

Investor Sentiment, Corporate Governance and Downside risk

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Abstract

The research examines the effect of investor sentiment on downside total risk with the interplay of corporate governance mechanism. The investor sentiment is measured through six proxies proposed by Baker and Wurgler (2006, 2007). Corporate governance mechanism comprises of board structure, ownership structure and audit quality. Whereas, downside risk is estimated using methodology suggested by Estrada (2002) based on sample of 233 non-financial firms from 2004 to 2014. The analysis is carried for full sample, small size firms and big size firms. Further, the persistency of model is also examined across major industries through static regression estimation. Theoretically, findings mainly support noise trader theory. Consistent with previous studies, results show the positive effect of investor sentiment on downside total risk. Moreover, as per the agency theory, results reveal that corporate governance weakens the relationship between investor sentiment and risk.

Keywords: Investor Sentiment, Corporate Governance and Downside risk

Introduction

The last few decades evident substantial advancements to understand the pricing of the securities. Traditionally, the pricing of securities is attributed mainly to the fundamental factors. However, the recent empirical studies consider the behavioral aspect as legitimate approach in explaining the mispricing of securities (Kyle, 1985). The rational investor postulates that the effect of noise traders on stock prices is short lived in competitive markets (Fama, 1965; Friedman, 1953) due to the existence of symmetric information which contributes toward the readjustment of securities to their true values.

However, the catastrophic financial scandals such as the internet bubble in 2000 and the real estate bubble crash in 2007 and 2008 have ascertained the disastrous consequences of noise trader theory on asset valuation (Finter, Niessen-Ruenzi, & Ruenzi, 2012). The failure of fundamental valuation models in explaining such extreme anomalies established a solid foundation for the development of behavioural based valuation models (Sayim & Rahman, 2015). The behavioural valuation models of De Long, Shleifer, Summers, and Waldmann (1990), Campbell and Kyle (1993), Kogan, Ross, Wang, and

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Westerfield (2006), and Baker and Wurgler (2006, 2007) established relationship of irrational trading with securities' mispricing.

The previous literature provided mixed evidence of irrational investor behavior and stock returns. For instance, Lee, Shleifer, and Thaler (1991), Swaminathan (1996), Neal and Wheatley (1998), Rehman and Shahzad (2016) found a casual effect of investor sentiment on stock returns. Similarly, Hussain and Amir (2017) argued that investor sentiment increase the investors' exposure toward risk. However, Guner and Guner (2009) argued that investor sentiment has insignificant influence on the returns of large firms. On the Contrary, inconsistent with notion of noise trader theory, Brown and Cliff (2004) observed insignificant effect of investor sentiment on small stock returns.

Moreover, the recent empirical studies argued that the existence of weak corporate governance reduces the investors' confidence over the equity market and creates financial panic (Akbar, Poletti-Hughes, El-Faitouri, & Shah, 2016; Kun Liew, 2015). This situation triggers the investor sentiment, which has disastrous effect over capital markets' performance (Singh & Zammit, 2006). Cooper and Bosworth (1998) argued that weak corporate governance and lack of transparency led to inefficient spending and fragile financial system. However, Stiglitz (1999) challenged the assumption that occurrence of financial crisis is due to the failure of corporate governance mechanism. The study argued that corporate governance compliance is unnecessary, because the market provide optimal compensation for the disclosure. In addition, Furman, Stiglitz, Bosworth, and Radelet (1998) argued that countries with good corporate governance and transparency have faced financial crises. In the similar vein, Singh, Singh, and Weisse (2003) also challenged the notion that poor corporate governance led to financial crisis.

The current study contributes to the existing literature in several ways. Firstly, the previous literature estimated risk through various proxies. For instance, Wang, Lin, Fung, and Chen (2015) measured the risk through value at risk (VAR). However, Artzner, Delbaen, Eber, and Heath (1997) highly criticized VAR, as it measures the percentile profit-loss distribution. On other hand, Christy, Matolcsy, Wright, and Wyatt (2013) and Ur Rehman (2013) used standard deviation to measure the risk. However, empirical studies such as Hogan and Warren (1974), Harlow and Rao (1989), Estrada (2002) argued that risk estimation based on semi-variance hypothesis is more suitable than risk measures based mean variance behaviour hypothesis (MVB), because investors are more concerned towards downside risk. Hussain and Shah (2017) addressed the aforementioned concerns and estimated systematic risk using downside capital asset pricing model (DCAPM) following the methodology of Estrada (2002). Nevertheless, Guay (1999b) argued that total risk is more preferable to analyze market reaction in term of equity compensation for managerial risk-taking. Hence, the research estimated risk through semi-standard deviation based on semi-variance hypothesis in order to capture left tail moments as well as to cater the market response in terms of equity compensation.

Secondly, the emerging markets have long standing history of extreme volatility as compared to developed capital markets (Bekaert & Harvey, 2003). The investors' behaviour is noticeably irrational as compared to market participants' behaviour in developed markets (Frugier, 2016). Maitra and Dash (2017) asserted that investor sentiment has greater adverse effect over the small size firms vis-a-vis large size firms. Mian and Sankaraguruswamy (2012) also argued that investor sentiment varies among the large and small sized firms. Likewise, Fernandes, Gama, and Vieira (2016) and Baker and Wurgler (2006; 07) supported the claim that small firms are more susceptible to investor

sentiment as compared to their counterparts. Edwards, Biscarri, and De Gracia (2003) argued that understanding volatility in emerging economies is critical for asset allocation. Therefore, we investigated the effect of investor sentiment for full sample as well as sub samples (Large firms and small firms). Further, persistency of investor sentiment across major industries of Pakistan Stock Exchange is also analyzed.

Thirdly, the compliance of strong corporate governance mechanism is expected to minimize the conflict of interest between shareholders and managers (La Porta et al., 2000). The reduction in agency problem not only increases investor confidence in capital market but also curtails their irrational behaviour. However, poor corporate governance shatters the investor confidence that trickles financial turmoil in capital market (Cooper & Bosworth, 1998). Further, Detthamrong, Chancharat, and Vithessonthi (2017) argued that behaviour of corporate governance varies across firm's characteristics. Ullah and Kamal (2017) argued that policy makers should consider the size of the firm while formulating the corporate governance framework. Thus, we explored the moderating role of corporate governance mechanism between investor sentiment and firm risk among large firms, small size firms, full sample and across major industries. In addition, we have scrutinized the interplay of corporate governance mechanism across industries.

We found positive effect of investor sentiment on downside risk in full sample as well as sub samples. Consistent with notion, as Maitra and Dash (2017), Wu, Hao, and Lu (2017), Rehman and Shahzad (2016), Brown and Cliff (2004) argued that investors' irrational behaviour shaped stock market volatility. Further, we found that corporate governance weakens the relationship between investor sentiment and risk in case of full sample and small firms. Similarly, the presence of corporate governance curtails the irrational behaviour of market participants to minimize financial panic among investors (La Porta et al., 2000; Kun Liew, 2015). Thirdly, we found that the effect of investor sentiment and corporate governance varies across industries. Consistent with claim, that the effect of investor sentiment and corporate governance varies across various firm-level characteristics (Ullah and Kamal, 2017; Baker and Wurgler (2006; 2007; 2012).

2. Literature Review

The noise traders contribute towards the volatility of stock market. Noise trader theory suggests that traders act upon noisy signals which creates investor sentiments (De Long et al. 1990). In such a situation, the stock prices diverge from its fundamental value (Bahloul & Bouri, 2016). However, Fama (1965) and Graham and Harvey (1996) conducted studies in early days of sentiment birth, have contradictory views. They are of the opinion that noise traders have no substantive standing in capital market, specifically in the process of stock prices formation. Because the divergence of equity prices from their intrinsic values is brought back by the sophisticated arbitragers.

Contrary, De Long et al. (1990) argued that rational investor deters themselves from taking long/short position due to systematic risk induced by the noise traders. If the rational investors do so, they would bear huge losses in short term. Therefore, the rational market participants fail to completely eliminate the mispricing of financial assets in equilibrium. The previous studies such as Baker and Wurgler (2006, 2007); Ryu, Kim, and Yang (2017), Baker, Wurgler, and Yuan (2012), Brown and Cliff (2004), Ahmed, Ali, and Mahmood (2012), Ur Rehman (2013), Lee et al. (1991) ascertained the casual effect of investor sentiment on capital market behaviour.

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Moreover, the presence of corporate governance mechanism is expected to resolve the aforementioned issue in light of agency theory i.e. reducing the agency problem by making the top management accountable for their actions (La Porta et al., 2000). The previous studies suggest that strong governance mechanism increases investors' confidence over the equity market and curtails the volatility in investor sentiment. Similarly, corporate governance mechanism discourse the problem of moral hazard which enables the firm to achieve stabilization in its share prices. Whereas, emerging economies are destined with lack of good corporate governance practices that results in unpredictable behaviour in the capital markets. Consequently, several empirical studies such as Wang (2015), Alam and Ali Shah (2013), Christy et al. (2013) ascertained the relationship between corporate governance and agency risk.

2.1 The Measurement of Risk

The emergence of modern portfolio theory and capital asset pricing model provided a strong foundation for the risk measurement and portfolio diversification (Tsai, Chen, & Yang, 2014). However, the literature suggest conflicting views over the measurement of risk. Markowitz (1952) and Sharpe (1964) argued that risk measurements based on mean variance behaviour hypothesis (MVB) are more preferable to estimate the required rate of return. However, Hogan and Warren (1974), Harlow and Rao (1989), Estrada (2002), and Rashid and Hamid (2015) argued that investors are more concerned with downside risk. Hence, downside risk measurements based on semi-variance behaviour (SVB) are more suitable to accurately price investors' exposure towards risk.

2.2 The investor Sentiment and Risk

The investor sentiment is a set of emotions, feelings or attitude of investors towards the risk and return associated with their investment. Hence, positive perception (negative perception) contribute toward the overvaluation (undervaluation) of the securities (Harper, Iyer, & Nejadmalayeri, 2017). Baker and Wurgler (2006; 2007) investigated the effect of investor sentiment on stock returns. The results showed significant effect of investor sentiment on stock returns.

Further, Maitra and Dash (2017) examined the effect of investor sentiment on stock market volatility. The research revealed that the sentiment has significant effect over the market volatility. In addition, the results revealed that investor sentiment has greater adverse effect over the small firms as compared to large size firms. Similarly, Mian and Sankaraguruswamy (2012) argued that investor sentiment varies across firm size. Baker and Wurgler (2006) complemented that fragility of small firms' performance towards investor sentiment. Elton, Gruber, and Busse (1998) ascertained that small firms are more sensitive to investor sentiment. Further, Fernandes et al. (2016) complemented the negative effect of investor sentiment on stock returns. Moreover, various empirical studies in Pakistan investigated the casual effect of investor sentiment on firm risk. For instance, Rehman (2013) found a positive effect of investor sentiment on stock market volatility. Similarly, Hussain and Shah (2018) and Shu and Chang (2015) found positive effect of investor sentiment on risk.

As far the empirical evidences related to the measurement of investor sentiment are concerned, the previous literature has used various proxies for investor sentiment. For instance, Lee et al. (1991) used three proxies such as number of IPO's, closed end mutual funds discount and stock market turnover for the estimation of investor sentiment. Likewise, De Long and Shleifer (1992) studied investor sentiment through closed end mutual funds discount. Similarly, Elton et al. (1998) used closed end mutual funds discount

in order to establish the effect of investor sentiment on portfolio returns. Neal and Wheatley (1998) measured the investor sentiment using closed end mutual funds and purchase of odd lot sales. The study established a significant impact of closed end mutual funds. However, purchase of odd lot sales has no effect over the returns. Baker and Wurgler (2006; 2007) constructed investor sentiment through six proxies such as initial public offering, first day return on IPOs, turnover, dividend premium, close end mutual funds discount and equity share in order to establish the relationship between investor sentiment and stock returns. The proxies proposed by Baker and Wurgler (2006; 2007) have already been used by various empirical studies in Pakistan such as Ahmed et al. (2012), Ur Rehman (2013), Rehman and Shahzad (2016), and Hussain and Shah (2017).

The stock price fluctuations are considered as the primary reason for the financial crises of 1998-1999 and 2007-2008. The price fluctuations directly influence the investment sentiments regarding trading activities. Hence, Scheinkman and Xiong (2003) used share turnover as proxy for investor sentiment. The results indicated positive effect of market turnover on stock returns. Cochrane (2002) demonstrated the significant relationship between the trading volume and the share prices. The results revealed that trading volume has a significant positive impact on investor sentiment.

H1: The investor sentiment is positively associated with downside risk

2.3 The Corporate Governance and Risk

The Jensen and Meckling (1976) explained the agency problem in terms of the misalignment of interests between the principal and agent. The agents compromise the interest of principal to maximize their personal benefits, which create agency problem. In order to resolve the agency problem, the principal must curtail the opportunistic behaviour of agent (Chen, Lu, & Sougiannis, 2012). Contrary to agency theory, the stewardship theory presumed that manager as 'steward' instead of being self-centered (Muth & Donaldson, 1998). It suggests non-financial motives for managerial behaviour such as needs for appreciation, internal satisfaction and recognition and assumes that the conflict of interest may not be the inherent factor given ownership is separated from control (Kiel & Nicholson, 2003).

The previous literature ascertained the negative relationship of corporate governance mechanism with firm downside risk. Wang, Lin, Fung, and Chen (2015) explored the relationship between corporate governance mechanism and firm risk. The study argued that the presence of good corporate governance mechanism reduced the firm downside risk. Further, the study argued that managerial ownership and independent directors minimized the firm downside risk. Hussain and Shah (2017) investigated the effect of corporate governance mechanism on firm downside risk. The study observed that corporate governance mechanism negatively affect the downside risk.

Several policy makers and analysts gave recommendations regarding the board structure, assuming that "One Size Fits All" irrespective of the economic characteristics of market. The previous literature asserted that firms with smaller board size are more effective than the firms with large board's size (Jensen, 1993), which increased the firm value (Yermack, 1996). Similarly, Lipton and Lorsch (1992) argued that firm with small board size has efficient monitoring mechanism due to unified decisions. Shleifer and Vishny (1997) established a negative relationship between corporate governance mechanism and agency risk. Christy et al. (2013) also established an inverse relationship between board structure and agency risk.

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Further, the Fama and Jensen (1983) argued that presence of independent directors improves firm performance and reduced agency risk. Several empirical studies ascertained the critical role of independent directors to enhance the firm value (Anderson, Reeb, Upadhyay, & Zhao, 2011; Upadhyay & Zeng, 2014). Khan and Awan (2012) analyzed the relationship between board composition and firm performance in Pakistan. The results revealed that the firms' market value increased as a result of independent board of directors. Similarly, Ibrahim, Rehman, and Raouf (2010) substantiated the significance of relationship between board composition and firm's performance. Anderson, Mansi, and Reeb (2004) suggested that the firms having independent directors are characterized with the low financing cost.

Moreover, Adams and Ferreira (2009) asserted that the board meetings increased the effectiveness as more information could be obtained, advise for the management and the fulfillment of monitoring role. In order to properly monitor the activities of management, board of directors meeting on regular basis plays a vital role (Conger, Finegold, & Lawler III, 1998; Adams, Hermlin, & Weisbach, 2010).

CEO duality occurs when CEO is also the chairperson of board. In other words, a person having two positions in the firm at the same time such as chairman of board and the chief executive officer. The CEO duality reduced the management's monitoring mechanism which created the conflict of interest between principal and the agent risk (Rhoades, Rechner, & Sundaramurthy, 2001). Nevertheless, Chi, Huang, and Xie (2015), Chen, Jiang, and Yu (2015) argued that presence of CEO duality reduces the firm risk.

Likewise, the managerial ownership reduce conflict of interest between principal and agent. In case of higher managerial ownership, top management works in the best interest of shareholders by effective decision making. However, in the absence of the managerial ownership the environment of mistrust would be created among the stakeholders. This unfavorable scenario provoke agents to take irrational decisions about the risky projects (Singh & Harianto, 1989).

Managers usually avoid taking risk and sometimes loses the opportunity to earn high profit due to their passive behaviour (Hirshleifer & Thakor, 1992). Chen et al. (2012) observed negative association between managerial ownership and risk. Akin, Wright, Ferris, Sarin, and Awasthi (1996) explored the effect of managerial ownership on the firm's risk. The results revealed that managerial ownership reduced the agency risk

Similarly, the majority shareholders are more interested in monitoring the performance of the firm as compared to the minority shareholders. Generally, it is assumed that the firm which is characterized by concentrated ownership perform better than the firm with diluted ownership.

De Andres and Vallelado (2008) argued that the block holders are interested to reduce the agency problem as they having greater financial stakes. However, it is concluded that the access to the inside information to the block holders triggers the idiosyncratic volatility.

Generally, the institutional investors are considered to have more knowledge and the information in contrast with the individual investors and as a result the firm risk reduces (Rubin & Smith, 2009). Previous studies such as Neubaum and Zahra (2006), and Johnson and Greening (1999) argued that institutional investors are involved in monitoring the performance of management. Rubin and Smith (2009) verified that there is a significant negative relationship between the risk and presence of institutional investor because the firms are exposed to higher volatile returns when there is less institutional ownership.

Besides, the credibility of firm's financial information is enhanced by appointing big 4 auditors. The relationship of disclosure quality and audit firms is postulated by reputation hypothesis. According to reputation hypothesis, audit firms provide quality audit services to retain valuable clients (DeAngelo, 1981). The Big-4 audit firms provide quality audit service, because they have greater dependency over the clients in terms of revenue (Becker, DeFond, Jiambalvo, & Subramanyam, 1998; Simunic, 1980). Likewise, the presence of the audit committee reduced the conflict of interest among the principal and the agent and thus reduces the firm's risk as the audit committee works in the best interest of the shareholders (DeZoort, Hermanson, Archambeault, and Reed 2002). Klein (2002) argued that the audit committee also enhances the reliability and quality of firm's financial disclosure and the cost of capital decreases, which reduced the chances of default (Anderson et al., 2004). Moreover, the presence of audit committee improve investors' confidence which reduce the stock market volatility (Collier & Zaman, 2005).

H2: The corporate governance is negatively associated with downside risk.

H2: The corporate governance moderates the relationship between investor sentiment and downside risk.

3. Methodology

The emerging markets have long standing history of extreme volatility than developed capital markets (Bekaert & Harvey, 2003). The investor's behaviour in emerging markets is noticeably irrational as compared to their counterparts in developed markets (Frugier, 2016; Maitra & Dash, 2017). Hence, the research explored the casual effect of investor sentiment on downside total risk.

Further, the presence of corporate governance enhance the investors' confidence which would curtail the investor sentiment and reduced stock market volatility (Christy et al., 2013; La Porta, Lopez-de-Silanes; Shleifer & Vishny 2000). Nevertheless, the existence of weak corporate governance mechanism, in developing economies, encourages the exploitation of minority shareholders which negatively affect investors' behaviour and contribute towards abnormal swings in the general stock prices (Alba et al., 1999; Lesmond, 2005). Thus, the interplay of corporate governance is examined between investor sentiment and risk through Baron and Kenny (1986).

Moreover, the previous literature estimated risk through various proxies. For instance, Wang, Lin, Fung, and Chaen (2015) measured the risk through Value at Risk (VAR). However, Artzner, Delbaen, Eber and Heath (1997) highly criticized VAR, as it measures the percentile profit-loss distribution. Likewise, Christy (2013) used standard deviation to measure the agency risk. However, empirical studies such as Hogan and Warren (1974), Harlow and Rao (1989), Estrada (2002), Rashid and Hamid (2015) argued that investors are more concerned with downside risk. Similarly, Hussain and Shah (2017) estimated the risk through downside systematic risk following the methodology of Estrada (2002). However, Guay (1999a) argued that total risk is more preferable to analyze the market reaction in terms of equity compensation for managerial risk-taking. Hence, the semi-standard deviation is used to capture left tail moments. The research used DCAPM proposed by Estrada in 2002 for two reasons. Firstly, it is an appropriate method to measure whether the return follows symmetric or asymmetric distribution. Secondly, the semi-variance combines the variance and skewness information into one measure. Therefore, making it suitable to use semi standard deviation in order to capture the managerial

compensation for managerial risk taking. The total risk is measured through semi-standard deviation (Estrada, 2002).

3.1 The Variable Definition and Measurement

3.1.1 The Downside Total risk

We have used the downside risk as dependent variable for this research. Firstly, the daily returns of each cross section i for time t were calculated. Afterwards, the mean values of daily returns were calculated on yearly basis for 233 cross sections. Then each daily return was subtracted from mean return of each year. Subsequently, the returns below mean values were considered for the estimation of yearly semi-standard deviation. The formula for the estimation of downside total risk is as follow:

$$\sigma_{it} = \sqrt{\frac{\left\{ \sum_{i=1}^n \text{Min}[(R_i - \mu_i), 0]^2 \right\}}{n-1}} \dots (3.1)$$

Where, Min stands for the minimum value, R_i stands for individual returns and μ_i stands for yearly mean value of the average returns of each cross section.

3.1.2 The Investor Sentiment Proxies

The investor sentiment index is constructed through principal component analysis. We have used two principal component PC1 and PC2 with eigen values greater or equal to one. Consistent with previous empirical studies such as Maitra and Dash (2017); (Rehman & Shahzad, 2016), Baker and Wurgler (2006, 2007). We have considered six proxies such as number of initial public offering per year (NOIP); average first day return on initial public offerings for each year (FDRIPO); shares turnover in Pakistan Stock Exchange (PSXTURN); equity share in total equity and long term debt (EQSHARE); closed end mutual fund discount (CEMFD); dividend premium (DP), which measures a log of book to market ratio of dividend paying firm minus book to market ratio of non-dividend paying firms.

3.1.2 The Corporate Governance Proxies

The corporate governance mechanism is tested as moderating variable. For this purpose, we constructed corporate governance index through principal components analysis (PCA). The components with eigen value, either equal to or greater than one are considered for the estimation. For instance, corporate governance index is estimated though four components PC1, PC2, PC3 and PC4 with eigen values greater than one. We have used ten proxies, which are consistent with previous studies of Kamran and Shah (2014), Nguyen (2011), Ullah and Kamal (2017), Christy et al. (2013). Consistent with Bhagat and Bolton (2008), board size (BSIZE) is measured as the number of board directors; board independence (BD_IND) is measured as the ratio of the number of independent directors to total number of directors. Dummy variable is used to calculate CEO duality (CD), which takes a value of one if the CEO is also the chairman of the board, and zero otherwise; board meetings (BMEET) is measured as number of board meetings per year (Nadarajah, Ali, Liu, & Huang, 2016; Saleh, Iskandar, & Rahmat, 2005). We have used four proxies related to ownership such as concentrated ownership (CONC), which is estimated as log of number of shareholders; institutional ownership (INST) is measured as percentage of shares held by the institutional shareholder; managerial ownership (MANG) is calculated as

percentage of shares held by the executives; big 5 ownership is estimated as percentage of shares held by big five shareholders (Alam & Ali Shah, 2013; Kamran & Shah, 2014).

As far as audit quality is concerned, the audit quality is estimated as whether a firm uses one of top four auditing firms and takes value of one where a firm's auditor is one of the big four auditing firms, and zero otherwise. The big four auditing firms include KPMG, Deloitte, Price Waterhouse Coopers and Ernst & Young. Audit committee composition is measured as number of independent board members divided by total audit committee members (Detthamrong et al., 2017; Ullah & Kamal, 2017).

3.1.3 The Control Variables

Given that our approach to testing hypothesis relies upon a set of underlying assumptions, we mitigated the regression biases by including a set of firm-level variables to control for firm-specific characteristics that might influence the firm's downside risk. For this purpose, consistent with previous studies we have included two market based measures of firm performance such as Tobin's Q and market value added. The Tobin's Q is calculated as the market value of equity plus total debt divided by total asset. While market value added is estimated as the difference between the market value and book value of equity (Abdullah, Shah, & Hassan, 2008; Mollah & Talukdar, 2007).

3.2 Baseline Estimation

The research conducted the empirical analysis in penal data framework. Hsiao (1986) argued that penal regression estimation have several benefits. Firstly, the penal estimation allows us to account for unobserved heterogeneity. Secondly, large number of observations provide more degree of freedom. Thirdly, penal data address the issue of collinearity among explanatory variables.

$$y_{it} = \alpha_i z_i + \alpha_{it} x_{it} + \varepsilon_{it} \dots (3.2)$$

The dependent variables such downside total risk is represented by Y_{it} of firm i and time t . While X_{it} represents the explanatory variables such investor sentiment index, corporate governance index and control variables. The Z_i stands for constant of the regression line, which captures the effect of observed and unobservable variable. The results of Chow, Breusch Pagan LM reveal that Z_i varies across cross section. Thus, ordinary least square regression is not suitable for the data set.

We scrutinized the effect of investor sentiment index on downside total risk with moderating role of corporate governance in full sample and subsamples by dividing the firms into two categories i.e., big and small firms. This categorization is done because Maitra and Dash (2017) asserted that investor sentiment has greater adverse effect on small size firms than large size firms. Mian and Sankaraguruswamy (2012) argued that investor sentiment varies across firm size. Similarly, Detthamrong et al. (2017) observed that the behaviour of corporate governance varies across firm size. The Policy makers should consider the size of the firms while establishing rules for their governance (Ullah and Kamal; 2017).

Further, industry analysis is carried out to examine whether the behaviour is persistent across specific industries or not. For the purpose of analysis, the sample is divided into 13 industries. These industries include Textile industry, Miscellaneous, Oil and Gas, Transport, Technology and Communication, Engineering and Allied industries, Fertilizer, Glass & Ceramics, Paper & Board, Automobile Parts & Accessories, Pharmaceuticals, Food & Personal Care Products, Cement, and Chemical. Nevertheless, the industries with less than 80 observations were excluded for industry-wise analysis.

We have used Hausman test to choose between fixed effect and random effect regression. Based on the results of Hausman test, random effect regression is used. Raunig (2015) argued that random effect model is more suitable to capture the cross-section effect in residuals. In addition, the results of Hausman test revealed that the variations in the data are cross-sectional in nature rather than time series, with some changes occurring over the years. Therefore, random effect estimator is the feasible generalized least squares (GLS) estimator

$$\begin{pmatrix} \hat{\alpha}_{RE} \\ \hat{\beta}_{RE} \\ \hat{\gamma}_{RE} \end{pmatrix} = (W' \Omega^{-1} W)^{-1} W' \Omega^{-1} y.$$

Where, $W = [tNT, X, Z]$ and is a $NT * 1$ vector of one

The error covariance matrix Ω_v is assumed block diagonal with equi-correlated diagonal element Ω_v, i , which depends on the two unknown parameters such as σ_v^2 and σ_c^2 only. There several ways to estimate these two parameters. For instance,

$$\hat{\sigma}_v^2 = \frac{1}{NT} \sum_{t=1}^T \sum_{i=1}^N \hat{v}_{it}^2, \hat{\sigma}_c^2 = \hat{\sigma}_v^2 - \hat{\sigma}_\mu^2$$

$$\hat{\sigma}_\mu^2 = \frac{1}{NT - N} \sum_{t=1}^T \sum_{i=1}^N \left(\hat{v}_{it} - \bar{\hat{v}}_i \right)^2$$

$$\text{and } \hat{v}_{it} = y_{it} - \alpha POLS^{-Z_{it}} \beta POLS^{-Z_{it}} \hat{\gamma} POLS \text{ and } \bar{\hat{v}}_i = 1/T \sum_{t=1}^T \hat{v}_{it}.$$

$$\text{and } \hat{v}_{it} = y_{it} - \alpha POLS^{-Z_{it}} \beta POLS^{-Z_{it}} \hat{\gamma} POLS \text{ and } \bar{\hat{v}}_i = 1/T \sum_{t=1}^T \hat{v}_{it}.$$

The degree of correction in $\hat{\alpha}_v^2, i$ is also asymptotically critical when $N \rightarrow \infty$ yield the within model

$$\ddot{y}_{it} = \ddot{y}_{it} \beta + \mu_{it}$$

$$\text{where } \ddot{y}_{it} = y_{it} - \bar{y}_i, \ddot{x}_{itk} = x_{itk} - \bar{x}_{ik} \text{ and } \ddot{\mu}_{it} = \mu_{it} - \bar{\mu}_i$$

Note that the individual specific effect C_i , the intercept α and the time invariant regressor Z_i cancel.

3.2.1 Econometric Model:

$$\sigma_{it}^E = \beta_0 + \beta_1 CGINDEX_{it} + \beta_2 INVESEN_t + \beta_3 CGINDEX_{it} * INVESENT + \sum_{i=1}^n \gamma_i ControlVariable + \varepsilon_{it} \dots (3.2)$$

σ_{it} represents semi standard deviation estimated through Estrada (2002). β_0 is the intercept of the regression line, $CGINDEX_{it}$ is corporate governance index for firm i and time t is constructed through ten proxies such as board size, board independence, board meetings, CEO duality, concentrated ownership, institutional ownership, managerial ownership, Big 5 ownership, audit quality and audit committee composition . While, $INVESENT_t$ is investor sentiment index for time t, which is constructed through six proxies, which included the number of IPO's per year, first day return after IPO, shares turnover in Pakistan Stock Exchange, equity share, closed end mutual funds discount and dividend premium. Further, $CGINDEX * INVESENT_t$ is interactive term of regression equation. We have constructed the indices through principal component analysis (PCA). The methodology of Baron and Kenny (1986) has been followed to test the moderating effect

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of corporate governance mechanism. While \sum_{it} Control Variable include firm specific variables such as Tobin's Q and Market value added (MVA), ϵ_{it} is error term.

3.3 Sample Size

We have analyzed the secondary data of non-financial firms listed in Pakistan Stock Exchange for a period of 11 years i.e. from 2004 to 2014. After excluding firms with missing data, we are left with unbalanced panel sample of 233 firms having 2875 firm-year observations. The non-financial firms cover thirteen major industries such as Textile, Oil and Gas, Transport, Technology and Communication, Engineering and Allied, Fertilizer, Glass & Ceramics, Paper & Board, Automobile Parts & Accessories, Pharmaceuticals, Food & Personal Care Products, Cement, Chemical and Miscellaneous. We have obtained the investor sentiment data, firm-level corporate governance and financial data from website of Pakistan Stock Exchange, opendoors.pk and fintechprofessor.com. The data is winsorized at 5th and 95th percentile to remove outliers and possible data recording errors.

4. Analysis and Discussion

4.1. Descriptive Statistics and Correlation Matrix

The descriptive statistics of variables are reported in table 03. The downside total risk has mean value of 0.035, which suggests the average value semi-standard deviation value of 3.5% for 233 firms with smaller variations across cross-sections. The results are slightly lower than the findings of Christy et al (2013). There are two possible reasons for the change. Firstly, we have estimated total risk through semi-standard approach. Whereas, Christy et al (2013) calculated the agency through standard deviation. Secondly, the change is possibly due to difference in market dynamics. Further, investor sentiment index has mean value of 0.232 with higher variations in comparison to downside total risk. In comparison with Rehman (2013), the results of individual proxies such as NOIP, FDRIPO, PSXTURN, EQSHARE, CEMFD have slightly higher mean values.

Moreover, the corporate governance index has mean value of 0.33 and has higher variations in comparison to investor sentiment index. As far as the individual proxies are concerned, typical board size has a mean of about 8.00 in the whole sample. This result is consistent with (Bokpin, Isshaq, & Aboagye-Otchere, 2011). Similarly, for the whole sample, on average 18.8% board members are independent directors. This result is lower comparatively to the findings of Chen and Chuang (2009) which is 42.6%. The board meeting has a mean value of 5.4 which is lower than mean value of 6.32 as suggested by Jackling and Juhl (2009).

Further, the correlation matrix is presented in table 03. The results suggest that investor sentiment has statistically significant weak positive correlation with downside risk. Contrary, corporate governance mechanism has a negative association with downside total risk which is significant at 0.000%. The investor sentiment and corporate governance indices are constructed due to the moderate association among their individual proxies. The results confirmed that these indices are constructed through Principal component analysis using stated individual proxies.

Table 02 : Descriptive statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
DSTR	2875.000	0.035	0.0361	0.0003	0.474
INVSINDEX	2875.000	0.232	0.868	-1.084	1.085
CGINDEX	1285.000	0.033	1.454	-3.995	5.314
BSIZE	1686.000	8.007	1.715	0.000	20.00

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BIND	1560.000	0.188	0.249	0.000	1.000
BMEET	1594.000	5.429	2.603	0.000	34.00
CD	1525.000	0.208	0.406	0.000	1.000
CONC	1711.000	7.558	1.255	2.708	16.06
INST	1713.000	0.133	0.155	0.000	0.988
MANG	1713.000	0.223	0.260	0.000	0.957
BIG5	1713.000	0.584	0.211	0.000	0.994
AUQ	1770.000	0.575	0.494	0.000	1.000
ACC	1591.000	0.800	0.220	0.000	1.000
NOIP	2875.000	49.71	29.77	18.39	116.49
FDRIPO	2875.000	179.93	77.35	26.20	282.55
PSXTURN	2875.000	5323.0	4261.2	16.8	14404.0
EQSHARE	2875.000	310.48	55.92	223.06	375.62
CEMFD	2875.000	37.974	30.906	10.787	123.020
DP	2875.000	9.142	4.002	1.328	12.688
TobinQ	2590.000	1.385	1.150	0.454	25.425
MVA	2683.000	3.832	12.916	-17.628	20.808

The table reports descriptive statistics of downside total risk (DSTR) as endogenous variable and corporate governance mechanism as moderating variable. The downside total risk is estimated through semi-standard deviation using the methodology of Estrada (2002). Further, Investor sentiment (INVSENINDEX) is constructed through Number of of IPO annually (NOIPt), is first days return on IPO (FDRIPOit), Pakistan Stock Exchange average daily turnover (PSXTURNt), Equity share (EQSHAREit), closed end mutual funds discount (CEMFDit) and dividend premium (DPit). Whereas, corporate governance index (CGINDEX) is constructed through board size (BSIZE), board independence (BIND), board meetings (BMEET), CD (CEO duality), concentrated ownership (CONC), institutional ownership (INST), managerial ownership (MANG), Big 5 ownership (BIG5) and audit quality (AUQ), no of IPOS (NOIP), first day return on IPO (FDRIPO), average daily return (PSXTURN), equity share (EQSHARE), dividend premium (DP). Further, the study used control variable such as TobinQ and market value added (MVA)

4.2 Regression Analysis

The effect of investor sentiment on downside risk with interplay of corporate governance mechanism is reported in table 05. The aforementioned casual effect is explored for whole sample as well as sub-samples i.e., small size firms and big size firms through static regression estimation. The results revealed that investor sentiment has positive coefficient value which suggests that investor sentiment increases the downside total risk. Consistent with previous claim of Black (1986), who asserted that investor sentiment causes extreme fluctuation in stock prices and as a result investor exposure increases towards market volatility. Consistent with previous results of Rehman and Shahzad (2016), Maitra and Dash (2017), the current research provides empirical support to the noise trader theory of De Long et al. (1990).

Further, corporate governance index has statistically significant negative coefficient value. The beta value suggests that corporate governance has negative effect over the firm downside total risk. Thus, results revealed that the presence of strong corporate governance mechanism reduces market risk, while weak compliance of corporate governance increases the downside total risk. Consistent with the point of view that firms having strict compliance of corporate governance reduces the extreme downward fluctuations in stock prices and improves firm performance (Akbar et al., 2016). Wang et al. (2015) also argued that corporate governance reduces the downside risk. The current research also augments the agency theory proposed by Jensen and Meckling (1976).

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Moreover, the interactive term i.e., CGINDEX*INVSENINDEX has negative coefficient value. The result depicts that the presence of corporate governance weakens the relationship of investor sentiment and downside risk. The results are consistent with the claim that strong governance mechanism curtails the adverse effect of investors' irrational behaviour on firm performance (La Porta et al., 2000; Akbar et al., 2016). The favourable circumstances increase investors' confidence over the equity market and curtail investor sentiment.

The analysis of sub samples, which include big firms and small firms, revealed non-persistent behaviour of stated variables. For instance, the investor sentiment has significant positive coefficient value in small firms. The results are consistent with the notion that investor sentiment has greater adverse effect over the small size firms vis-a-vis large size firms (Maitra and Dash 2017). Mian and Sankaraguruswamy (2012) argued that investor sentiment varies across firm size. Likewise, Baker and Wurgler (2006;07) and Baker, Wang, and Wurgler (2008) complement the fragility of small firms' performance towards investor sentiment. Elton et al. (1998) also ascertained the claim that small firms are more sensitive to investor sentiment. However, in case of large firms, the coefficient has become statistically insignificant.

Contrary to the above discussion, corporate governance has statistically significant coefficient value across subsamples. The results reveal that corporate governance mechanism significantly contribute to reduce the overall downside risk in case of full sample, small firms and big firms. The result is consistent with Detthamrong et al. (2017). Moreover, the moderating role of corporate governance exists in full sample as well in small size firms. However, we found that in case of large firms the interplay of corporate governance mechanism has insignificant effect.

4.4 Industry-Wise-Regression Analysis:

The persistency of aforementioned relationship is analyzed across major industries. Table 5 report industry wise regression results. We considered only six industries with sufficient observations. The results reveal that the effect of investor sentiment varies across industries. Consistent with notion, the adverse effect of investor sentiment varies across industries due their fundamental characteristics (Rehman & Shahzad, 2016). Likewise, corporate governance has statistically significant coefficient values in engineering and chemical sector. Moreover, we found non-persistent behaviour of corporate governance across 06 sectors. In the similar vein, Linck, Netter, and Yang (2008) criticized the assumption that one size fits all. They suggested firm-level dynamics may be considered during the formation of corporate governance mechanism. Detthamrong et al. (2017) argued that the behaviour of corporate governance varies across firm size. Ullah and Kamal (2017) also argued that policy makers should consider the size of firm while establishing rules or corporate governance code.

Table 04: Regression Analysis (Full sample, Small Firms, Big Firms)

Variables	Full-Sample	Small Firms	Big Firms
INVSENINDEX	0.00434**	0.0119***	0.00082
	-0.00176	-0.00275	-0.00191
CGINDEX	-0.00621***	-0.00489**	-0.00349***
	-0.00103	-0.00248	-0.000844
CGINDEX*INVSENINDEX	-0.00151*	-0.00848***	6.25E-05
	-0.000851	-0.00324	-0.00082
TOBINQ	0.00169	-0.00198	0.00208

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	-0.00128	-0.00224	-0.00135
MVA	-0.000212**	-0.000719***	2.77E-05
	-8.89E-05	-0.000249	-7.34E-05
Constant	0.0297***	0.0371***	0.0246***
	-0.00244	-0.0049	-0.00234
R-Square	0.1364	0.1009	0.0479
Wald Chi2 Test	44.62***	33.4***	33.4***
Observations	1,220	389	831
Number of id	233	81	152

Robust standard errors in parentheses Statistical significance is denoted by ***, **, and * at 1, 5, and 10 percent, respectively

The table reports the random effect regression results of downside total risk(DSTR) as endogenous variable and corporate governance mechanism as moderating variable. The downside total risk is estimated through semi-standard deviation using the methodology of Estrada (2002). The regression equation is estimated for Full sample, small firms and big firms. Further, Investor sentiment(INVSENINDEX) is constructed through Number of of IPO annually (NOIPt), is first days return on IPO(FDRIPOit), Pakistan Stock Exchange average daily turnover(PSXTURNt), Equity share(EQSHAREit),closed end mutual funds discount(CEMFDit) and dividend premium(DPit). Whereas, corporate governance index(CGINDEX) is constructed through board size(BSIZE), board independence(BIND), board meetings (BMEET), CD(CEO duality), concentrated ownership (CONC), institutional ownership (INST), managerial ownership(MANG), Big 5 ownership(BIG5) and audit quality(AUQ), no of IPOs(NOIP), first day return on IPO (FDRIPO), average daily return(PSXTURN), equity share (EQSHARE), dividend premium (DP). Further, the study used control variable such as TobinQ and market value added(MVA).

Table 05: Industry-Wise Regression Analysis

Variables	Oil & Gas	Engineering & Allied	Automobile & Acces	Parts	Food & Care Products	Cement	Chemical
INVSENINDEX	0.00199 -0.00164	0.00548** -0.00249	0.00123* -0.00224		0.00657* -0.0112	0.00128* -0.00116	0.00437** *
CGINDEX	-0.000842 -0.00109	-0.00350*** -0.00101	-0.00682 -0.0064		-0.0104* -0.00826	-0.00136 -0.00165	0.00412** -0.00162
CGINDEX*INVSEIND EX	-0.000499	-0.0021*	-0.00381		0.00829*	0.000793	0.000873*
TOBINQ	-0.000552 -0.00168* -0.00194	-0.00155 -0.00528 -0.00425	-0.00545 0.00905** -0.00578		-0.0104 -0.001 -0.00159	0.000511 0.00365 -0.00525	-0.000696 0.000585 -0.00264
MVA	7.86E-05** -8.42E-05 0.0228**	-0.000368* -0.000208	-0.000148* -0.000293		0.000238 -0.000346	-0.00015 0.000116 0.0237**	0.000118 - -0.000177
Constant	* -0.00312	0.0315*** -0.00495	0.0224** -0.0104		0.0413*** -0.0085	* -0.00856	0.0284*** -0.00444
R-Square	0.0579	0.1264	0.2593		0.039	0.0931	0.0532
Wald Chi2 Test	4.98***	15.99***	16.67***		5.22**	13.93**	15.57***
Observations	115	80	87		147	116	114
Number of id	20	12	16		31	18	21

Robust standard errors in parentheses Statistical significance is denoted by ***, **, and * at 1, 5, and 10 percent, respectively

The table reports the random effect regression results of downside total risk(DSTR) as endogenous variable and corporate governance mechanism as moderating variable. The downside total risk is estimated through semi-standard deviation using the methodology of Estrada (2002). Further, Investor sentiment(INVSENINDEX) is constructed through Number of of IPO annually (NOIPt), is first days return on IPO(FDRIPOit), Pakistan Stock Exchange average daily turnover(PSXTURNt), Equity share(EQSHAREit),closed end mutual funds discount(CEMFDit) and dividend premium(DPit). Whereas, corporate governance index(CGINDEX) is constructed through board size(BSIZE), board independence(BIND), board meetings (BMEET), CD(CEO duality), concentrated ownership (CONC), institutional ownership (INST), managerial ownership(MANG), Big 5 ownership(BIG5) and audit quality(AUQ), no of IPOs(NOIP), first day return on IPO (FDRIPO), average daily return(PSXTURN), equity share (EQSHARE), dividend premium (DP). Further, the study used control variable such as TobinQ and market value added(MVA). The regression equation is estimated for six industries having atleast 80 observation

5. Conclusion

We have scrutinized whether variations in investor sentiment and corporate governance, combine to affect the shareholders' assessment of their exposure to economic and agency risks. This study has two primary motivations. Firstly, we explored the causal effect of investor sentiment on downside risk. We have ascertained the positive influence of investor

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sentiment with downside risk in full sample as well as sub sample (Small firms). The results are in accordance with the studies undertaken by Wu et al. (2017), Ahmed et al. (2012), Bekaert and Harvey (2003), Wang, Keswani, and Taylor (2006) who argued that investors' behaviour is noticeably irrational in emerging markets that cause stock market volatility. Secondly, we have tested the moderating role of corporate governance mechanism. The results revealed that corporate governance significantly weakens the relationship between investor sentiment and risk in case of full sample and small firms. Nevertheless, we found insignificant effect of corporate governance mechanism in case of large firms. The presence of corporate governance curtails the irrational behaviour of market participants which reduces the downside risk (La Porta et al., 2000). Thirdly, we found that the effect of investor sentiment and corporate governance varies across industries. Consistent with notion, the effect of investor sentiment and corporate governance are subject to various firm level characteristics (Baker & Wurgler, 2006, 2007; Mian & Sankaraguruswamy, 2012; Ullah & Kamal, 2017).

The regulatory rules and recommendations on board characteristics assume that one size fits all. However, this assumption is challenged by existing U.S. evidence Linck et al. (2008) and our study further complemented inconsistency that one size fits all approach to the governance characteristics. In relation to our results, the SECP may initiate measures to strengthen the corporate governance mechanism in Pakistan, which would boost investors' confidence and curtail the irrational behaviour of market participants. As a result, the rational market participants' exposure towards downside risk would be considerably reduced. Further, it is deemed important for policy makers to consider the size of the firm while establishing corporate governance code. Moreover, the future research may estimate the risk based on co-skewness and co-kurtosis. The cross-country comparison could be another interesting avenue for future research.

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