing the disparity of information that exists between management and external users of information through increasing the visibility of the repercussions of managerial decisions. External investors can therefore obtain more details on the working capacity and the management effort. These all escalate the cost of concealment of negative news and persuade the management to decrease the deception of earning to present the false image. The external monitoring by shareholders is also increased in fierce market competition. The peril of dismissal and the credibility mechanism provides the management more incentive to divulge more company-specific information and perform their fiduciary responsibility to gain confidence, which reduces the behavior of stockpiling the bad news and improves the quality of information that ultimately reduces the COE. . These results are incompatible with the proprietary cost and agency cost theory. The sixth objective is to examine the effect of lack of information quality on corporate investment by considering the moderating role of competitive position. This study confirms that companies that perform better communicate their strength by raising the quality of their disclosure. This increase the firm credibility and reduce the agency problem which increase the corporate investment.

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Likewise, the seventh objective is to check the sensitivity of the relationship between information transparency and COE by considering the moderating role of a firm competitive position. The study's finding shows that competitive status makes the information climate more transparent, and companies that are willing to compete are more generous and transparent in their disclosure to ensure their access to key financial resources by giving the signal of their strength of risk management. In addition, companies enhance their credibility and build investor trust in uncertain times by releasing 'rich' and more detailed' disclosures (uncertainty reduction theory). This increased investor trust decreases the expense of the agency cost and allows businesses to access external capital at a lower price that reduces COE and increases investment. The study meets the eight objectives by finding the significant

positive relation between information transparency and corporate investment in highly competitive environment,

Besides, the study's ninth objective is to look at how investor attention influences the relationship between information risk and COE. The major outcome of this study revealed that the investor's attention impact existed in the Pakistani stock market. This study corroborates that investor attention minimizes all three types of information risk, reducing the COE and increasing investment efficiency. The finding of the study shows that Investor attention reduces the information risk in the following ways.

First, searching for information on the internet makes the investor more informed, decreases information asymmetry, and reduces the COE. Second, individual investors increase their acquisition and processing of accounting information and non-accounting data when facing a poor and less precise information environment. This attention also makes it difficult for managers to stockpile bad news from investors by presenting fabricated financial information that decreases the information risk arising through less quality information. Third, greater discussion with investor attention improves the investor's ability to interpret the accounting information, reducing the problem of less transparent information. However, when the problem of asymmetric information is resolved, investors become more confident and willing to invest in company stock and provide the capital for increasing the investment. The tenth objective of the study is also achieved by finding the significant role of investor attention in reducing the information risk and increasing the corporate investment.

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5.2. Practical Implication

Disclosure quality apparently substances to participants of capital-market and has significant pecuniary consequences for firms COE. These verdicts have some important implications for regulators, managers, policymakers and investors who are concerned about the overall quality of financial disclosure as follow:

1. Regulars should solemnly perform its protection function by restricting the management behavior of earning management doggedly and should also give the penalties to companies sacrilegious the requirements.

2. Policymakers should cap the management for accounting policy choice by ensuring the appropriateness and inclusiveness of information disclosure and paying attention to accounting estimates' robustness.

3. As the producer of financial reports, the manager should adopt the impartial approach in amassing and disclosing financial information, thus articulating the real picture of the company truthfully and objectively without subjective prejudice. Moreover, release the pertinent information to investors well-timed and evade intentionally cover the release of bad news.

4. In order to grasp the effectiveness of information dispersal, firms listed on PSX must ensure the investor aptitude and characteristics completely before selecting transmission channels.

5. This study highlights that, although there has been general agreement among standard setters and regulators such as the Pakistan Securities and Exchange Commission (SEC) on understandable disclosure, the issue of annual report readability is still aggravated by various causes. The effect of this disclosure on stakeholders must be emphasized. Regulators must consider writing comprehensible disclosure into laws while enhancing corporate information reporting to create a likely switch between integrity and annual report readability.

6. As financial reporting is a professional document based on professional standards and norms, investors must clutch the required theoretical and analytical skills.

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7. Investors in the capital market can benefit from this online search behavior by incorporating more information into stock prices and, therefore, reducing the trading uncertainty. Therefore, companies should make themselves more visible on the internet search engines by SEO (search engine optimization) to grasp the attention of potential investors.

8. As financial markets increase investment performance because they provide valuable information to managers. While on the other hand, the feedback effect from prices to the real economy can allow price manipulation, which can cause real economy inefficiencies. These results have significant regulatory consequences aimed at improving market transparency and promoting information acquisition.

9. The study's finding is also beneficial for emerging markets, such as Pakistan, which implies that attempts to enhance transparency in disclosure policies may prove fruitful not only in terms of governance but also strategic aspects, such as the competitive position of companies, are factored in. Also, volatility and uncertainty in the macro-economic environment must be addressed before this mandatory risk disclosure policymaking.

10. Online search activity can aid capital market investors by integrating more information into stock pricing and thereby lowering trading uncertainty.

11. Finally, financial regulators should place a greater emphasis on internet regulations. Particularly with regard to the media, to make the stock market environment more transparent.

5.3. Limitations of the Study

Despite a significant contribution to the current body of knowledge, the study has established a range of shortcomings that could be extended to future studies. Data limitation is the primary issue, as it focuses on Pakistan and is an emerging market. Data for the specific variable of each firm is difficult to obtain in different periods. As a result, companies with missing values are excluded from the sample data, and the sample size can be expanded with an improvement in time frames.

The availability of financial data and managerial control are the two most important drivers. The research focuses on financial controllable factors that may be retrieved from the financial accounts of the firm. Variables that are incomputable or uncontrolled are introduced as short-term variables and hence eliminated from the investigation. It also implies that financial facts are reviewed from the investor's perspective, despite the lack of internal information.

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Furthermore, despite the enormous data collection, the study does not include relevant factors that have been proposed in earlier studies, such as investor protection, legal rules and managerial behavior. The analysis would be more comprehensive if these variables could be integrated. The reason for not incorporating these factors in the study is the unavailability of data and the lengthy process involved in collecting data.

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