Impact of Corporate Governance and Ownership Structure on Idiosyncratic Volatility: A Case Study of Pakistan

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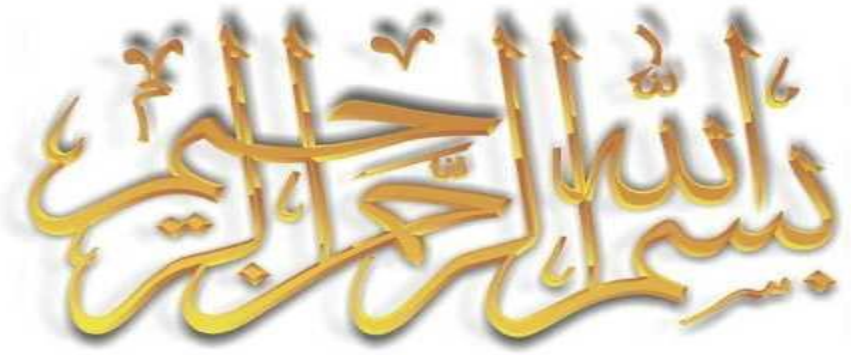

In the name of Allah the most Beneficent and the most Merciful

"That man can have nothing but what he strives for; that (the fruit of) his striving will soon come in sight: Then will he be rewarded with a reward complete." (Quran 53:39-41)

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CERTIFICATE

This is to certify that this thesis entitled **"Impact of corporate governance and ownership structure on idiosyncratic volatility: A case study of Pakistan."** submitted by **Mr. Fahad Mehmood** is accepted in its present form by the Department of Economics and Finance, Pakistan Institute of Development Economics (PIDE) Islamabad as satisfying the requirements for partial fulfillment of the Degree of Master of Philosophy in Economics and Finance.

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DECLARATION

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DEDICATION

This humble effort is wholeheartedly dedicated to my loving parents and siblings who are my true heroes and source of inspiration. Their love, affection, devotion and prayers brought me here. In addition, this piece of work is dedicated to my elder brothers, who continually provide their moral, spiritual, emotional, and financial support.

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Abstract

This study examines the impact of corporate governance (CG) practices and ownership structure on idiosyncratic volatility using the sample of 100 non-financial firms listed at the Pakistan Stock Exchange for the time period of 2003-2017. Agency theory suggests that good governance practices can enhance transparency and reduce asymmetric information which leads to decrease the risk of the firm. This study uses idiosyncratic volatility index as a dependent variable, which is measured by cash flow volatility, sales volatility and earning per share volatility, whereas Corporate Governance attributes, institutional ownership, family ownership and managerial ownership as independent variables. Using the GMM model, this study shows that CGI and family ownership both have a negative association with idiosyncratic volatility, whereas institutional ownership and managerial ownership are both increases idiosyncratic volatility of firm in Pakistan. It is concluded that quality CG practices can decrease the idiosyncratic volatility of firms. This result of the study may helpful for firm managers, investors, shareholders, risk managers and policy-makers

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LIST OF ABBRIVATIONS

AR	Auto Regressive
BSA	Balance Sheet Analysis
CAPM	Capital Asset Pricing Model
CEO	Chief Executive Officer
CF	Cash Flow
CG	Corporate Governance
CGI	Corporate Governance Index
EPS	Earning Per Share
FS	Firm Size
GMM	Generalize Method Of movement
IV	Instrumental Variable
OLS	Ordinary Least Square
PCA	Principle Components Analysis
PSE	Pakistan Stock Exchange
SBP	State Bank of Pakistan
SD	Standard Deviation
SECP	Security and Exchange Commission of Pakistan
SUR	Seemingly Unrelated Regressions

Chapter 1

Introduction

1.1 Background

Risk is a concept that refers the precise probability of particular event. In finance, risk is the probability that an investment's factual return will be different than expected. Corporate risk is frequently measured using historic equity price volatility, i.e. the standard deviation (SD) of the stock price of a listed company. In finance, there are two broad types of risk that are the systematic and unsystematic risk. Systematic risk is firstly introduced by Sharpe (1964). Systematic risk is a market risk and it is undiversifiable. While Lintern (1965) gives the idea completely opposite to systematic risks called unsystematic risk. Unsystematic risk refers is a firm-specific risk. Unsystematic risk can be diversifiable through portfolio diversification (Beja, 1972).

Unsystematic risk is also known as idiosyncratic risk or idiosyncratic volatility. In financial economics, most of the models stated that only system specific risk can affect stock returns. But, in empirical literature, there are several studies found that idiosyncratic risk (firm specific risk) can also affect returns. Some economic theories indicate that idiosyncratic volatility should be positively associated to stock return. If investors demand compensation for not being able to diversify risk on a particular venture, then agents will demand a premium for holding stocks with high idiosyncratic volatility (Malkiel and Xu, 2002). The well-celebrated traditional CAPM (Capital asset pricing model) theory by Sharpe and Lintner indicate that only systematic risk (market risk) would be priced in equilibrium, all other risks i.e. idiosyncratic risk should effectively lessen through diversification. Later on, the CAPM theory has challenged by

Fama and French (1992, 1993) which document that firm specific risk can also affect firm returns. The debate is still alive that whether the empirical approach of Fama and French has contradicted the CAPM (Berk, 1995; and Loughran, 1996). The CAPM theory holds only in the fulfillment of the condition that investors should hold the combination of the market portfolio. In contrast, however, some institutional investors for the sake of extraordinary returns, structure their portfolio in a way that they accept a substantial idiosyncratic risk. These investors appreciate and give importance to the idiosyncratic risk factors which make changes in overall risk (Malkiel and Xu, 2002).

High idiosyncratic volatility stocks increase expected return of firms (Barberis and Huang, 2001). While the results of Ang et al. (2009) directly opposite to these theories and suggest that high idiosyncratic volatility lower average return of the firm. The literature regarding determinants of idiosyncratic volatility demonstrates that idiosyncratic volatility affects asset returns more when investors are not capable to hold market portfolio (Malkiel and Xu, 2002). According to Black (1976) and Christie (1981) stated that a firm's leverage might boost the firm's cash flow risk. As leverage increases, shareholders tend to bear a high proportion of total risk, and hence stock return volatility increases accordingly. Furthermore, West (1988) Shiller (1981) and Leroy and Porter (1981) argued that having improved information about future cash flows within the required time frame can decrease idiosyncratic volatility. Grossman (1989) found the impact of financial innovation on idiosyncratic risk is ambiguous. Innovation like an opening of the new derivative market can ease the availability of new information about cash flows led to a decrease in firm volatility. However, Stein (1987) provided empirical

results which opposed the Grossman findings. He pointed out that an opening of the new market can change the whole trading pattern would boost up the volatility.

The idiosyncratic volatility of a single firm is significant in both theory and practice. So, it is meaningful to identify and study the factors that predict and determine volatility. However, there are different studies which empirically mentioned the firm-specific factors relating to idiosyncratic risk. Chok and Sun (2007) scrutinized the cross-sectional determinants of idiosyncratic volatility. They revealed that the age of board members, CEO (chief executive officer) stock option, and resource dependency are significantly related to idiosyncratic volatility. Cao et al. (2007) noted that the upward trend in idiosyncratic risk over the past some decades is mainly due to corporate growth options. Bekaert et al. (2012) inspected the real determinants behind the US aggregate idiosyncratic volatility and they found that cash flow variables such as (market to book value and growth option), market-wide volatility, and business cycle variables are the most influential determinants. Firms with fewer antitakeover provision lead to disclose private information and proliferate the idiosyncratic risk. Idiosyncratic risk decreases with the increase of the firm's degree of isolation from takeovers (Ferreira and Laux, 2007). Cohen (2012) observed that financial reporting quality significantly associated with idiosyncratic variability. Durnev et al. (2004) founded that, decision making quality regarding corporate investment become the reason to increase in idiosyncratic volatility. Ross (1989) and Roll (1988) documented that private information flow about the firm is directly correlated with idiosyncratic volatility. Supercilious corporate social responsibility (CSP) is indeed boosting shareholder wealth by mitigating undesirable

firm's specific risk. leading CSP portfolio substantially perform better than lagging CSP firms (Lou and Bhattacharya, 2009; Lee and Faff, 2009).

Moreover, the study of Durnev, Morck and Yeung (2004) analyzed that more efficient capital allocation reflects a high level of idiosyncratic variability. Dennis and Strickland (2004) seek out the cross-sectional and time-series determinants of idiosyncratic volatility. In the time-series prospective their finding exposes that heightened institutional ownership and leverage are positively related to firm-level volatility. While on the cross-sectional side their work argued that changes in institutional ownership positively affect idiosyncratic volatility. Campbel et al. (2001) documented that raise in the variance of the cash flow shocks, expansion in the variance of discount rate shocks, or the increase in the covariance of both shocks are the responsible components that drive idiosyncratic volatility of the firm.

Agency theory disclose firm specific risk as the conflict between shareholders and managers. As a theoretical background, this study also uses the agency theory to developed empirical framework. Agency theory is presented by Stephen Ross in the 1960s. This theory, further explained by Jenson and Meckling (1976), says that there are two types of players in the corporate world. They are principal (investors/shareholders) and agent (managers/employees). The principals or owners of the company hire an agent as a manager to run the company. There are two main factors on which agency theory bases. First, it is a simple and conceptual theory which determine the firm to two partners i.e. shareholders and agent. Second the theory indicates that both managers and shareholder are self-interested (Daily et al., 2003). Principal expects from managers to act and make decisions on the behalf of shareholder interest. But on the other side, instead to

work in the shareholders' interest managers engaged in activities such for their own benefits (Padilla, 2000). Due to self-interest, opportunistic behavior, and risk defer approach of agents. The agency theory was introduced as a separation between ownership and control (Bhimani, 2008). To minimize this conflict of interest between principal and agent corporate governance (CG) is considered as a remedy for such a serious problem.

In this study, we examine the impact of corporate governance (CG) on idiosyncratic volatility in the context of Pakistani non-financial firms. Corporate governance is considered as the vigorous remedy measure for agency problem. Corporate governance is the mechanism of rules regulation and practices that a corporation or organization can adapt to forestall managers (Agents) who are working for their own benefits at the expense of shareholders (principal). Good corporate governance can prevent dishonest activities and make sure that managers can enhance their activities to maximize shareholders' wealth. There are some common problems regarding corporate governance all over the globe. Good corporate governance codes may substantially minimize these problems. Good corporate governance codes refer to the set of best practices regarding the structure of the firm. It is the set of rules that have been adopted to improve, developed, and to execute corporate governance deficiencies through a suitable composition of a board of directors, remuneration committee, auditing, and discloser of information. However, legitimating pressure and efficiency needs are the factors which lead to the adoption of codes all around the world (Aguilera and Cazurra, 2004).

In recent years corporate governance has received much more attention (see, Merz and Trabert, 2017; Mezhoud et al., 2017; Gul et al., 2016 and Abata and Migiro, 2016) due to the Asian financial crises. The major corporate governance issue in Asian financial

crises has been the lack of minority shareholders' rights (Claessens and Fan, 2002). Financial crises in 2008 plainly demonstrate the default of risk management at numerous companies. Because the companies' risk management department realized low risk but in fact the situation was more severe and their trading strategies face up more risk. (Larcker and Tayan, 2015). Moreover, during crises, some firms were affected more while some are less (Erkens et al., 2012). Firms with higher institutional ownership and a high number of independent directors in their boardroom were worsted more. The reason is that prior to the crises institutional investors taking more risk, so when crises occur they have more to pay. On the other hand, firms with more independent board raised more equity financing, however during crises they have lost more. Overall, firms with good corporate governance that have followed sensible financial policies with moderate risk had worsted less. Some papers explained that financial crises occurred in Korea, somewhat due to the weak system of governance (Chang et al., 1998).

Previous research studies found that the legal system and laws of corporate governance that protect investors are significantly differed across countries, because of the country's specific origins and laws enforcement. Based on differences in law affects market valuation, ownership structure and cost of external financing (La Porta et al., 1998). For example, in Asia, countries with a weak judicial system and poor shareholders protection, corporate governance matter much more than countries with substantially better law and order situation. Alternatively, we can say that strong corporate governance does not depend on a well-structured legal system to solve their governance matters, rather corporate governance is more vital in countries with inadequate investor protection law and relatively weak legal system (Klapper and Love, 2004). In developing countries

like in Asia, the role of family-owned firms, state-owned firms, law enforcement, the role of banks in corporate governance, and role of institutional investors are very important areas concerning corporate governance, where more work and attention are needed (World Bank, 2006). Similarly, in South-East Asian countries where existence of culture, political, and legal differences, led the role of corporate governance practices significantly more (Clark, 2007).

In past corporate governance has not been much considered in developing countries like Pakistan. But in the recent past companies' scandals and fraudulent activities in the west like Enron and WorldCom and financial crises in 1997 and 2008 urged the need of corporate governance in developing countries (Reed, 2002). Pakistan is an emerging country; effective use of corporate governance practices can give benefit to Pakistani market in several ways. Corporate governance practices play a positive role in market valuation and improve firm performance in countries with common origin if we compared with countries of civil origin (Gul, Rashid, and Muhammad, 2017). Good corporate governance practices in emerging market not only protect small and large shareholder rights but also support sustainable growth rate and mobilize saving in the economy (Javid and Iqbal, 2010). It is observed that after the adoption of corporate governance codes in Pakistan in 2002, corporate governance practices are quite impressive in Pakistan in the region, because of the proper implementation regarding corporate disclosures (Iqbal, 2008) taken by SECP (security and exchange commission of Pakistan) and other judicial authorities (Zaheer, 2013). Due to family control nature of the firm’s Corporate governance gets significant importance in Pakistan. However, lack of transparency in financial reporting, the role of multiple shareholders, law and

regulation, the functions of the board of director, and financial structure are some of the issues relating to corporate governance in Pakistan.

In prior studies, few researchers reveal the relativeness of corporate governance and firm idiosyncratic volatility. For example, Nguyen (2011) found that ownership concentrated and family control firms are positively correlated with high idiosyncratic volatility. moreover, firms that regulate by banks are associated significantly less idiosyncratic volatile. Ginglinger and Saddour (2008) showed that financially constraint firms with quality governance attributes i.e. with strong investor rights had found with high cash reserves when compared to less financially constraint firms. It has widely concurred that poor-quality corporate governance can increase price volatility. Adoption of quality governance practices can increase transparency and decrease uncertainty which is often scaled by share price volatility (Mugaloglu and Erdag, 2013). The study by Ramadan (2013) finds that share price volatility in Jordan industrial firms is negatively related to dividend policy, as the dividend payment to shareholder increases, stock prices tend to stabilize. As a result, price volatility decreases. Similarly, top corporate governance weakens innate earning quality, where is innate earning quality measure by cash volatility and sales volatility. While strong corporate governance can enhance discretionary earning (Athanasakou and Olsson, 2012). Affective corporate governance would result in improve earning quality of a firm through overcome agency problem which arising by information asymmetry. So, it increases the value of the firm (Latif, Bhatti, and Rahman, 2017).

One fundamental question arises that why firms are sometime more volatile and sometimes less. Evans (1987) argued that firm's age is one of the important determinants

of the firm's volatility. As the age of the firm increases, firms' variability decreases. Bradley et al. (1984), concluded that there is a significant negative association between a firm's earnings volatility and its optimal leverage. The study by Sorensen (2002) suggested that a strong corporate culture maintains stability in a corporation that is strong culture firms seem less likely to underinvest. Therefore, their cash flows are less volatile. (Cheng, 2008) revealed that board size is one of the important determinants of the firms' volatility, as the size of the corporate board increases the firm's variability decreases.

Furthermore, Bartram (2012) investigated that why the stock return of US (united states) corporation is more volatile than the stock return of foreign firms. After investigation, he found that the US stock return is more volatile because of high idiosyncratic risk in US firms compare to foreign firms' idiosyncratic risk. He further specifies that this high idiosyncratic risk is good not bad in the sense that the idiosyncratic volatility of U.S. firms increases because of stock market development, with investor protection, innovation, economic growth and development, and the greater share in research and development (R&D) compare to foreign countries firms. However, Comin and Mulani (2006) proposed that U.S firms are more volatile because of the increase in aggregate productivity growth and employment growth volatilities.

1.2 Research Gaps

In previous studies, researchers have used firm-specific variables as a determinant of idiosyncratic risks i.e. (Black, 1976; Bradley, 1984; and Christie, 1981) have used firm leveraged. Grossman (1989) and Stein (1987) used new innovation. Evans (1987) used firm age. Cheng (2008) used board size as a determinant of idiosyncratic risk. But, to the

best of my knowledge, no one have checked the impact of corporate governance on firm idiosyncratic volatility in case of Pakistan except Alam and Shah (2013). but their study focused more on ownership structure and less on corporate governance attributes for a very limited time frame. Their study investigates the relationship between corporate governance and firm risk for the time period of 2005 to 2010. The findings of the study showed that there is positive association of ownership concentration and CEO duality with firm risk while family concentration and bank control have negative relationship with risk. Forasmuch, the impact of corporate governance attributes on idiosyncratic volatility is essential and very important to examine. So, our first contribution is to examine the impact of corporate governance index on idiosyncratic volatility for a time span of 2003-2017.

Second, the previous studies have given proxy for idiosyncratic volatility on firm bases, such as (Fama and Macbeth, 1973; Fama and French, 1993; Ang et al., 2009; Campbell et al., 2001; Malkiel and Zu., 2002) have used residual standard deviation of market model. Bali et al. (2005) used equal-weighted average of stock variance as a proxy for idiosyncratic volatility. Asghar et al. (2011) estimated idiosyncratic risk by estimating the variance of the return. (Afzal and Mirza, 2012) employed value at risk (VAR) as a proxy for risk. However, the stock price can increase and decrease without any fundamental changes at firm level. So, therefore, it is better if we use the balance sheet or financial reports of the firm as the proxy of risk. which includes firm cash flow (CF) volatility from operating activities, earning per share (EPS) volatility, and firm sales (FS) volatility.

Third, previous studies had examined only one single proxy for idiosyncratic risks, like Khan (2012) had used the standard deviation of stock prices, Afzal and Mirza (2011) have used value at risk (VAR) approach to estimate results. While our study uses three proxies for idiosyncratic risk these are cash flow from operating activities, sales of the firm and earning per share. Previously no one has used more than one proxy for risk in the case of Pakistan except (Azid et al. 2006) accustomed rolling standard deviation and ARCH-GARCH process for volatility. But they separately used two different proxies through separate models. The current study has use more than one proxy of idiosyncratic volatility. First, we generates a self-constructed composite index of volatility from the firm's financial reports which is called a firm-level idiosyncratic volatility index which includes firm's sales, cash flow and earnings volatilities. Then we check the determinants of idiosyncratic volatility index.

1.3 problem statement

Firm idiosyncratic risk has a role to play in firm performance. because firms that take more risk generally have higher (although volatile) returns. Due to their volatile nature, firm-specific risks hinder the firm' s policy makers and planning department' s ability to forecast and plan their cash flows and related activities, etc. Firms that engage in risky projects are expected to yield better returns that those which lack the appetite to take risks. However, excessive risk taking may prove to be fatal for a firm.

The relationship between corporate governance measures and firms' performance has been widely studied in corporate literature; although the evidence on this strand of literature has been mixed. The relationship between firm performance and governance may also be authenticated, theoretically, by considering agency theory. This mixed

evidence suggests that the impact of corporate governance measures on firm performance may not be direct. It seems plausible that this relationship is mediated by the levels of firm' s risk. Therefore, corporate governance has a strong role to play in the nature and intensity of risks taken by the firm, thereby impacting the performance of the firm.

1.4 Objectives of the study

1) To examine the impact of corporate governance on idiosyncratic volatility of the firm.
2) To examine the impact of ownership structure on idiosyncratic volatility of the firm.

1.5 Significance of the study

Due to political uncertainty, unfavorable security condition, devaluation in Pakistan's currency, and recent sharps up and down in oil prices led to drastic changes in corporate finance in Pakistan. These changes make the corporation uncertain about their cash, earnings, sales, and prices which in turns these corporations bear some degree of risk on their investment. Beside all these, we know that it is very crucial for Pakistani firms to achieve a better and effective position in the global market by adopting superior corporate governance practices.

Corporate governance is an increasingly eventful subject of the corporate world, especially after the modern world era. Corporate governance is more meaning full to emerging market like Pakistan. After the 2008 financial crises, corporate governance becomes a strategic issue for the corporations in Pakistan. There are numerous international papers which explain the nexus between corporate governance and

idiosyncratic risk, but in Pakistan, there is very negligible work have been done so far to shed light on this issue. So, to shed the light on this illusion that whether CG practices deplete idiosyncratic risk or not? If yes, Then how and to what extent. Hence it is important to bridge the gap and to figure out what are the governance practices that bring changes to overcome firm specific risk consequently. The main focus of the study is to find out the correlation between idiosyncratic volatility and firm's governance mechanism used in Pakistani corporations. This study contributes to the existing literature in several ways. First, what are the corporate governance practices that best suit to business condition in Pakistan such that to overcome the problem related to firm specific risk so that to achieve consistency, stability and smoothening in stock prices, firm sales, shareholders earning, and firms cash cycle instead of volatility in all these. Second, to identify what are the determinants factors of idiosyncratic volatility in Pakistan. Third, this study looks forward to providing some useful insights into adopting, regulating, monitoring corporate governance practices in order to take over the issues related to firms' risk such as firm earnings, firm cash flow, and sales of the firm.

Moreover, the findings of this study would help investors, firms, researchers, academics, firm managers, policymakers and other affiliated parties to entirely understand the effect of corporate governance exercises on firms' related volatilities. In addition, to inspirit and drawing the way for foreign companies and investors, in the way that which kind of governance practices would they adapt to manage idiosyncratic risk effectively and vice versa in case of investment in Pakistan.

1.6 Plan of the study

The sequence of this study is organized as followed. Chapter 2 reviews the literature of determinants of idiosyncratic risk and the link of corporate governance and idiosyncratic volatility. Chapter 3 contains the discussion of variables development, data and sample, econometric model and methodology of the study. Chapter 3 also includes the formulation of idiosyncratic risk and its index. Chapter 4 comprises of empirical analysis and discussion of the results. While chapter (5) contains the conclusion, policy recommendations, limitations and direction for the future research of the study.

Chapter 2

Literature Review

2.1 Determinants of Idiosyncratic Risk

To understand the pattern of idiosyncratic volatility it is crucial to identify the determinant factors of idiosyncratic volatility. In literature, there are numerous studies who are empirically declared factors that tampering firm's idiosyncratic risk. Among these Pastor and Veronesi (2003) find that idiosyncratic volatility of firm tends to be higher for those with higher uncertainty about future profitability and more volatile firm-specific profitability, and for those whose pay no dividend. Fama and French (2004) explained that the increase in idiosyncratic volatility results of the increase in the number of firms listed at premature ages. Brown and Kapadia (2007) also showed that the increase in firm's volatility in the US is due to the listing of risk lover companies in the stock exchange. They found that firms that listed later in the sample have high idiosyncratic volatility than firms listed earlier.

Hamao et al. (2003) investigated an abnormal decline in firm-level variability in Japan after the crash in its stock market in 1990. They attributed this significant fall in firm risk to the lack of corporate restructuring and a sharp rise in earning homogeneity. The study by Gu and Kim (2003) investigated the determinants of firm-specific risk of United Stated hotel real estate investment trusts (REITs). The investigation shows that high dividend payment and high debt burden tend to exaggerate the unsystematic risk, while heavy capitalization can substantially help reduce the unsystematic risk of hotel REITs.

The study of Brandt et al. (2009) explained the puzzle of the steady increase in idiosyncratic volatility of individual firm in the U.S during 1962 to 1997 which reversal back to pre-1990s trend when they checked for 2013. They found two factors dominant over this reversal. One is corporations' low stock prices. and second is that the retail investors grabbed over these low stock prices.

Stiroh (2006) has identified the equity market risk determinants of US bank holding companies for the time span of 1997-2004. The outcomes of the study show that commercial and industrial loans, consumer lending and non-interest income drive the risk in US bank-holding companies. The study also showed that investment banking, other non-interest income, securitization income, servicing and gains from loan sales are also volatile activities. Irvin and Pontiff (2008) demonstrated the factors that make a significant increase in idiosyncratic volatility at firm-level over the time period from 1964 to 2003. The magnitude of this dramatic increase in idiosyncratic risk over the same period is explained entirely by a higher proportion of smaller firms, data provider coverage, new listing and changes in the composition of industries. They further explore that a boost up in competition among firm is positively and return on asset is negatively correlated with idiosyncratic volatility.

Can corporate social performance (CSP) affect the idiosyncratic variability of the firm? A recent study by Lou and Bhattacharya (2009) analyzed the relationship by using secondary data from COMPUSTAT. The results explain that high CSP resulted in low idiosyncratic risk and a low CSP of a firm have faced high risk. In addition, firm advertisement and research and development investment lower undesirable risk of the corporation. Similar results were presented by Lee and Faff (2009), documented that

lagging CSP firms return higher compensating with the high idiosyncratic risk. On the other hand, leading CSP firms have low return confronting with low risk at all.

Cao, Simin, and Zhao (2007) attempted to reveal the nexus between growth option and idiosyncratic volatility while using non-financial firms panel data for the time span of 1971-2002. The results of the study claim that both at the level and variance aggregate growth option significantly positively associated in upper trend in idiosyncratic risk of the firm.

The cross-sectional determinants of idiosyncratic volatility are tested by Chok and Sun (2007). For empirical analysis, they had tested 159 biotech firms for the time period of 1996 to 2001. They gave a couple of direction in their study. One direction had checked whether CEO stock option has any impact on idiosyncratic volatility. And in the second direction, they investigated some others managerial factors which impact the idiosyncratic volatility. Their finding revealed that resource dependency has an inverse relationship with idiosyncratic volatility while CEO stock option and age of the board members are positively related to idiosyncratic volatility.

Bekaert et al. (2012) inspected the reasons behind aggregate idiosyncratic volatility in US firms. For empirical analysis, they utilized daily US stock return data from the year 1964 to 2008. The resulted outcome has shown that variables related firm cash flows such that market to book value and growth option, variables related to the business cycle and variables related to market volatility are the most influential determinants in the U.S aggregate idiosyncratic volatility. Bartram et al. (2009) examined that why there are risk differences between foreign firms and firms operating in the US.

Using a large panel data across the world's big economies. The data time period is from 1991 to 2006 from (World scope). They explain that non-US firms have less idiosyncratic risk than US-based firms. One possible reason is that government quality and stability is inversely related to idiosyncratic volatility. Second is that they found again negative relationship between disclosure of assets and idiosyncratic risk. They also found no relationship between creditors rights and idiosyncratic variability. Similar work revised by Bartram et al. (2012) explain this puzzle. They explained that there are two types of volatility one is positive (good volatility) and one is negative (bad volatility). In the US firm volatility is high compared to non-US firms is mostly because of good volatility not bad. Good volatility in the sense that in the United States there is high investor protection, firm-based investment in Research and Development, stock market development and new patent.

To investigate the firm-specific determinants of quality financial reporting Cohen (2012) uses a sample of 2857 firms' year observation for the time span of 1987-2003. Using a two-stage estimation process the results show that financial reporting quality is insignificantly associated with systematic risk but significantly associated with unsystematic risk.

2.2 CG and idiosyncratic risk

On the empirical side our work related to the study of Parigi, Pelizzon, and Thadden (2015). In their study, they put forward a new model of agency theory with a countervailing outcome of strict corporate governance. Their empirical analysis showed that strict corporate governance negatively related with firms' earning but positively related with Beta (which measures risk per unit of cash flow). The more the stricter the

corporate governance the less the risk per unit of cash volatility but on the other hand strict corporate governance can limit the company's flexibility and aggressiveness regarding in managerial decision making. The analysis of Lalita, Nikhil, and Thenmozhi (2012) investigated the determinants of corporate cash holding for 1540 non-financial Indian firms, for the time span of 11 years, (from 2001-2011). The results reveal that Government-owned companies, private companies, and foreign-owned companies have larger cash holding, while family origin companies and companies with major group ownership have low cash holding. The findings of the study show that corporate cash holding is influenced by net working capital, size, net leverage, market to book ratio and return on asset. The study found that the cash flow volatility is not significant.

Ferreira and Laux (2007) elaborated the relationship between Corporate governance and idiosyncratic risk (a measure of stock price volatility) empirically. They argued that firms with fewer antitakeover provision lead to disclose private information and proliferate the idiosyncratic risk. They further incorporate that idiosyncratic volatility mainly related to the non-governance components. The results of the study show that idiosyncratic risk decreases with the increase of the firm's degree of isolation from takeovers. Moreover, Bushee and Noe (2000) investigated the influence of corporate disclosure practices on the composition of a firm’s institutional investors and the volatility of its stock price. The results demonstrate convincing evidence that firm with more forthcoming disclosers attracted more institutional investors which in turn more stable the firm’s stock prices.

In addition, a firm's weak corporate governance enhances the firm's internal cash flow sensitivity. Righteous corporate governance is more effective (in countries have

slight investor protection) in term of access to finance, reducing financial constraint, and uses firm's capital allocation efficiently Francis et al. (2013).

The impact of corporate governance on idiosyncratic risk was also analyzed by Nguyen (2011). The study had used the sample of 1252 non-financial firm from 27 different industries in Japan listed in Tokyo stock exchange. The study had utilized eight years of data from 1996 to 2003. The results of the study demonstrate that firms which are controlling by family ownership confronting more idiosyncratic risk because family controlling firms adopt more distinctive strategy comparative to others controlling ownership. Second, banks controlling firms appeared less likely to face idiosyncratic risk. While with the increase of ownership concentrations idiosyncratic risk also increases. Because of weak monitoring activities as defined by agency theory.

A political crisis or a financial crisis can have a tremendous impact on stock price volatility. The impact of political crises on stock price volatility largely influences due to the psychological reaction. The presidential election in Taiwan in 2004 Is the typical example of stock market return. So, firms with better corporate governance or better performance can strengthen the shareholder confidence level during a panic situation. In this way, firms exhibit less price volatility and make overreaction during political crises compared with weak corporate governance Hsu-Huei et al. (2011). Follow the same line Yusuf and Eser (2013) in their empirical study showed that poor corporate governance and weak regulation generate uncertainty and unwilling circumstances in stock market. To overcome such type of conditions Istanbul stock exchange (ISE) introducing a corporate governance index namely XCURY, in which includes, company public disclosers and shares of companies in line with good corporate governance principle to

encouraged corporate governance practices. The results of the study demonstrate that good corporate governance and transparency can lead to lower the uncertainty, decline the price volatility, and can achieve better economic growth and development. Similarly, Bistrova and lace (2011) argued that, because of the unstable environment it is more essential to follow corporate governance practices with more attention. They further elaborate that companies with active corporate governance seem to offer lower risk.

According to Brown and Caylor (2004) measured the correlation between the performance of the firm and its corporate governance. The study reported that firms with inferior quality corporate governance found riskier than firms with superior quality corporate governance. The results of the study reported that firms with inadequate quality corporate governance have more share price volatility if compared with quality corporate governance. They measure share price volatility with industry adjusted CGQ (corporate governance quotient). The study found that the weak corporate governance firm's share price is 6.20% more volatile than industry adjusted average, and the firms with top decile of industry-adjusted CGQ is 5.63% less volatile than their industry adjusted average. And their performance difference is 11.83%.

Jiang, Lee, and Anandarajan (2008) examined the nexus between corporate governance and earnings quality. To measuring corporate governance quality, they use Gov-score (developed by Caylor and Brown. (2006)). They found a strong evidence that firms with quality corporate governance result in improved earnings quality and low earnings management compare to weak corporate governance. They further proceed that small earnings surprises are negatively linked with corporate governance.

According to Alzeaideen and AL-Rawash (2014), share price volatility can be affected through different ownership structures such as largest ownership, five biggest, institutional and individual ownership structures. The panel data sample consists of 51 Jordan companies for the time period of 1995 to 2009. The study has employed ordinary least square (OLS) and seemingly unrelated regression (SUR) models. The results of the SUR model are more accurate than OLS. The findings of the study postulated that share price volatility positively associated with the largest and five biggest ownership structures. However, the individual and institutional ownership provides insignificant results with price volatility.

Board diversity can cause fundamental and idiosyncratic volatility, but diverse directors' decision doesn't any harm to firm overall risk. In the context of Giannetti and Zhao (2015) using the data of 3056 firms' year observations reveal that divers board evidently show up with the performance of more volatile stock returns. They also find that board diversity can lead to inconsistency in their decisions, it is difficult to predict their performance and their decision making.

2.3 Concluding remarks

This study reviews the literature regarding the corporate governance and ownership structure influence on idiosyncratic volatility of corporate firm both theoretical and empirical manner. These studies investigated the impact of corporate governance attributes and different types of ownership structure on idiosyncratic risk of the firm. The empirical results of these studies are not uniform. Some studies find positive while other studies find negative relationship of corporate governance components and ownership structure on idiosyncratic volatility of the firm. These studies, particularly, focus more on

the relationship of corporate governance and firm performance or stock return volatility. Moreover, the study by Alam and Shah (2003) has checked the relationship between corporate governance and firm risk for the very limited time period of 2005-2010 in the case of Pakistan. But they focused more on ownership structure and idiosyncratic risk of the firm. Furthermore, they measured risk by following Fama and French (1993) three factor model by making some extension of the single factor CAMP model.

With the conclusion of this section, to the best of our knowledge, this study differs from the past studies in several ways; first, our study investigates the impact of CG on idiosyncratic volatility by utilizing CG index of nine proxies of corporate governance which no one previously adopted in case of Pakistan. Second, this study has used different risk approach from rest of the studies by using balance sheet of the firm, rather than firm specific or CAPM model. Third, this study uses three proxies for risk by constructing index of these proxies. Last but not the least; our study checked the correlation between corporate governance and idiosyncratic volatility for relatively large time period of 2003 to 2017.

2.3 Hypotheses of the study

On the bases of the above discussion, we developed the following hypotheses

H_1 *: CGI is negatively associated to idiosyncratic risk*

H_2 *: Institutional Ownership is positively associated with idiosyncratic risk*

H_3 *: Managerial Ownership is negatively associated with idiosyncratic risk*

H_4 *: Family Ownership is positively associated with idiosyncratic risk*

H_5 *: Board Independence is negatively associated with idiosyncratic risk*

H_6 *: Board Size is positively associated with idiosyncratic risk*

H_7 *: Audit Committee Independence is negatively associated with idiosyncratic risk*

H_8 *: Chairman Duality is positively associated with idiosyncratic risk*

H_9 *: Board Meetings is negatively associated with idiosyncratic risk*

H_{10} *: Gender Diversity is positively associated with idiosyncratic risk*

H_{11} *: Minority Shareholders is negatively associated with idiosyncratic risk*

H_{12} *: Information Disclosure is negatively associated with idiosyncratic risk*

H_{13} *: Family Members on board is negatively associated with idiosyncratic risk*

Chapter 3

Data and Methodology

3.1 Data and Sources

This study is dealing with unbalanced secondary panel data (annual data). The sample of the study consist of 100 non-financial firms listed in Pakistan Stock Exchange (PSE). This study uses the sample of 100 firms bases on the availability of the data of these firms. The main sources of our data are the State Bank of Pakistan (SBP) and data for corporate governance variables is taken from companies' annual reports and their financial statements from their websites. This study uses non-financial firm-level data listed at PSE. The reason for the exclusion of financial firms is that there is a difference of financial year of non-financial and financial firms. Our study does not account for the pre-2003 period of time, because corporate governance code declared in 2002 in Pakistan, and implementation of these codes being started in 2003. So, this study considers only those firms listed from 2003 onward to 2017. State Bank of Pakistan performing to organized Balance sheet analyses (BSA) of companies listed at PSE annually. hence, this study utilized the required data from companies' BSA issued by SBP.

3.2 Definition of Variables

This study primarily focusing on the causes and impact of corporate governance on firm-level idiosyncratic volatility. Our study measures the idiosyncratic volatility of firms through cash volatility, earning volatility, and sales volatility. This study examines

the association between corporate governance, ownership structure and idiosyncratic volatility of the firm.

3.3 Dependent Variable

This study uses idiosyncratic volatility as a dependent variable which is measured by the index of cash flow volatility, earnings volatility, and sales volatility as follows.

3.3.1 Cash Flow Volatility

Different researchers measure cash flows volatility differently. Farooq (2016) measure cash flow volatility as the standard deviation (SD) of cash flow. Belghitar and Khan (2013) measure cash flow volatility as the standard deviation of the previous five years of funds from the firm's operation. Similarly, Chen et al. (2012) take the SD of firm cash from firm's operations of every year. Anand et al. (2012) measured it by taking rolling SD of the cash flow of three years at a time. Bo (2002), Caglayan and Rashid (2013), and Rashid (2017) measured sales volatility as auto-regressive (AR) process first they take residual of each firm then used one year ahead residuals.

To measure cash flow volatility, this study follows Huang (2009) and Ang et al. (2006). This approach is more convenient and preferable over the conventional technique to measure idiosyncratic volatility because while working on panel data there are market specific impacts which effect firm cash flow volatility i.e. cash flow volatility causes by market specific condition. Equation (3.1) represents total cash flow volatility. This study required to separate total cash flow volatility into systematic volatility and firm specific volatility. It is difficult to define systematic components of cash flow for single firm because there is lack of a benchmark "market" cash flow. In order to define such market

cash flow, it is necessary to consider a comprehensive set of variables that describe industry condition. Beside this, managers, analyst and investors frequently compare their firm performance with the same industry. On the basis of this motivation, this study considers industry cash flow as the market cash flow for the firm (Huang, 2009). This study then defines systematic volatility and idiosyncratic volatility according to firms' exposure to industry mean. Hence, the cash flow volatility of equation (1) from the exposure to the industry mean can be considered as systematic volatility. So, from now

Table:3.1. industry-wise distribution of the firms

Industry Number	**Industry Name**	**Number of Companies**	**Percentage of Selected Companies**
1	Sugar	7	0.07%
2	Textile	28	0.28%
3	Manufacturing	13	0.13%
4	Chemical	5	0.05%
5	Oil & Gas	6	0.06%
6	Pharmaceutical	4	0.04%
7	Telecommunication	3	0.03%
8	Energy	9	0.09%
9	Food	5	0.05%
10	Automobile	4	0.04%
11	Fertilizer	3	0.03%
12	Cement	13	0.13%
	Total	**100**	

this study labeled the systematic volatility such define "industry volatility" for industry exposed volatility. To eliminate industry specific effects, current study used to follow the technique of Huang (2009) for cash flow volatility. So, this study first standardized cash flow by firm sales for the purpose of cross-sectional aggregation. But cash flow needs to be standardized through firm size. The reason of scaling cash flow by firm sales is that prior studies used firm sales as a measure of firm size (see, e.g., Huang, 2009 and Berk, 1995).

This study measure cash flow volatility as the rolling standard deviation of the residuals of the standardized cash flow over the past fifteen years. For this purpose, the current study run the regression of equation (1) to get residuals of cash flows of the firm. First, we obtained the residuals of each firm for every selected year. Then the study calculates variance of the residuals of these firms. And the next step, our study takes SD of the variance of the residuals of cash flows. Then, this study utilized one-period ahead of SD for cash flow volatility through recursive approach. To construct volatility proxy by adopting recursive approach for the year 2004, this study calculates the SD of the residual term by using the data of 2005 and 2004. Similarly, for the year 2005, again we calculated the SD of the residual by the same model but, using the data of 2006, 2005 and 2004. This process continues until the last period of the selected sample. The demerit of this method is the mislaying of one observation in each firm. The equation form of this method is the following:

$$CF_{i,t} = \kappa_i + \phi_i CF_{j,t} + \mu_{i,t} \quad (3.1)$$

where $CF_{i,t}$ is the firm cash flow scaled by sales of the firm. i Indexes firm, t indexes time. $CF_{j,t}$ is the mean of industry's cash flow in which the specific firm lies. j denotes industry at time t. ϕ_i measure firm- i exposure to industry/market cash flow. And, $\mu_{i,t}$ is idiosyncratic cash flow of firm i at time t.

For each one-year rolling period, this study takes the variance of idiosyncratic cash flow i.e. Var ($\mu_{i,t}$) and standard deviation of the variance i.e. $\sqrt{\mu_{i,t}}$

3.3.2 Sales Volatility

The choice of method to measure sales volatility in accordance with previous studies. A similar approach has been adopted mention in equation (1) used by Huang (2009) and Ang et, al. (2006) previously. The main reason for following this approach is to wipe out industry effect mixing up with firm specific effects associated with firm sales variability. In this particular method, first, this study regress firm sales on its industry average sales. Then the study takes the variance of the error term of the equation, and after standardizing, our study recognized it idiosyncratic sales volatility. Equation (3.2) is presenting firm sales volatility below.

$$FS_{i,t} = \kappa_i + \phi_i FS_{j,t} + \mu_{i,t} \quad (3.2)$$

where $FS_{i,t}$ is the firm's sales scaled by the book value of total assets for firm i at time t, κ_i is the constant term for firm i,$FS_{j,t}$is the average sales of that industry for which the firm belongs.ϕ_i is the exposure of firm sales to industry sales and,$\mu_{i,t}$ is the natural interpretation of idiosyncratic sales volatility of firm i and time t. The similar

operation this study applies here i.e. in equation (1), first this study takes the variance then SD of $\mu_{i,t}$.

3.3.3 Earnings Volatility

The similar approach has been following here also, as such adopted for cash flow volatility and sales volatility in the current study in equation (3.1) and (3.2) respectively, utilized by Huang (2009). As it is following:

$$EPS_{i,t} = \kappa_i + \phi_i EPS_{j,t} + \mu_{i,t} \quad (3.3)$$

Where $EPS_{i,t}$ is the firm earnings per share for firm$i, at\ time\ t$, the remaining components of the equation are same as described in equation (3.1) and (3.2).

3.3.4 Idiosyncratic volatility index

After execution volatility of the firm's cash flow (cash flow from operating activities), firm sales and earnings per share separately. Our study combines these three risk proxies of the firm through index using principal components analysis (PCA) in Stata. After this, this study inspected the behavior of the firm specific risk. PCA is a tool commonly used in the most cases when a large set of variables need to be reduced in small set that still occupy most of the information of large variables' set. PCA is a mathematical process in which it converts a number of correlated variables into small number of uncorrelated variables called components analysis. It is a dimension-reduction tool and often uses in multivariate analysis where there are substantial number of variables correlated with each other. This study uses PCA because our dependent variables having many dimensions and it is difficult for good visualization.

3.4 Independent variables

Our independent variables in this study are the corporate governance index (CGI), its attributes and Ownership structure. following are the CGI, the attributes this study uses in the construction of CGI and different Ownership structures of the study.

3.4.1 Corporate Governance Index

The current study constructs corporate governance index on the following grounds: (1) The Pakistan code on corporate governance; (2) OECD corporate governance practices; and (3) previous corporate governance studies related to Pakistan. This method is previously used by Gul, Rashid and Muhammad (2017). To construct CGI, our study utilized principle components analysis (PCA) in this study. PCA is a tool used to reduce the dimension of your feature space or it is used for feature extraction. It is used when there are a lot of variables and it is difficult to recognize the relationship between each and every variable. It is also used when having so many variables and there is possibility of over fitting the model one may run. This study used CG index because in this study there are many CG attributes and these are also correlated with each other with different dimensions. The second reason of using CGI is that current study wants to ensure that our variables are independent from one another. The index comprises nine attributes of corporate governance these are; CEO duality, Gender diversity, Information disclosure, Minority shareholder representation, Family members on board, Board independence, Audit committee independence, Board size and board meetings.

3.4.2 Board size

Board size is used as the proxy for corporate governance by many researchers such as Cai et al. (2006) and Hassan (2017). It is the total numbers of directors in the company's boardroom in a given year. It is contended that a large size of the board can decrease asymmetric information, increases transparency, and reduces adverse selection (Anderson et al. 2004). Which boost up confidence regarding a firm's decision making. There is contradiction in literature regarding board size and firm performance as such Haleblian and Finkelstein (1993) and Yasser et, al. (2011) found positive association between board size and firm performance, on the other hand, Yermack (1996) and Lasfer (2004) found a negative correlation between board size and firm performance. Because of the risky environment prevailing in Pakistan's firms so this study expects there may positive nexus between board size and idiosyncratic risk.

3.4.3 Board independence

Board independence is measured as the number of outside directors divided by the total number of directors in a firm in a given year. This proxy for CG used by many researchers which include, (Hassan, 2017; Yang et al. 2009; and Kee et al. 2003). It is empirically proven that large numbers of non-executive directors on the board decreases adverse selection which in return decreases the firm's variability (Cai et al. 2006). Le (2005) also relate outsider directors with risk. He interprets that as the board independence captured by independent directors the quality of corporate governance increases whereas, the risk of the firm decreases.

3.4.4 Institutional Ownership

Institutional ownership is the percentage of ownership of share held by institutional investors. To measure institutional ownership, our study divided the number of shares owned by institutional investors by the total number of outstanding invertors, as followed by many researchers like Cao and Petrasek (2014), Hassan and Ahmed (2012), and Shah (2009). Piotroski and Roulstone (2005) cited that institutional investors are more sensitive to corporate behavior. They monitor firm performance effectively and associated positively with idiosyncratic risk.

3.4.5 Audit Committee Independence

Audit committee independence can influence firm risk. Independent members on board may force decision maker to indulge investment in low risky projects. Erickson (2005) reveals a positive association between audit committee independence and firm performance. In Pakistani context, Alam and Shah (2003), find a negative relationship between firm risk and audit committee independence. To calculate the audit committee independence, this study divided the total number of directors in the audit committee by the independent directors of the committee as measured in prior studies by Ebrahim (2007) Forker (1992) and Hassan (2017).

3.4.6 CEO Duality

CEO duality is defined as if the company CEO also as the chairman of the company board. In the agency theory perspective if CEO is also chairperson of the board it may hamper firm performance. Because he/she may select those directors on the board which easily control by his influence and makes decision on their own will Westphal and

Zajac (1995). While considering steward theory, chairman duality may execute better perform because of focused and uniformed command on the board which makes decision making more effective Finkelstein and Aveni, (1994). To measure CEO duality, our study generates a dummy variable which takes the value of 1 if CEO is also a chairperson of the corporate board otherwise 0, following Yosef and Prencipe (2013) Mcknight and Weir (2009).

3.4.7 Information Disclosure

Disclosure of information is one of the strong features of CG. In theoretical perspective, effective information disclosure mechanism reduces the risk of information asymmetry (Latif et al. 2017). Information regarding board of directors is a wide portion of information of a Corporation. It contains information regarding directors such as, the identity of outsider and insider directors, the attendance records of each directors of attending board meetings, whether board chairman is an outside director or not, whether firm's directors play its role as a directors in others corporations or not, disclose the percentage of independent directors in boardroom, their qualification and their remuneration etc. in the light of prior study this study expect that with disclosure of information firm idiosyncratic volatility decreases. This study uses dummy variable taking the value of 1 if the firm has disclosed the information to the public otherwise 0.

3.4.8 Family ownership

Family ownership is the oldest form of business ownership. It is the large publicly traded companies in which the majority of the business is under the control of family members. They are major controlling shareholders and the majority of directors are their

own family members. The major decisions and firm goals are greatly influenced by family members. A lot of work has been done on the nexus between family ownership and firm performance. Nguyen (2011) and Alam and Shah (2003) stated that family ownership is positively associated with firm-specific risk, this is because family leadership uses to adopt different strategies and practices, unlike non-family controlling firms in order to gain higher profit. This study has used the percentage of shares owned by family members as a proxy for family ownership.

3.4.9 Number of board meetings

The number of board meetings is the meeting attending by the board of directors per year in a corporation. Generally, there is a minimum at least four meeting with the gap of 120 days in a year by a firm. In some cases, there are more than the mentioned numbers. The board meeting lead by chairmen of the board in which discussion of the major functions of the corporation take place, in which includes firm performance, risk, auditing, Human resource development, and short and long-term business goals. Vafeas (1999) documented that the annual number of board meeting negatively associated with firm value because increasing board activities can decline in share prices. On the contrast, the study of Eluyela et al. (2018) investigated that board meeting frequency affected firm performance positively. They suggested that corporation should increase board meetings numbers at least up to 4 per annual.

3.4.10 Gender diversity

Gender diversity is the proportion of the male and female directors in the corporations' boardroom or the percentage of female directors to the total number of

directors in a firm. Often studies use the percentage of the men and women who occupy director seat in a firm to measure gender diversity. The study by Gul et al. (2011) concludes that gender diversity improves stock price information through voluntary disclosers of information. Which in turn decrease investor risk regarding stock prices. Another study by Carter (2003), concluded that a diverse board may increases board independence. In other words, a diverse board might be more activist board because of gender differences, ethnic and diverse background. Moreover, Giannetti and Zhao (2015) find that divers board leads to greater fundamental and performance volatility.

3.4.11 Minority Share-holders Representation

The reason of including minority shareholder representation as an independent variable is that because of minority representation on board can improve firm performance. The analysis by Zahra and Stanton (1988) find no significant relationship between ethnic minority and firm performance. However, the study by Carter et al. (2003) concludes that board with having minority directors have greater value. This study uses dummy variable taking the value of 1 if there is minority representation on board otherwise 0.

3.4.12 Family members on board

Family members on board are the total number of directors on board whose belong to the same family or relatives of the chairman at loggerheads. The inclusion of this variable is to check the effects of such family members together, their decision making and risk behavior on the idiosyncratic risk of the firm. The study of Lee (2006) found that family members involved in management give better performance. Anderson and Reeb (2003) also find positive association between firm performance and family

firms. This proxy of CG is not used previously in this context. Because family-controlled firm, with family CEO along other family members on board, perform better than hired CEO. And family members act as a steward Anderson (2003). Upon this argument, current study expects a negative relationship between family members on board and idiosyncratic volatility.

3.4.13 Managerial ownership

Managerial ownership is the shares ownership in the company owned by the management of the company. According to Holderness (2003), managerial ownership is the ownership in which insiders and block holders owned a percentage of the firm's equity. By insiders, he meant the firm's directors and its officers. Jensen and Meckling (1976) documented that the firm's value is positively associated with concentrated managerial ownership. Like most parts of the world, in Pakistan also, mostly firms have concentrated ownership in form of family, institutional, block holders and managerial ownership. The influence of this concentrated ownership mostly firms gives results with positive and significant performance (Abbas et al., 2013). Similarly, Javid and Iqbal (2008) also revealed that concentrated ownership positively associated with performance of the firm. It is because big owners effectively monitor firm's performance. While scaling managerial ownership, this study following the approach of Gul et al. (2017), they have used the total shares held by management from the firm issued shares.

3.5 Control variables

To anatomize the influence of corporate governance on firm's variability, besides corporate governance attributes there are many other components which can determine

firm' volatility. To get control over this causal linkage between corporate governance and firm's volatility and to make the model more reliable empirically, our study uses following control variables.

3.5.1 Firm size

Firm size might play its role in the firm's volatility. It is observed that due to more information on large firms experience less adverse selection relatively than small firms. The large firms are more diversified in their finance. Therefore, large firms had regular and less volatile cash flows. Ahmad (2011) documented that firm size is an important determinant of firm performance. Mirza and Javid (2013) also showed that firm size affects firm performance positively. To measure firm size, different proxies have been used by different researchers. For example, Rajan et al. (1995) used the firm's sale as a proxy for firm size. Total asset of a firm used the proxy for firm size by Ataullah et al. (2012). While to measure firm size, this study uses the natural logarithm of the firm's year-end capitalization because market capitalization of the different firm varies by a large scale. So, current study used this proxy for firm size in order to make a comparison of each firm.

3.5.2 Leverage

Leverage is our next control variable used in this study. Leverage is the combination of debt and equity to finance projects of the firm. Firms with a high level of leverage financing are considered more monitored by debt holders. So, this monitoring habit reduce the asymmetric information of the firm Harris et al. (1991). In contrast, many researchers, however, argued that firms with high leverage are cross sectionally

appear with more spread. The reason is that the lenders to the firm can demand their finance anytime when they needed Cao and Petrasek (2014). This study has used to measure leverage is the ratio of interest-bearing debt over total market value of equity. Because, Pakistan's bond market is not so much established yet, so that, the major source of debt finance is commercial bank rather than the bond market.

3.5.3 Firm growth

Firm growth is also our control variable. Firm growth is a matter more in dealing with the survival and asset growth of the firms. Firm's growth indicating a firm's risk-bearing behavior regarding investment. A high growth rate of the firm denoting high risk-taking behavior of the firm. It means that firm financing the riskier investments. Chen et al. (2005) empirical analysis document that the firm's sales growth can enhance firm performance. Renders et al. (2010) gave evidence that firm growth positively affects firm performance. This study calculated firm growth is the difference between current year asset price and last year asset price divided by current year asset price.

3.5.4 Firm age

Firm's age is our control variable and it is defined as the number of years the company operating since. Some researchers defined firm age is starting after its registration. The current study has used to count the firm's age since its listing in the stock exchange as previously used by Gul et al. (2011).

The construction of variables is highlighted in table 3.1.

Table 3.1: construction of variables used in the study

	CG attributes	**Measurement**
1	CGI	Corporate governance index constructed through principle components analysis (PCA) using nine proxies of corporate governance.
2	Idiosyncratic Volatility	Idiosyncratic volatility is the index of firm specific volatility in firm's cash flow, earnings per share and sales construct through PCA.
3	Board size	Total number of directors in the board in a given year (Hassan, 2017).
4	Board independence	Number of independent directors in the board divided by total number of directors in a given year (Hassan, 2017)
5	Institutional ownership	Number of shares held by institutional ownership divided by the total number of outstanding investors (Cao and Petrasek, 2014).
6	Audit committee independence	Number of independent directors in audit committee divided by total number of directors in the audit board (Ebrahim, 2007).
7	CEO duality	A dummy variable takes the value of 1 if CEO also serves as chairperson of the board otherwise 0 (Yosef and Prencipe, 2013).
8	Information disclosure	A dummy takes the value of 1 if firm discloses information to the public otherwise 0 (Latif et al., 2017).
9	Family ownership	Percentage of the shares held by family members of a firm (Nguyen, 2011).
10	Number of board meetings	Number of board meetings held during the given year of a corporation, minimum at least four meetings (Gul et al., 2017).
11	Gender diversity	Percentage of the female directors to the total number of directors in a boardroom (Gul et al., 2017).
12	Minority shareholders representation	We align a dummy which takes the value of 1 if there is minority representation in the board otherwise 0 (Gul et al., 2017).
13	Family members on board	Total number of family members on boardroom.
14	Managerial ownership	Total number of shares owned by firm management from the issued shares by the firm (Gul et al., 2017).

	Control variables	Measurement
1	Firm size	Natural logarithm of the firm's year-end capitalization (Gul et al., 2016).
2	Leverage	Ratio of interest-bearing debt over the total book value of asset Rashid (2013).
3	Firm growth	It is the growth rate in term of firm assets over the previous fiscal year (Gul et al., 2016).
4	Firm age	Firm listing year in stock exchange (Gul et al., 2011).

3.6 Descriptive statistics

3.6.1 Firm specific variables

Table 3.2 represents the summary statistics of the variables related to firm specific and control variables. Idiosyncratic volatility is the index of risk proxies generated through principle components analysis (PCA). Idiosyncratic volatility index consists three variables of firm specific variables following in table next to idiosyncratic volatility namely cash flow volatility, earnings volatility and sales volatility. Remaining are the control variables i.e. size of the firm, age of the firm, leverage of the firm and growth of the firm. The largest average value in the table is firm age (29.83666) followed by the firm size (7.92556) and the smallest mean value is sales volatility (0.1228981) followed by the firm growth (0.135165). In column 4 from left to right shows the standard Deviation (SD) from the mean. The largest value of SD is again firm age (10.10182) next

Table 3.2: summery statistics

Variable	Observation	Mean	Std. Dev.	Min	Max
Idiosyncratic Volatility	1036	0.7215818	0.5758122	0.0002016	4.811377
Cash Flow Volatility	1395	0.1892005	0.4463375	0.000006	3.34458
Sales Volatility	1061	0.1228981	0.1418523	0.000233	1.17142
Earnings Volatility	1049	4.599322	4.782096	0.022415	22.7795
Firm Size	1401	7.925565	1.898983	3.24	14.034
Firm Age	1402	29.83666	10.10182	15	45
Leverage	1401	0.517836	0.2028181	0.0085	0.923
Firm Growth	1301	0.135165	0.2970084	-1.0061	2.7485

to firm age is earning volatility (4.782096) while the smallest SD value is sales volatility (0.1418523) followed by leverage (0.2028181). The second last column represents the minimum of these variables. Firm growth (-1.0061) is the smallest figure in this series followed by cash flow volatility and idiosyncratic volatility are (0.000006) and (0.0002016) respectively. Firm age (15) and firm size (3.24) are the largest ranks in the minimum column. The last column of the table represents the maximum values of the variables. Firm age (45) is the largest among the variables followed by earning volatility (22.7795) and firm size (14.034), while smallest in the maximum is leverage (0.923) next to leverage in terms of low value are sales volatility (1.17142) and firm growth (2.7485).

3.6.2 Corporate Governance variables

Table 3.3 represents summary statistics of corporate governance index, all its containing components and summary statistics of ownership structure. Institutional ownership, Family ownership and managerial ownership are all included in ownership structure in this study. Remaining all are the CG attributes. Family ownership, chairman duality, information disclosure and minority shareholder representation are dummy variables contains the value of 0 and 1. The largest mean value in the table associated with board size (8.152639) second among the list is board meeting (5.383738) while the lowest value in the rank is gender diversity (0.0748095) and managerial ownership (0.1949665) respectively. Similarly, the largest SD value in column four is board meeting (1.869693) followed by board size (1.49883), while the smallest SD value associated with gender diversity (0.1233664), audit committee independence (0.2051435) and board independence (0.2128194) respectively. Column five shows minimum values of variables in the table. The highest value among minimum is 5 associated with board size following by the minimum number of board meetings which is (3). The smallest value in column 5 is (0) associated with institutional ownership, managerial ownership, family ownership, Chairman duality, gender diversity, information disclosure, minority shareholder representation, family member on board, board independence and audit committee independence. The last column of the table represents the maximum values of the variables. Board size (12) and board meeting (12) have again the highest maximum values while the smallest values in this column associated with gender diversity (0.5944595), managerial ownership (0.9796) and institutional ownership (0.994245) respectively.

Table 3.3 - Corporate Governance Attributes

Variable	Observations	Mean	Std. Dev.	Min	Max
CGI[1]	1401	0.8426563	0.5379832	0.0147134	4.079447
Institutional Ownership	1402	0.5096256	0.3186008	0	0.994245
Managerial Ownership	1402	0.1949665	0.2518074	0	0.9796
Family Ownership	1402	0.296719	0.4569746	0	1
Chairman Duality	1402	0.5870185	0.4925452	0	1
Gender Diversity	1402	0.0748095	0.1233664	0	0.594595
Information Disclosure	1402	0.5805991	0.4936371	0	1
Minority Shareholders Representation	1402	0.2054208	0.404153	0	1
Family Member On Board	1402	0.3348361	0.3066235	0	1
Board Independence	1402	0.6603491	0.2128194	0	1
Audit Committee Independence	1402	0.837097	0.2051435	0	1
Board Size	1402	8.152639	1.49883	5	12
Board Meeting	1402	5.383738	1.869693	3	12

[1] The CGI is Corporate Governance Index obtained through principle components analysis (PCA) which is formed of nine CG's components, these are chairman duality, gender diversity, disclosure of information, minority shareholder representation, members of family in the board, board independence, audit committee independence, board size, and board meeting.

3.7 Correlation Matrix

In order to examine the correlation between independent variables and idiosyncratic volatilities, this study present the correlation matrix in table 4.2 as below.

Table 3.4: correlation matrix

	Idovoli	**CGI**	**INSTOWN**	**MGOWN**	**FMOWN**	**CEOD**	**GD**	**ID**	**MSR**	**FMB**	**ACI**	**BIND**	**BMEET**	**BSZ**	**FS**	**FA**	**LVG**	**FG**
Idovoli	1.0000																	
CGI	-0.0343	1.0000																
INSTOWN	0.0392	-0.1477	1.0000															
MGOWN	0.0667	0.1615	-0.7217	1.0000														
FMOWN	-0.0265	0.1339	-0.4580	0.5293	1.0000													
CEOD	0.0031	-0.2400	0.3644	-0.3179	-0.2566	1.0000												
GD	0.0116	0.0346	-0.4176	0.3657	0.4337	-0.3974	1.0000											
ID	-0.0364	0.0308	0.0177	-0.0155	-0.0765	-0.0016	-0.0073	1.0000										
MSR	0.0397	-0.1041	0.3094	-0.1531	-0.2204	0.1657	-0.1555	0.1092	1.0000									
FMB	0.0262	0.1398	-0.5258	0.5983	0.7065	-0.3314	0.4686	-0.0828	-0.3707	1.0000								
ACI	-0.0257	-0.6489	0.2266	-0.2855	-0.2921	0.4294	-0.1614	0.0237	0.2151	-0.3472	1.0000							
BIND	-0.0432	-0.4083	0.1590	-0.3111	-0.2167	0.4368	-0.1816	-0.0535	0.1523	-0.2782	0.6249	1.0000						
BMEET	-0.0301	0.2026	-0.0282	-0.1265	-0.0670	-0.0768	0.0461	-0.0594	-0.0735	-0.0415	-0.0852	-0.0275	1.0000					
BSZ	-0.0429	-0.0697	0.1155	-0.1947	-0.1309	-0.0229	-0.0225	-0.0110	-0.0457	-0.0744	0.1081	0.1129	0.0577	1.0000				
FS	-0.0320	-0.0960	0.3467	-0.4343	-0.4587	0.2651	-0.2868	0.0469	0.2066	-0.5156	0.2119	0.1524	0.1960	0.2281	1.0000			
FA	0.0214	-0.0369	0.0171	-0.0171	-0.0003	-0.0299	-0.2020	0.0115	0.0636	0.0272	0.0046	0.0366	-0.1072	-0.0997	-0.0819	1.0000		
LVG	0.0013	0.0584	-0.1592	0.1204	0.2320	-0.1997	0.1545	-0.0058	-0.0715	0.2127	-0.0742	-0.0250	0.0025	0.0559	-0.3582	-0.0151	1.0000	
FG	0.0146	0.0154	-0.0171	0.0465	-0.0018	0.0133	-0.0273	-0.0594	-0.0169	0.0220	-0.0448	-0.0061	0.0481	0.0108	0.1168	0.0081	-0.0361	1.0000

Table 3.4 provides correlation matrix analysis of idiosyncratic volatility and CG attributes along with ownership structure. This correlation matrix gives us a brief picture of the relationship among idiosyncratic volatility, corporate governance components and ownership structure. The correlation matrix basically used to identify the problem of multicollinearity. High correlation among the variables shows severe multicollinearity issue in the data set. The correlation's values should range from -1 to +1. If the correlation value near to -1 i.e. -0.9 or -0.8 it indicates high negative correlation between explanatory variables. And if the value is +1 or near to one it indicates perfect or near to perfect positive correlation. Moreover, if the correlation value of any of the variable is 0 it means that there exists no relationship between such variables. Anderson et al. (2008) and Hair et al. (2006) documented that correlation value lies below 0.9 may not cause serious multicollinearity problem. While the study of Malhotra, (2007) argued that correlation coefficient above 0.75 indicate that there exists the problem of multicollinearity in the data. Table 3.4 shows that there exists no high degree of association among the selected variables of the study.

The negative sign associated with CGI, family ownership, information disclosure, board independence, board size and audit committee independence demonstrate the inverse relationship with idiosyncratic volatility index. While, institutional ownership, managerial ownership, chairman duality, gender diversity, minority shareholder representation, the family member on board and board meeting are positively associated with idiosyncratic volatility. It is concluded from the table that high negative correlation is observed between managerial ownership and institutional ownership with magnitude of (0.7217). And high positive relationship is found between family member on board and

family ownership which is (0.7065). So, on the basis of this correlation results this study conclude that there is no harmful issue of multicollinearity in the data of the variable.

3.8 Empirical Model

To empirically investigate the effects of corporate governance on firm's specific volatilities such as cash volatility, sales volatility, and earnings volatility, this study regresses the following regression model which is broadly used in earlier studies e.g. Alam and Shah (2013) and Cheng et al. (2018). In order to get consistent and unbiased results this study has used generalized method of moment (GMM) estimation technique which is initiated by Arellano and Bond (1991). The reason of choosing GMM modeling is that because it removes the chances of bias results which may arises if we ignore dynamic endogeneity. The second reason is that, to shrug off simultaneity and unobserved heterogeneity problem this model present powerful and reliable instruments. The detail discussion of GMM technique is present in section (3.9). Following is the base line model of this study.

$$Idovol_{i.t} = \alpha_0 + \beta_1 IdovolI_{i,t-1} + \beta_2 CG_{i,t} + \beta_3 Control_{i,t} + \varepsilon_{i,t} \quad (3.4)$$

where, $Idovol_{i.t}$ denotes the idiosyncratic volatility for firm i (1,2,3,…,n) at time t (1,2,3,…,t). $Idovol_{i,t-1}$ is one time lag of the dependent variable for firm i (1,2,3,…,n) at time t (1,2,3,…,t). $CGI_{i,t}$ Represents the corporate governance attributes for firm i (1,2,3,…,n) at time t (1,2,3,…,t). $Control_{i,t}$ is the vector of firm age, firm growth, firm size and leverage of firm i (1,2,3,…,n) at time t (1,2,3,…,t) adjusting the effect other than CG on firm's volatility. And $\varepsilon_{i,t}$ control the unexplained apportion of the model.

3.8.1 Effect of CG Attributes on the Idiosyncratic Volatility

Our first model investigates the effect of CG on idiosyncratic volatility index. To examine the changes in idiosyncratic risk pattern made by Corporate Governance this study uses different proxies of CG. The purpose of this model is to observe the impact of every component of corporate governance on firm specific risk separately in case of Pakistan. This study also includes control variables in our model in order to capture the firm's specific and industry effects. To examine such effects, this study uses the following model.

$$Idovol_{i.t} = \alpha_0 + \beta_1 Idovol_{i,t-1} + \beta_2 BS_{i,t} + \beta_3 BI_{i,t} + \beta_4 ACI_{i,t} + \beta_5 CEOD_{i,t} + \beta_6 NBM_{i,t} + \beta_7 GD_{i,t} + \beta_8 MSR_{i,t} + \beta_9 ID_{i,t} + \beta_{10} FMB_{i,t} + \beta_{11} FS_{i,t} + \beta_{12} FA_{i,t} + \beta_{13} FG_{i,t} + \beta_{14} LEV_{i,t} + \varepsilon_{i,t} \quad (3.5)$$

where; $Idovol_{i.t}$= idiosyncratic volatility (dependent variable)

$Idovol_{i,t-1}$ = one-year lag of idiosyncratic volatility

$BS_{i,t}$ = board size (CG's proxy)

$BI_{i,t}$ = board independence (CG's proxy)

$ACI_{i,t}$ = audit committee independence (CG's proxy)

$CEOD_{i,t}$ = CEO duality (CG's proxy)

$NBM_{i,t}$ = Number of board meetings held during the year (CG's proxy)

$GD_{i,t}$ = Gender diversity (CG's proxy)

$MSR_{i,t}$= Minority shareholders' representation (CG's proxy)

$ID_{i,t}$= Information disclosures (CG's proxy)

$FMB_{i,t}$ = Family members on board (CG's proxy)

$FS_{i,t}$ = firm size (Control variable)

$LEV_{i,t}$ = leverage (Control variable)

$FA_{i,t}$= Firm age (Control variable)

$FG_{i,t}$ = firm growth (Control variable)

3.8.2 Effects of CGI on the Idiosyncratic Volatility

Our next model estimated the effects of corporate governance index on idiosyncratic volatility index. Different studies have investigated the impact of corporate governance on idiosyncratic volatility differently but no one checked the impact of CGI on idiosyncratic volatility in Pakistan. Hence, this study is curious to find out the effect of CGI on idiosyncratic volatility on Pakistani firms. To perform the regression, this study has used corporate governance index on the right side of the equation plus control variables and the lift side of the equation contained idiosyncratic volatility index.

$$Idovol_{i.t} = \alpha_0 + \beta_1 Idovol_{i,t-1} + \beta_2 CGI_{i,t} + \beta_3 FS_{i,t} + \beta_4 FA_{i,t} + \beta_5 FG_{i,t} + \beta_6 LEV_{i,t} + \varepsilon_{i,t} \quad (3.6)$$

Where, $CGI_{i,t}$ is the corporate governance Index for firm (1,2,3,…,n) and time t (1,2,3,…,t). The remaining components of the model are same as described in the model (4).

3.8.3 Effects of Ownership structure on the Idiosyncratic Volatility

The majority ownership in Pakistani firms mostly are family ownership, institutional ownership and managerial ownership. Therefore, our study also interested to evaluate the influence of ownership structure on idiosyncratic volatility. To investigate the effects of ownership structure on firm idiosyncratic variability, current study regresses idiosyncratic risk on ownership structure i.e. family ownership, institution ownership and managerial ownership plus some control variables, to capture the effect of risk other than ownership structure. To estimate the results for this purpose, this study has regressed the following model.

$$Idovol_{i.t} = \alpha_0 + \beta_1 Idovol_{i,t-1} + \beta_2 FAMILY_{i,t} + \beta_3 MO_{i,t} + \beta_4 INST_{i,t} + \beta_5 FS_{i,t} + \beta_6 FA_{i,t} + \beta_7 FG_{i,t} + \beta_8 LEV_{i,t} + \varepsilon_{i,t} \quad (3.7)$$

Where, $FAMILY_{i,t}$ is the family ownership, $MO_{i,t}$ is managerial ownership and $INST_{i,t}$ is institutional ownership for firm i (1,2,3,…,n) at time t (1,2,3,…,t). The remaining components of the model are same as described in the model (6) and (5).

3.8.4 Effects of CGI on the Industry Idiosyncratic Volatility

In model (3.8) we investigate the relationship of corporate governance on the volatility of major industries uses in this study in which include cement industry, sugar industry, manufacture industry, textile industry and energy sector. The core purpose of

this model is to analyze the impact of corporate governance on industry wise risk or volatility uses in this study. In this regard equation (3.8) has been utilize for every industry of the study.

$$Idovol_{i.t} = \alpha_0 + \beta_1 Idovol_{i,t-1} + \beta_2 CGI_{i,t} + \beta_3 FS_{i,t} + \beta_4 FA_{i,t} + \beta_5 FG_{i,t} + \beta_6 LEV_{i,t} + \varepsilon_{i,t} \quad (3.8)$$

Where, $Idovol_{i.t}$ is the index of idiosyncratic volatility for industry i at time t. whereas, the remaining component of the model are same is in equation (3.5)

3.9 Estimation Technique

To analyze the impact of CG and ownership structure on idiosyncratic volatility, current study deal with panel data specification. Panel data is the combination of time series data and cross-sectional data. Nowadays in literature there is a bunch of studies working with panel data. Such in growing popularity it has been observed that generalize method of movement (GMM) is the best technique dealing with panel data up to date.

3.9.1 Panel data Modeling

Panel data is also known as cross sectional time series data or longitudinal data. It is the type of data in which usually include the small number of observations over time (T) and large numbers of cross sectional (N) like the data of firms or households. In the field of Economics or Econometrics panel data refers to multidimensional data analyzing over some time of period. Panel data provide for researcher a large number of data points which increases the degree of freedom of study analysis to explore the relationship and explanatory variables. Panel data models can solve the problem of over-identification.

The solid feature of panel data is that the cross section is the same for different time period Baltagi (2002).

If the data set having all the observation for every individual across all the time period this data set is known as balance panel data set. And if, a data set has some missing observation across time period is called an unbalanced set of data. The one general advantage of GMM is that it deals with unbalanced panel data effectively. Furthermore, the panel data model overcome the issue of multicollinearity and hence increase the efficiency of estimators Hsiao (1986). By using dynamic panel modeling it solve the problem of omitted variables.

3.9.2 Fixed Effect and Random Effect Models

The estimation of the model by ordinary least square (OLS) technique will lead us with biased results, it is because of unbalanced data regression specification. So, it will come up with heteroscedasticity problem because there Ɛ (error term) are not normally distributed. While dealing with panel features of data, two estimation techniques discussed firmly. i.e. fixed effect model and random effect model. The one lacking feature of the fixed effect model is that this model gives no weights to the unobserved heterogeneity and place them to the ignorance region, i.e. to the error term, which might affect our dependent variable. Because in dynamic penal data model the error term is indirectly correlated to the dependent variable i.e. through lag of the dependent variable used as an independent variable. While random effect models capture this unobserved endogeneity by its α (intercept). To check whether the fixed effect model measure the nexus suitably or random effect model explains the correlation more purely, the Hausman test has been utilizing for this purpose which is suggested by Hausman (1978). However,

this study is not going to utilize fixed effect or random effect model because without considering the data nature and specification these models are criticized for endogeneity issue in prior studies.

3.9.3 the Generalized Method of Movement (GMM)

To avoid the possible inconsistency that may arise from Fixed effect models and Random effect model estimates, this study uses generalized method of movements (GMM) as proposed by Arellano & Bond (1991) and later modified by Blundell and Bond (2001). GMM is the modified form of instrumental variable (IV) technique. The GMM has many features, it avoids the problem of serial correlation, heteroscedasticity, and reverse causality. Moreover, GMM used specifically to cope with the problem of endogeneity (Blundell and Bond, 2001). There are three main causes of endogeneity discussed by (Bascle, 2008) i.e. omitted variables, simultaneous causality, and errors in variables. Omitted variable's problem arises when researcher some time missing to include the main variable in the model which is unobservable to researcher and it has a substantial effect on its dependent variable in the regression. Thus, the mislaid variable goes to error term region where if its relationship is being found with explanatory variables then the problem of endogeneity may happen to occur. Simultaneous causality may occur when there is two-way causality in the dependent and explanatory variables. More simply, it would happen when the independent variable effect dependent variable and dependent variable effect independent variable in the regression line. The error in the variable is also known measurement error of variables. It refers to the phenomena when researcher some time uses the proxies of those variables which is quite difficult or unobservable to measure directly. Quite often the error has been found between the

variable of interest and its proxy while measuring it. The conceptual difference has been found in both substitute variables. So, the measurement imperfection of variables leads us to measurement error. Hence, this error also incorporates in unobserved area i.e. (μ) therefore this generating the problem of endogeneity. GMM technique increasingly popular if one dealing with firm-level panel data. If there is a dynamic endogeneity problem involve in the data, the GMM technique is considered as most appropriate to cop the problem.

3.9.4 Types of GMM

In such consistency of endogeneity prevailing in panel data modeling. In 1991 Arellano and Bond extend the instrumental variables (IV) technique to Difference GMM estimator. The Difference GMM is further expended by Blundell and Bond (1998) to System GMM. By estimating panel data modeling Difference GMM first transform the equation by taking the difference of all the variables and then estimate the coefficients. While System GMM had operated through a system of two equations i.e. equation on level and equation with a difference of level equation. For level equation, the System GMM use the difference of the regressors as an instrument, and for differential equation the System GMM uses lagged difference as instruments for the lag dependent variable.

3.9.5 Concluding remarks

While working on dynamic panel data; if we estimate equation (4) on pooled OLS it will lead us to biased and inconsistent results because of heteroscedasticity and serial correlation problems. Fixed Effect model and Random Effect model will not work because of unobserved fixed effect and endogeneity. Hence, the estimate will yield with downward biased results. Moving forward to IV technique, it also gave the estimate

which is not reliable because it does not incorporate all available movement conditions in the case when the number of instrument greater than the number of groups. So, for dynamic panel data, GMM is considering as the best estimator on the basis of their special features that GMM considers for the hetero problem, eliminate endogeneity, overcome serial correlation and utilizes all movement condition.

Chapter 4

Empirical Results

After in depth detail about selecting suitable model specification and methodology in previous chapter applying in this study. This chapter contains empirical results of the study by employing two-step system GMM technique. Section 4.1 presents the estimation results of the relationship between CGI and idiosyncratic volatility. In Section 4.2, we proceed our analysis of the association between ownership structure (institutional ownership, family ownership and managerial ownership) and idiosyncratic volatility. Last but not the least, we estimate the model that inspects the impact of corporate governance attributes (separately) on the idiosyncratic risk of the firms in Section 4.3.

4.1 Relationship between CGI on Idiosyncratic Volatility

In order to investigate how corporate governance index effect idiosyncratic volatility of the firm, we estimated Model 1 mentioned in equation (3.5). This model also contained a one-year lag of dependent variable followed by some control variables, in order to control firm-specific effects which also used in previous studies.

Table 4.1 presents the results of equation (3.5). The subsequent table contained two panel, panel A and B. Panel A shows the results of CGI plus control variable while, Panel B demonstrate the results of some test i.e. The number of observations, number of groups, AR (2) and Hansen J-statistics. But before presenting the main results of panel A we first, interpret the results of diagnostic tests that show the adequacy and reliability of the model. The Arellano-Bond AR (2) test and Hansen test report the information that the instrument used in the model are valid.

Particularly the Arellano-Bond AR (2) test's null hypothesis suggests that the instrument used by the model are valid that is the second-order correlation of error term are not found with these instruments. While the null hypothesis of the Hansen j-statistics suggests that the instrument as a whole are exogenous and orthogonal to the error term. The probability value of AR (2) is (0.61) are insignificant so we cannot reject the null hypothesis of the test. And suggest that our model is valid enough. Similarly, the probability value of Hansen test is (0.722) also highly insignificant so we cannot reject the null hypothesis.

Now our main focus lies on the coefficient of CGI in Panel A that tells about what changes occurred in idiosyncratic volatility index if there is one-unit change occur in corporate governance index. The table reports that corporate governance index, firm size and leverage are significantly negative related to idiosyncratic volatility as we expected. However, firm growth shows a significantly positive relationship with idiosyncratic volatility. While the association of firm age with idiosyncratic volatility is positive but insignificant. Our finding is consistent with the results of Li, Jr and Yost (2012), Derwall and Verwijmeren (2007), Ferreira and Laux (2005).

The positive relationship between idiosyncratic volatility and one time lagged idiosyncratic volatility suggest that firm-specific volatility in the previous year is followed by current year firm specific volatility. The inverse relation of CGI with idiosyncratic volatility is that due to better corporate governance practices may reduce some private benefits of manager and induce investor benefits Litov et al. (2006). The other argument may take place in the context that due to many barriers to managers in form of corporate governance can reduce the idiosyncratic volatility of the firm. The study by Francis et al. (2013) also supports our results by reverse manner. Their finding suggests that weak corporate governance Causes to elevate cash flow sensitivity of the firm.

Table 4.1: Impact of CGI on Idiosyncratic Volatility

Panel A: Estimation results

Variables	Idiosyncratic Volatility	Std. Error
Lagged dependent Variable	0.125**	(0.0721)
CGI	-0.143**	(0.0748)
Firm size	-0.576*	(0.311)
Firm age	0.0592	(0.191)
Leverage	-0.469*	(0.244)
Firm growth	0.841**	(0.324)
Constant	1.511***	(0.470)

Panel B: Diagnostic tests

	Statistics	P-value
AR (2)	(-0.51)	(0.613)
Hansen Test	(98.67)	(0.722)
Observations	850	
Number of Id	100	
Number of instruments	96	

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Similarly, Ferreira and Laux (2007) found that corporate governance index is negatively associated with idiosyncratic risk.

Firm size is one of the vital components of the firm volatility in many studies. The coefficient of firm size (-0.576) claim that with the increase of size firm experience more of less riskiness this result is consistent with the finding of Giannetti and Zhao (2015). One reason is that large size firm can diversify their portfolio effectively than small size firm and hence reduce some elements of risk. The other reason may be that larger firm are more open to information available for everyone due to the press release and more analyst following and inspect these corporations' investment. So, in such cases firm shrinking from idiosyncratic volatility Le et al. (2012). Leverage had also a negative association with idiosyncratic volatility it shows that with the increase in leverage (debt to equity ratio) firm specific risk decreases. These results are similar to the study of Li et al. (2012) and Cheng et al. (2016). The inverse association of leverage is contradicting with other studies. One argument may be is that this contradiction may take place with the argument that firms with high managerial ownership likely to operate with a high level of debt Agca and Mansi (2008). Firm growth is also significant and positively linked with idiosyncratic volatility. This positive relation says that with every one unit increase in growth idiosyncratic volatility will increase about 0.841 unit. Firm age is another control variable showing a similar result with the findings of Ferreira and Laux (2007) which suggest a positive relation with idiosyncratic risk but it is not significant in the current study.

4.2 Relationship between Ownership Structure and Idiosyncratic Volatility

In this portion of the study, we analyzed the nexus between idiosyncratic volatility and ownership structure of the firm. In this regard, institutional ownership, family ownership and managerial ownership used in term of ownership structure. To capture the influential impact of ownership structure on idiosyncratic volatility we also include some control variable as used in the previous model.

Table 4.2 reports the results of Model (3.6). The table is distributed in the two panels. Panel A contain the results of the variables of our main interest whereas panel B reports the information regarding diagnostics test for the adequacy and good fit of the model. Both the values of Arellano-Bond AR (2) and Hansen J-statistics are suggesting that the instrument used in the model are valid, robust and exogenous to residuals of the firm. In Panel A we can see that lagged of idiosyncratic volatility is linked positive and highly significant with idiosyncratic volatility. Institutional ownership and managerial ownership show a significantly positive relationship with idiosyncratic volatility. However, family ownership is also significant but inversely associated with idiosyncratic volatility. Moreover, firm size and firm growth are significant but firm size has a negative relationship with idiosyncratic volatility while firm growth is positively correlated. Furthermore, leverage and firm age are not significant.

Our measure of institutional ownership has a significant association with idiosyncratic volatility. The positive sign of the institutional ownership (0.321) reveal that high ownership by institutions leads to high idiosyncratic volatility. This result also shown earlier by Bushee and Noe (2014). They document that high ownership by the institution can experience firm more with

Table 4.2: Impact of Ownership structure on Idiosyncratic Volatility

Panel A: Estimation results		
Variables	**Idiosyncratic Volatility Index**	**Std. Error**
Lagged Dependent Variable	0.183***	(0.0617)
Institution Ownership	0.321*	(0.164)
Family Ownership	-0.154**	(0.0722)
Managerial Ownership	0.632**	(0.247)
Firm size	-0.889***	(0.315)
Leverage	-0.105	(0.157)
Firm age	0.0197	(0.110)
Firm growth	0.154*	(0.0897)
Constant	1.073***	(0.350)
Panel B: Diagnostic Tests		
	Statistics	**P-value**
AR (2)	0.64	0.522
Hansen Test	99.58	0.846
Observations	936	
Number of Id	100	
Number of Instruments	124	

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

high return volatility. Piotroski and Roulstone (2004) are another evidence showing that institutional trading linked positively associated with idiosyncratic volatility.

The relationship of managerial ownership is statistically significant with idiosyncratic volatility. The positive association of insider ownership (0.632) suggests that one unit increase in managerial ownership lead to increase idiosyncratic volatility about 0.632 of a unit. The reasonable ownership of board of directors in a firm indicates that high risk will be expected. The reason behind this risk-taking behavior is that it is now high incentives for managers as well to invest in risky ventures. This outcome is consistent with the results of Hutchinson (2001), Abbas and Badshah (2017), Shah and Alam (2013). But this result is opposing for findings of Shah et al. (2011) and Wahla et al. (2012). On the contrary, family ownership (-0.154) have the significant and negative association with idiosyncratic risk which indicates that firms having family influence in decision making do not motivate to take a high risk because of less probability of excessive return. This finding is in line with Shah and Alam (2013) in the Pakistani context but contradicting with the findings of Nguyen (2011) who find a positive relationship in the context of Japan. These opposing results with one another may be due to the difference in the nature of both markets i.e. Pakistan and Japan.

Among control variables firm growth positive at 5% level of significance and firm size which is highly significant at 1% have shown a negative association to idiosyncratic volatility of the firm. While, leverage and firm age both (-0.105, 0.0197 respectively) did not show any significant association with idiosyncratic volatility.

4.3 Relationship between Corporate Governance attributes and Idiosyncratic Volatility.

So far, we documented the impact of CGI on idiosyncratic volatility (firm-specific risk) and the impact of ownership structure on idiosyncratic volatility. Since, corporate governance index tells us the overall picture of its influence on idiosyncratic risk of the firm, whatsoever, we also interested to inquest the impact of corporate governance attributes (each and every component of CG used in CGI in equation (5)) on idiosyncratic volatility separately. For this purpose, we regress the model in which our dependent variable is same as used in previous models but our lift side of the equation contains components of CG with some firm-specific control variables which already mentioned in previous model.

Alike Table 4.1 and 4.2, Table 4.3 has also similar features. Panel B reports the diagnostic test for model accuracy and estimation method. The Hansen statistic and AR (2) tests' p-value is high i.e. (0.940 and 0.185 respectively) and we cannot reject the null hypothesis which says that our instruments are valid and orthogonal to the error terms of the model. Panel A present the results of the main variables of study interest, where one time lagged idiosyncratic volatility is positively correlated with its dependent variable (idiosyncratic volatility). This positive relation shows that the previous fluctuation in volatility is being followed by current fluctuation regarding risk. Moreover, audit committee independence, board independence, family members on board, board meeting, the disclosure of information, firm size and leverage are shows significance inverse association with idiosyncratic volatility except for audit committee independence which is insignificant. Furthermore, gender diversity, chairman duality and firm growth have

shown significant positive relation with idiosyncratic volatility. While bored size, minority shareholder representation and firm age are also had the positive sign but not significant.

The sign of board independence is negative and significant at the level of 1% reveal that the more the outside directors on board the less will be the idiosyncratic volatility, Giannetti and Zhao (2015) also found negative relationship of outside directors in board with idiosyncratic volatility. This is because as exhibit from the name "independent directors" they are independent in their decision making which are straight forward for good measure of firm progress. It also because the absence of self-benefits or self-interest of the independent directors. The association of duality (0.243) is more likely to advice risky task because of the positive relationship with the idiosyncratic volatility. This indicates that if CEO is also the chairman of the firm board the firm is likely to invest in risky projects. This result is supporting agency theory which suggests that CEO duality may hinder firm performance because of dual chairman more often select directors from their family or relative member (Westphal and Zajac, 1995). On the contrary, this result is contradicting if we relate to stewardship theory which suggest that with combined and focused decisions firm performance even better Finkelstein and Aveni (1994). This result is consistent with the study of Shah and Alam (2013), Giannetti and Zhao (2015) and Cheng et al. (2016). We have strong evidence at 5% level of Significance that disclosure practices (-0.155) have potential to lessen firm volatility, as such Lang and Lundholm (1993) also documented that information disclosure can potentially reduce information asymmetry and mitigate firm periodic surprises about performance and make firm less volatile. Unlike information disclosure, gender diversity

Table 4.3: Impact of CG Attributes on Idiosyncratic Volatility

Panel A: Estimation results

Variables	Idiosyncratic Volatility Index	Std. Error
Lagged idiosyncratic Volatility	0.201**	(0.0779)
Audit Committee Independent	-0.216	(0.302)
Board Independence	-0.622***	(0.335)
Family members On board	-0.845*	(0.440)
Board size	0.118	(0.169)
Board meeting	-0.184**	(0.0989)
Minority shareholders Representation	0.0337	(0.0988)
Information Disclosure	-0.155**	(0.0757)
Gender diversity	1.116*	(0.581)
Chairman duality	0.243*	(0.144)
Firm size	-1.029*	(0.580)
Leverage	-0.461**	(0.247)
Firm age	0.139	(0.191)
Firm growth	0.205**	(0.0818)
Constant	2.513***	(0.947)

Panel B: Diagnostic Tests

	Statistics	**P-value**
AR (2)	(-1.33)	(0.185)
Hansen Test	(96.93)	(0.940)
Observations	800	
Number of Id	100	
Number of instruments	135	

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

positively correlated with idiosyncratic volatility at a 10% level of significance suggest that with more diverse board environment firm risk are likely to induce more. This is because of several reasons, one is that strategies with diverse board are less persistent with time and situation if we compare it with less diverse board, secondly, there is conflict in the board room because of diversity hence, there is difficulty to make decisions, thirdly, this volatility suggests that the diverse board makes decision making more erratic, finally it is difficult for analyst to forecast and predict decision with a diverse board. This result is consistent with the study of Giannetti and Zhao (2015). Board size, audit committee independence and minority shareholder representation did not find any significant influence on idiosyncratic volatility in this study. Thus, on basis of this evidence, we may conclude that there is no empirical evidence that board size, audit and minority shareholder can affect firm idiosyncratic risk either positive or negative. The estimate of board meetings is significant with a negative sign. The estimate suggests that whenever board members meet often frequently, then the associated risk of

the firm will be less. This may be because of close analyses of firm operations with very short period of time which Control some unpalatable elements on the nick of time, that may harm firm if board of directors not meet frequently. This result is contradicting with the results of Vafeas (1999), he finds that board with frequent numbers of meetings experience less firm value. Similarly, the estimated coefficient of family members on board (-0.845) are negative with a 10% level of significance. These results insist that the high number of directors of founder family in the board play their positive role to lessen idiosyncratic volatility.

All control variables in this study are found significant except firm age which is being constantly insignificant across all the models. Among those significant control variables firm size (-1.029) and leverage (-0.461) are negatively associated with firm idiosyncratic risk. While firm growth (0.205) significant at 5% level insist that idiosyncratic risk increases with the growth of the firm.

4.4 Relationship between CGI and Industry Volatility

In this portion of the study we investigate the impact of corporate governance index on industry specific volatility. Up to now we measure the association of corporate governance on firm specific volatility (idiosyncratic volatility) from different angles. But this model of the study is more interested because of its uniqueness from other models of the study. In this model our effort is to reveal that what is influence of corporate governance on industry specific volatility. To demonstrate this relationship, this study uses dependent variable is idiosyncratic volatility index of these industry where our sample belongs. Whereas, the independent variable is corporate governance index of

Table 4.4: Impact of CGI on Industry Idiosyncratic Volatility

IDIOVOL	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
VARIABLES	SUGAR	ENERGY	MANUFACTURE	CEMENT	TEXTILE
L.IDIOVOL	1.387**	0.43**	0.245***	0.364***	0.519**
	(0.655)	(0.18)	(0.040)	(0.177)	(0.035)
CGI	-4.061**	-24.72**	-0.175***	-0.022	-0.179***
	(1.523)	(5.80)	(0.073)	(0.136)	(0.100)
Leverage	8.497**	38.32	-0.482*	0.200***	0.109
	(4.176)	(24.04)	(0.729)	(0.982)	(0.370)
Firm size	31.607**	23.92	-0.006**	0.035	-0.467***
	(13.579)	(14.88)	(0.141)	(0.230)	(0.275)
Firm age	-6.135	46.64**	-0.086	0.079*	0.137
	(3.922)	(23.52)	(0.202)	(0.179)	(0.168)
Firm growth	-1.618*	-8.35***	0.319**	0.083	0.361**
	(0.681)	(4.01)	(0.175)	(0.530)	(0.203)
Constant	-10.382**	-74.65**	0.928*	0.470**	1.104***
	(8.561)	(50.20)	(0.847)	(1.241)	(0.324)
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Observations	67	85	111	107	257
Number of Id	7	9	13	12	28
Hansen test (P-value)	0.894	0.962	0.538	0.740	0.963
AR (2) p-value	0.165	0.847	0.237	0.309	0.100

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1p<0.01, ** p<0.05, * p<0.1

these firms and control variables to capture unavoidable elements. Similarly, this study regress five model of major industries of these firms which belongs to the study sample i.e. cement industry, sugar industry, manufacturing, textile and energy sector of Pakistan.

The diagnostic tests of the models are valid i.e. there is no 2nd order serial correlation in the instruments used in the models and the instruments have used in this study are valid and exogenous throughout the models. Because the P-value of both tests are greater than 0.05 which we cannot reject it. The lag of dependent variable of all Models shows positive association with idiosyncratic volatility mean that it follows idiosyncratic volatility of the previous year of the industry significantly. The corporate governance index of sugar industry and energy sector is significant at 5% and shows negative relationship with industry specific risk. It means that as CG increases in sugar and energy industry, the relative risk of these firms decreases simultaneously. Similarly, the relationship of corporate governance on manufacture and textile industry is significance at 1% level and shows inverse relationship with volatility of these industries. Furthermore, the association between corporate governance and cement industry is insignificant and reveal inverse association with cement industry. Among control variables leverage of the sugar and cement industry is significant and shows positive nexus with the idiosyncratic risk. Leverage of the manufacture industry is also significant but shows inverse association with idiosyncratic volatility of manufacture industry. Moreover, energy and textile are not significant in this regard. The association between idiosyncratic volatility and firm size is significant for sugar, manufacture and textile industry and demonstrate inverse relationship with idiosyncratic volatility of these

industries. While, energy and cement industry are not significant in this regard. Firm age is another control variable which shows significant and positive relationship with energy and cement industry which demonstrate that as firm age increases risk of these industries also increases. Moreover, this relationship for textile, manufacture and sugar industry is insignificant. Last but not least, firm growth is significant and negatively associated with sugar and energy sector. While this relationship for manufacture and textile industry is positive and significant but insignificant for cement industry.

Chapter 5

Conclusions

5.1 Key findings

The impact of corporate governance (CG) on idiosyncratic volatility has been widely investigated more in developed countries. Whereas, in developing countries like Pakistan, very few studies discussed the effects of corporate governance on idiosyncratic volatility or firm risk. Therefore, in this regard, the need of more research required in this specified area in Pakistan.

The significance of this study is twofold. First, we have explored the relationship between corporate governance (CG index and CG attributes) on idiosyncratic risk. This study uses a sample of 100 nonfinancial Pakistani firms for the time span of 2003 to 2017. While applying the system GMM the outcome of the study shows a negative relationship between corporate governance index and idiosyncratic volatility of the firm. Similarly, the estimates of the board independence, family members on the board, board meetings and information disclosure had also indicated the significant inverse association with idiosyncratic volatility. Moreover, this study also found a positive relationship of gender diversity and chairman duality with idiosyncratic volatility. This result is consistent with many previous studies such as Ferreira and Laux (2005), Alam and Shah (2013) and Li et al. (2012). Current study suggests that to overcome firm specific risk i.e. cash flow volatility, sales volatility and earning per share volatility quality corporate governance play significant role in developing countries like Pakistan. For firms to achieve stability in its idiosyncratic risk should adopt to arrange a greater number of

board meetings, disclosing the information regarding its board of directors and firm performance and contract more outside directors on board room. While in similar context firm should separate the role of chairman and CEO of the firm and avoid gender diversity because these components may increase the volatility of the firm.

Secondly, this study empirically investigated to measure the relationship between ownership structure (institutional ownership, family ownership and managerial ownership) and the idiosyncratic volatility of the firm. Among ownership concentration, we found that family ownership negatively correlated with idiosyncratic volatility of the firm. Contrary to this, institutional ownership and managerial ownership concentration have shown-off the positive relationship to the idiosyncratic volatility. These results are similar to the analysis of Bushee and Noe (2014), Hutchinson (2001) and Alam and Shah (2013). The inverse relation of family ownership-idiosyncratic volatility can be justified by the argument that family ownership may not likely to encourage firms to adopt risky strategies for the sake of good performance. The positive association of managerial ownership and idiosyncratic volatility can be justifying by the argument that active check and balance of CG can force managers to undertake (idiosyncratic) risk in order to assure better performance. Similarly, institutional investors keep monitoring and collect information regarding the firm's activities in order to make risky ventures for high returns.

5.2 Policy recommendation

- The study has some significant implications for firms in order to enhance their performance. Firms should aim at independent directors on the board and should

not allow institutions to be their major shareholders since institutional ownership accelerate firm's idiosyncratic risk.

- Firms should also encourage its family-directors to have more ownership in its stocks since that would induce them to make better decision and it also leads to reduce firm specific risk. Also, a single person should not hold both the chairman and chief executive officer since it provides a decision-making power that hyper idiosyncratic volatility of firm.
- The more outsiders on the board, which captures board independence, the better governance a firm has and the less risk a firm is expected to incur.
- The more outsiders on the board, which captures board independence, the better governance a firm has and the less risk a firm is expected to incur.
- It is recommended for government concerned authorities regarding corporate sector i.e. Security and Exchange Commission of Pakistan (SECP) to adopt and conduct corporate governance codes and practices to ensure of implementations and regulations of these practices in order to enhance performance and keep risk at a stable and low or moderate level.
- The more outsiders on the board, which captures board independence, the better governance a firm has and the less risk a firm is expected to incur.It is for their part of managers, investors, shareholders, and firms that they should follow and implement strict corporate governance practices, and to invest in those corporations which follow and supervised good corporate governance practices.

5.3 Limitation and future research

There are some limitation and various aspects of the study under which future research can be conduct. These are the following.

- The current study only used 100 non-financial firms listed in PSE. One can utilize the data of more than 100 firms that can capture the scenario clearer and show clearer picture of CG environment prevail in Pakistan.
- This study has investigated the impact of CG on idiosyncratic volatility index (cash flow volatility, sales volatility and earning per share volatility). future research can be done in the direction that instead of using the index of these volatility, the CG impact can be identified through using these mention proxies of idiosyncratic volatility separately one by one. While keeping the right side of the equation constant.
- Last but not least, this research can be extended by including some macroeconomic variables such as exchange rate volatility, interest rate volatility, import and export using as an independent variable.

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