

**Impact of Cash Flow Volatility on Corporate Investment and  
Dividend Payment: A Case Study of Non-Financial Sector of  
Pakistan**



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## CERTIFICATE

This is to certify that this thesis entitled **“Impact of Cash Flow Volatility on Corporate Investment and Dividend Policy: A case study of Non-Financial Sector of Pakistan”** submitted by **Mr. Sardar Ali** 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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**IN THE NAME OF**

**ALLAH**

**The Most Beneficent**

**The Most Merciful**

“To Allah belongs whatever is in the heavens and whatever is in the earth. Whether you show what is within yourselves or conceal it, Allah will bring you to account for it. Then He will forgive whom He wills and punish whom He wills, and Allah is over all things competent.”

(Al-Baqarah, 2:284)

## **GOLDEN SAYING OF**

## **THE HOLY PROPHET**

### **(Peace and Blessings of Allah be Upon Him)**

“Whoever follows a path in pursuit of knowledge, Allah will make easy for him a path to Paradise. No people gather in one of houses of Allah, reciting the Book of Allah and teaching it to one another, but the angels will surround them, tranquility will descend upon them, mercy will envelop them and Allah will mention them to those who are with Him. And whoever is hindered because of his bad deeds, his lineage will be of no avail to him.”

(Sunan Ibn e Majah)

**Dedicated**  
**To**  
**My Beloved Parents**

(Whose prayers, support and encouragement always enlightened my way)

**&**

**Of course my Honourable Teachers**

(Who educate me and made me believe that I can do everything)

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## **Abstract**

This study examines the impact of cash flow volatility on the corporate investment behaviour and dividend decision of Pakistan's non-financial firms. The study also aims to explore whether the impact of cash flow volatility on investment spending varies across financially constrained and unconstrained firms. To identify the two set of firms; we use the Total Assets and Dividend Payout ratio methods. We employ Generalize Method of Moments (GMM) to deal with problem of endogeneity and utilize 274 non-financial firms' data over the period 2006 to 2015. The overall results confirm that volatility in cash flow adversely effects investment and dividend decisions of the firms. It is further confirmed that investment behaviour of the two set of firm's response differently to cash flow volatility. However, the magnitude of response directly influenced by the criteria used for the separation of the two set of firms. Financially constrained firms are more sensitive to cash flow variation, as these firms significantly reduce their investment whenever experience a volatile cash flow.

**Keywords:** Investment, Dividend, Cash flow volatility, financially constrained, Financially Unconstrained, GMM

## Abbreviations and Acronyms

SZ	Size
ROA	Return on Assets
CFV	Cash Flow Volatility
CF	Cash Flow
DP	Dividend Payout ratio
INV	Investment
LEV	Leverage ratio
SG	Sale Growth
ROE	Return on Equity
MBR	Market-to-Book ratio
EPS	Earnings Per share
DPS	Dividend Per Share
GMM	Generalized Method of Moments
SBP	State Bank of Pakistan
U.S	United States
GCC	Gulf Co-operation Council
R & D	Research and Development
U.K	United Kingdom
NPV	Net Present Value
KSE	Karachi Stock Exchange
OLS	Ordinary Least Square
2SLS	Two Stage Least Square
3SLS	Three Stage Least Square

# Chapter 1

## Introduction

### 1.1 Cash flow volatility and Investment spending

The economic agents associated with firms productive activities devote much time to examine and identify the dynamics which could cause volatility in cash flow.<sup>1</sup> Cash flow volatility is an important issue as it might lead to dead weight losses in the form of distraction managers' concentration from productive activities to non-productive actions, deferment in capital expenditure and delay in debt repayments. Cash flow volatility is costly for the firm as it causes variations in internal cash flow which lead to cash flow shortfall, and firm responds to these variations through reduction in investment spending instead of acquiring external finance (Minton and Schrand, 1999). Variations in cash flow can be smoothed by making use of external capital,<sup>2</sup> nevertheless cost of external capital is higher than internally generated funds and this higher cost decreases investment spending of the firm, hence firms at first should utilize internally generated funds for financing their investment projects, however, when these funds are not sufficient then they should rely on external capital market to raise funds (Myser and Majulf, 1984). Finance models assume that internally generated funds are available at lower cost than external funds for investment and utilizing internal funds decrease tax cost for the firm (Bond and Meghir, 1994). High level of cash flow volatility causes deficiency of internally generated cash flow, which in turn diminishes the

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<sup>1</sup> Cash flow is the amount of cash generated by a firm from operating activities. It shows that whether a firm is capable to generate enough positive cash flow in order to maintain and grow its operations.

<sup>2</sup> External capitals are funds which are raised from outside sources by firm for financing purposes.

capability of firm to finance its desired investment.<sup>3</sup> In case of high volatility in cash flow, the expected future cash flow and earnings level of the firms reduce and their investment pattern becomes lumpy over the time (Smith and Stulz, 1985; Froot et al. 1993). Firms facing high volatility in cash flow temporarily limit their investment spending and employment until they find precise solution to overwhelm this problem (Bloom, 2009).

The investment decisions of a firm are sensitive to its cash flow volatility. Generally, cash flow-investment sensitivity of financially constrained<sup>4</sup> firms is higher than those firms which are less constrained (Fazari et al. 1988). Nevertheless, those financially constrained firms which experience operating profit show positive cash flow-investment sensitivity while those with operating loss show negative cash flow-investment (Bhagat et al. 2005).

Cash flow volatility is positively correlated with the amount of financial slack,<sup>5</sup> firms whose cash flow is more volatile than their competitors maintain a high amount of financial slack consequently their investment spending become less sensitive to internally generated funds (Cleary, 2006). Finance risk management theory document that if a firm hold smooth (less volatile) cash flow, its shareholders are better off in that case.<sup>6</sup> Furthermore, holding a smooth cash flow is beneficial for the firms as it reduces firm's dependence on external funds which are costly (Froot et al. 1993). Earnings and cash flow indicate the financial stability of a firm and they directly affect management decisions and risk management policy of the firm. Cash flow and earnings volatility are negatively associated with value of the firm.<sup>7</sup> Firms which hold smooth cash flow are highly valued by investors relative to those with volatile cash flow; usually investors, analysts and managers focus on earning volatility as compared

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<sup>3</sup> Risk management theory proposed the relation between investment and volatility, when there exist imperfection in market then cost of external funds is higher than internal funds and cash flow volatility is correlated with underinvestment. See Myser (1977) for further detail.

<sup>4</sup> Financially constrained firms are those firms which do not have sufficient internally generated funds to finance their investment activities. See Guariglia (2008) for detail.

<sup>5</sup> Financial slack also called firm's saving. It is the extra money available with firm in case of downshift in sale, revenue or profit.

<sup>6</sup> Firms with stable cash flow pay high amount of dividend to its shareholders and exhibit high probability of paying dividends (Chay and Suh, 2009).

<sup>7</sup> Firm value is proxy by Tobin Q: It is the ratio of market value of total assets divide by its replacement cost.

to cash flow volatility since earning volatility increase the possibility of negative earning (Allayannis and Weston, 2006).

The chances of default and cost of borrowing for the firm increased whenever volatility in its cash flow rises. Hence smoothening of earnings and cash flow will reduce the probability of default as well as the cost of borrowing for the firm (Trueman and Titman, 1988). The agents (suppliers and customers) do not prefer to engage in business with those firms which exhibit higher cash flow volatility and this in turn aggravate future performance of the firms (Shapiro and Titman, 1986). Variations in cash flow and earning normally affect small and low leverage firms as compared to financially healthy and large firm. Firm with low leverage cannot take additional debt because they have a smooth growth prospect and future cash flow, therefore, they are more sensitive to variations in cash flow (Allayannis and Weston, 2006).

According to the best of our knowledge previous studies have frequently ignored the role of volatility while forecasting future cash flow and earnings level of the firms. Cash flow volatility encompasses additional information about the performance of a firm, therefore, while forecasting future cash flow and earnings level of a firm, the historical volatility of cash flow should be incorporated in forecasting models to get more accurate and less biased results (Brennan and Hughes, 1991; Schipper, 1991; Minton et al. 2002). Firms generally underinvest when cash return on asset (ROA) is low, however, any increase in cash return on assets increases internally generated funds and that in turn boost up corporate investment (Minton et al. 2002).

Furthermore, volatility negatively affects information available about a firm which leads to raise cost of external capital for the firms. Consequently, firms that have less volatile cash flow and earnings their management issues earning forecast more frequently than those having high volatile cash flow and earnings (Waymire, 1985). Analysts usually prefer firms

whose earnings are easy to forecast. Less information leads to lower liquidity (supply of external funds) and raise the cost of external capital for the firms (Amihud and Mendelson, 1988; Walther and Willis, 1999).

According to existing literature the relationship between cash flow volatility and investment remain vague, as different views exist about relationship of cash flow volatility and corporate investment of financially constrained and unconstrained firms. According to Boyle and Guthrie (2003) and Hirth and Viswantha (2011) cash flow volatility has positive impact on investment spending of financially constrained firms. However, numerous studies like Minton and Schrand (1999) and Almieda et al. (2004) are of conflicting view by claiming negative association between volatility and investment. Furthermore, Boyle and Guthrie (2003) stated that volatility in cash flow does not affect the investment of unconstrained firms because these firms do not face the problem of cash flow shortfall hence there is no incentive for them to decrease investment or over-invest. In contrast to their opinion, Hadlock and Pierce (2010) claimed that cash flow volatility influence investment expenditures of financially unconstrained firms nevertheless these firms over a long period of time spread their investment financing that in turn decreases the impact of volatility on investment.

## **1.2 Cash flow volatility and Dividend payment**

Dividend policy plays a significant role in corporate finance and it is taken a vital issue by researchers. In the field of financial management, it is considered as one of the most debatable issue. The value of a firm in corporate finance can be understood in term of dividend.<sup>8</sup> Normally, firms distribute free cash flow among their shareholders in the form of dividends, therefore, firms holding high level of cash flow pay high dividends. However, cash flow volatility performs a significant role in dividend policy of a firm as it negatively

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<sup>8</sup> Present value of all future dividends gives the value of all equity firms.

affects the dividend amount, hence, managers of the firm should take volatility into consideration while making dividend decisions. Firms facing high volatility in cash flow want to pay low dividend and exhibit low probability of paying dividend. Under condition of uncertain cash flow managers of the firm aimed to avoid future financial troubles and problem of reduction in firm's stock price, therefore, they prefer to reduce dividend amount. Generally, firms facing high volatility in cash flow face difficulties in accessing external capital market because volatility increases the risk for capital providers, therefore, they demand higher return.<sup>9</sup> Due to high volatility firms become financially more constrained and increase their reliance on internally generated funds that in turn adversely affect dividend payment (Chay and Suh, 2009).

Financially constrained firms with unstable cash flow face higher cost of external capital than internally generated funds. They are more dependent on internally generated cash flow and pay the lowest amount of dividends as they fear that future cash flow will fall short. Managers of the firm avoid high dividend payment until they are assured of their capability to maintain dividends at high level in future. The earnings level of the firm and its stability are supposed to be most important factor in the dividend decision (Lintner, 1956). More than two-thirds of the dividend-paying firms report that the most important factor which effect dividend decision is stability of future cash flow (Brav et al. 2005).

Whenever a firm needs a significant amount of funds for investment purpose or when its earnings are depressed, in that situation it can maintain a regular payment of dividends either by using corporate cash reserves or borrowing funds from external capital market. Volatility in cash flow causes shortage of funds (available for investment and dividend payment) that in turn averts manager to pay dividend. Shareholders usually favour a stable dividend policy (Lintner, 1956; Brav et al. 2005).

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<sup>9</sup> Higher risk higher return.



Earnings have a strong positive impact on dividend payment and paying probability. Small firms sustain a lower amount of earnings and cannot afford dividend payment because they are in the capital infusion stage<sup>10</sup> of their life cycle, whereas large and established firm holds high amounts of aggregate profit therefore pay high dividends (DeAngelo et al. 2006). After distribution of free cash flow in the form of dividends, manager becomes unable to finance the projects which are in the best interest of firm as they face shortage of internally generated funds (Bradley et al. 1998).

In response to high volatility usually firms reduce investment and dividend amount and adjust cash holding balance or might rely on external financing. However, Chinese firms do not reduce dividend and investment when experience high volatility in cash flow. They prefer to raise funds in the external capital market instead of adjusting cash balance or increasing non-operating cash flow (Deng et al. 2013).

To the best of our knowledge we have limited information on the role of cash flow volatility as prior literature did not discuss the role of volatility as a significant factor of dividend policy similarly recent studies also ignore it and even do not consider volatility as a control variable (Fama and French, 2001; DeAngelo et al. 2006). Moreover, there is ambiguity among researchers regarding the decisions that whether investment is decided first or dividend. The prior study states that dividend is decided before taking investment decisions (Lintner, 1956). However, some researchers showed that firms decide dividend and investment simultaneously (Brav et al. 2005).

### **1.3 Research Gap**

In the area of research cash flow volatility is an important issue in the recent period, it has been taken as a part of debate by researchers, but unfortunately few studies have been carried out which show the relation among cash flow volatility, investment and dividend payment of

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<sup>10</sup> The stage of a company's lifecycle where capital is invested into the company in the form of cash, equity or debt.

a firm. Earlier studies have only identified the determinants of investment and dividends and they paid very little attention on how fluctuation in cash flow affects the investment and dividend decision of the firms. However, some studies<sup>11</sup> have explored the consequence of volatility associated with cash flow. Additionally, certain research studies<sup>12</sup> divided the firms into financially constrained and unconstrained category on the basis of different measures in order to examine the role of volatility in the presence of financial constraint.

Nevertheless, literature in the context of Pakistan is very limited which explores the role of cash flow volatility in investment and dividend decisions of firms. Therefore, it is worthwhile to fill this research gap by exploring the consequences of volatility associated with cash flow. Moreover, it seems necessary to examine the influence of cash flow volatility on investment spending of financially constrained and unconstrained firms separately. The reason behind performing disaggregated analysis is that financially constrained firms face difficulties in acquiring funds from external capital market thus investment spending of financially constrained firms are more sensitive to cash flow and these firms response differently to cash flow shocks (Cleary, 2006 ; Han and Qui, 2007; Denis and Sibilkov, 2009 and kefee and Tates, 2013). Hence, the study divide firms into financially constrained and unconstrained category in order to separately analyse the effects of cash flow volatility on investment spending of both set of firms.

#### **1.4 Research Questions:**

This study seeks to answer the following questions:

- 1) How cash flow volatility effect investment spending of the firms?
- 2) Does volatility effects dividend payment and dividend amount of the firms?

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<sup>11</sup> (Bradley et al. 1998; Minton and Schrand 1999; Abadeh and Janatpour, 2014)

<sup>12</sup> (Han and Qui, 2007; Keefe and Tates, 2013)

- 3) Whether the impact of cash flow volatility on investment is same for financially constrained and unconstrained firms or varies across both types of firms?

### **1.5 Significance of the study:**

This study contributes a significant addition to the literature of investment and dividends.

This research work enhances the literature of investment and dividend in several ways:

- 1) The study uses the models provided by Minton and Schrand (1999) and Bradely et al. (1998) for the case of Pakistan.
- 2) It employs Generalized Method of Moment (GMM) technique for estimation of both investment and dividend model.
- 3) It disaggregates the sample into financially constrained and unconstrained firms in order to examine the the intensity of cash flow volatility on corporate investment across these groups.
- 4) Finally, this study uses updated data for the period of 2006-2015.

### **1.6 Organization of the study:**

Chapter 1 covers introductory part of the study. Chapter 2 provides a detail about critical analysis of prior literature in the area of interest. Chapter 3 is about methodological structure used for capturing the relationship, econometric models, data description, definition of variables and econometric technique. Chapter 4 consist of estimations and results interpretation whereas chapter 5 provides conclusion of the study and suggestion of policy.

## **Chapter 2**

### **Literature Review**

Cash flow has an important role in the investment as well as dividend decisions of the firm. A number of studies evaluate the response of corporate investment and dividend policy to cash flow volatility. So before proceeding with this study it is important to have extensive idea about the current development in literature. In this chapter, we discuss the literature related to our study objectives to identify the research gap and describe the mechanism in order to fill the research gap.

#### **2.1 Cash flow volatility and investment**

This section discusses prior literatures which link cash flow volatility and corporate investment and also explores the impact of volatility on different financial variables.

The seminal work of Minton and Schrand (1999) analyse the impact of cash flow volatility on corporate investment and cost of external capital. This study applies OLS technique on quarterly data of 1287 U.S (United States) firms for the period 1989 to 1995 and find that cash flow volatility (measure through the coefficient of variation of cash flow) has significant negative correlation with investment expenditures and positive correlation with the cost of external funds. The study argues that cash flow volatility decreases internal funds therefore in response to such shocks, firms decrease their investment spending. Furthermore, higher volatility increases the likelihood of accessing external capital market and raises the cost of external funds. However, using different econometric technique (Fixed effect and Generalised Least Square) similar study is conducted by Abadeh and Janatpour (2014) for 144 Iranian firms listed at Tehran Stock Exchange for the time period of 1979 to 1991. They come with contrary results by stating that cash flow volatility does not contribute in investment decisions of the firms in other words cash flow volatility is insignificant

determinant of investment. Following Minton and Schrand (1999), the Minton et al. (2002) establishes the link among cash flow volatility, investment, future cash flow and earnings level of the firm. Findings of this study confirm that cash flow volatility has negative impact on investment outlay and future cash flow of the firms. It is also observed that firms can precisely forecast their future cash flow and earnings level when they incorporate cash flow volatility as an explanatory variable in their forecasting model of performance, and such type of model is preferred over traditional model which exclude the role of volatility.

To examine the rationale behind underinvestment and the effect of hedging on corporate investment expenditures under situation of uncertain cash flow (volatile cash flow), study is conducted by Deshmukh and Vogt (2005). This study uses fixed and random effect model on panel data of U.S firms for the period of 1992 to 1996 and finds that cash flow volatility decreases investment spending of the firms. However, hedging of cash flow can help in cash flow stability and investment decisions of hedger firms are less sensitive to cash flow volatility than non-hedger firms. They also find that among hedger firms, investment-cash flow sensitivity varies according to hedging value. Beside its negative effect on investment, volatility also negatively affects corporate employment as shown by the study of Bhagat and Obreja (2013). Using fixed and random effect model on U.S firm level data they investigate the rate of investment and employment before and after crisis of 2008-2009. Results indicate a strong negative correlation between cash flow volatility, corporate employment and investment expenditures. However, this negative correlation is high during a post crisis than pre crisis period. They also observe that post crisis the investment grew sluggishly and failed in reaching to the pre-crisis level. Post-crisis, firms face unchanged and low cost of capital, good investment opportunities and they are not financially constrained but due to high volatility in cash flow firms limit their investment and hiring activities which impede the growth of investment.

Booth and Cleary (2006) while exploring the consequences of cash flow volatility use a different approach regarding the nature of the firms (constrained and unconstrained firms). They select 1133 U.S firms for analysis and apply fixed effect model on the obtained data. Findings of the study reveal that cash flow volatility negatively affects investment decisions of financially constrained and unconstrained firms but the intensity is high in case of financially constrained firms. However, when they hold a high level of financial slack, their investment decisions become less sensitive to volatility as compared to those constrained firms which hold low level of financial slack. This study also document that financially constrained firms facing high volatility in cash flow, strengthen their balance sheets by raising financial slack in full knowledge and that in turn reduces the correlation between future cash flow and investment expenditures of the firms. Similar approach uses in recent research of Keefe and Tate (2013). Using 16228 U.S firms' data for the period of 1965 to 2011, this study categorizes the firms in financially constrained and unconstrained. Empirical analysis shows that financially constrained firms reduce their investment expenditures when they experience high volatility and negative growth in cash flow. However, firms do not decrease investment until the growth of cash flow remains positive irrespective of cash flow volatility. They also claim that the strength of correlation between volatility and investment increases with an increase in financial tightness, nevertheless holding a high amount of cash decreases this intensity.

Cleary (2006) examines the investment decisions of different firms from seven largest developed economies (Canada, Australia, Japan, France, Germany, United States and United Kingdom) by using their ten years unbalanced panel data. Results indicate that investment-cash flow sensitivity of financially stronger and high payout firms (financially unconstrained firms) is higher than weaker and low payout firms. Firms which experience higher cash flow volatility are found to be less investment-cash flow sensitive. In recent work, Mulier et al.

(2014) analyse firm level data of six European countries (Finland, Belgium, Czech Republic, France, Sweden and Hungary) to investigate the effect of cash flow volatility on investment-cash flow sensitivity. Their study results show that investment-cash flow sensitivity is high in case of financially constrained than unconstrained firms. Study also document that positive shock in cash flow of constrained firms reduces demand and cost of external funds severely which in turn boost up their investment spending. They also observe that within the same level of constraints, firms whose cash flow are less volatile have higher investment-cash flow sensitivity.

Olper et al. (1999) study the impact of cash flow volatility on corporate cash holdings for publicly traded U.S firms. Findings of this study reveal that firms which have strong growth opportunities, volatile cash flow and involve in riskier activities accumulate more liquid assets and cash out of their cash flow. However, firms that are larger in size and have easy access to external capital market grasp less cash and liquid assets as they can acquire financing from external market at lower cost. It is also found that firms generally hold more cash and liquid assets for future investment when they expect the future cash flow shortfall and increase in the cost of external funds. Han and Qui (2007) use different econometric technique (GMM) on quarterly data of U.S firms and report positive correlation of cash flow volatility with cash holdings and negative correlation with investment for financially constrained firms however this relationship is found insignificant for unconstrained firms. They also conclude that typically cash holdings of a firm depend on its financial tightness because financial constraints make an inter temporal trade-off between current and future investment. When the risk of future cash flow cannot be fully diversified then these inter temporal trade-off give incentives to constrained firms for precautionary savings. Findings of Han and Qui (2007) are confirmed by Denis and Sibilkov (2009). Empirical results of the study indicate that high amount of cash holdings by constrained firms is correlated with

higher levels of corporate investment and hedging needs. Study argues that holding high levels of cash allow constrained firms to undertake those projects which increase value of the firms that might otherwise be bypassed. Similar study is conducted by Bates et al. (2009) to inspect the determinants of corporate cash holding for U.S firms by collecting data of 13599 firms for the time period of 1996 to 2006. Authors use OLS estimation technique in this empirical study. They find that firms with volatile cash flow, poor access to external capital market and better investment opportunities accumulate more cash as they fear that adverse shocks in cash flow can cause funds shortage.

Allayannis and Weston (2003) conduct a study to find the relation of cash flow volatility and earning volatility with firm's value. This study reports that volatility is negatively valued by investors and both cash flow and earnings volatility are negatively correlated with value of firm but association of earning volatility with firm value is stronger. The authors use OLS and fixed effect (FEM) estimation technique on quarterly data of 3390 firms for the time period of 1986 to 2000. It is also found that firm with smooth cash flow is highly valued (at premium). Similar results are given by Rountree et al. (2008) who establish the relationship between cash flow volatility and value of the firm. This study applies OLS econometric method on annual data of 4000 U.S firms for the time period of 1987 to 2004. Empirical results of this study point out that cash flow volatility negatively affects the value of the firms. Authors also state that firms with volatile cash flow are negatively valued by investors and they feel more reluctant to invest in their stocks.

Saquido (2003) conduct a study on 233 firms of Philippine for the period of 1989 to 2003. For empirical analysis he uses OLS and GLS estimation technique and argued that cash flow is highly significant determinant of investment spending of the firms. Further, he claims that positive relation of cash flow with investment indicates the imperfection of capital market, which leads to finance hierarchy. However, Allayannis and Mozumdar (2003) argue



that when a firm incur loss of cash then its investment expenditures are independent of cash flow. Authors find that investment expenditures of financially constrained firms are high sensitive to cash flow. Furthermore, they also find that investment-cash flow sensitivity over the time for small firms are decreasing as size of the firm increases. The study also document that degree of asymmetric information between borrower and lender decrease as the firm grow in size and this in turn raise supply of external funds to these firms.

### **2.1.1 Studies on cash flow volatility in Pakistan**

In the context of Pakistan, Rizwan and Javed (2011) examine data of nonfinancial firms of Pakistan listed at Karachi Stock Exchange (KSE) to explore the determinants of corporate cash holdings. Study reviews that cash holdings is positively correlated with net assets, cash flow and cash flow volatility whereas negatively correlated with leverage, net working-capital and capital expenditures. Moreover, Ahsan and Ullah (2013) also study effect of cash flow volatility on cash-cash flow sensitivity. They use panel data of 377 manufacturing firms listed on KSE and classify them into financially constrained and unconstrained firms. Empirical analysis demonstrates that almost all firms either financially constrained or unconstrained exhibit cash-cash flow sensitivity, which implicate that firms accumulate cash because usually they prefer to utilize internal funds while investing in projects that have positive NPV. In developing countries like Pakistan growth opportunities are unlimited, but both set of firms (financially constrained and unconstrained firms) exhibit cash-cashflow sensitivity. Authors attribute the cash-cash flow sensitivity of financially constrained firms to growth opportunities available to these firms, whereas unconstrained firms exhibit cash-cashflow sensitivity due to high leverage ratio which affects cash flow volatility. Tahir and Ullah (2014) reporte positive association of cash holdings with cash flow and cash flow volatility while negative correlation with leverage ratio. Large and high leverage firms have easy access to external capital market and obtain financing at lower cost so they do not hold

more cash out of their cash flow. Using non-financial firms of Pakistan, a recent study is conducted by Shabbir et al. (2016) that confirms the findings of Tahir and Ullah (2014). Results of this study indicate positive correlation of cash flow level and cash flow volatility with cash holdings of the firms. While explaining the factors of corporate cash holdings both pecking order and trade-off theory<sup>13</sup> play a significant role. They also observe that factors which determine corporate cash holdings are same in both emerging and developed countries.

Haque et al. (2014) study the determinant of investment in the context of Pakistan by using 159 textile firms listed at KSE for the time period of 1998 to 2011. They use OLS estimation method for analysis and conclude that cash flow is significant and positively related with investment expenditures of the firms. They state that managers of the firm initially utilize internally generated funds for financing of projects then go for external financing in case of internal cash flow deficiency.

## **2.2 Cash flow volatility and dividend Payment**

This section explains the previous studies which examine impact of cash flow volatility on dividend payment of the firms.

The very first attempt to link cash flow volatility with dividend payment is taken by Bradley et al. (1998). This study uses data of 75 real estate investment trust (REITs) firms of U.S for the period of 1985 to 1992 for empirical analysis. Results of the study reveal that cash flow volatility is a significant determinant of dividend policy and negatively correlated with dividend payment and usually firms pay lower dividends when managers feel uncertainty in future cash flow. It is also found that the share price of the firm negatively reacts to dividend cut. Furthermore, dividend cuts negatively affect the future expected cash flow and increase

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<sup>13</sup> Pecking order theory describes that cost of financing increase with asymmetric information. Firm should use internal funds however in case of these funds shortage, debt should be preferred over equity while Trade-off theory suggest that firm should choose the combination of debt and equity in its capital structure where cost equates benefit. See Myers and Majluf (1984) for detail.

its volatility as evidenced by Lee and Suh (2008). This study reveals that those firms which repurchase shares as a substitute of dividend payment, they exhibit higher cash flow volatility compared to those which only pay dividends. Using Tobit and Logit model on annual data of seven major countries, Chay and Suh (2009) find that volatility negatively affects the amount of dividend payment and probability of paying dividend. They also claim that impact of volatility is highly significant and dominant over other determinants of dividend policy. In the context of China, contrary results are found by Deng et al. (2013). This study uses OLS model on ten years' annual data of Chinese firms. The econometric findings of the study indicate that in presence of cash flow volatility, Chinese firms neither cut investment spending nor cut dividend payment, but rather continue investment at high level and pay high amount of dividend. They prefer to use external funds as the major instrument to deal with cash flow volatility instead of using non-operating cash or adjustment of their cash balance. This study also document that in presence of cash flow volatility, there is N-shape non-linear relation between investment and dividend.

Al-kuwari (2009) conduct a study to examine the dividend decisions of 191 firms listed at Gulf Co-operation Council (GCC) Stock Exchange. He applies Random Effect (REM) and Tobit econometric technique in this study. Empirical results of this study indicate that main financial variables which effect dividend payout ratio are government ownership, firm size, firm profitability and business risk. They measure business risk through volatility of net earnings and find that it is negatively related with payout ratio of the firms. Similarly, Musiega et al. (2013) study the impact of earnings volatility on earnings predictability and dividend payment. The authors apply OLS model on annual data of 30 Kenyan firms for the period of 2007 to 2011. Results of the study illustrate that earnings volatility adversely affect predictability of earnings. They claim that manager feel hesitant to pay dividend when earnings of the firm are volatile.

DeAngelo and DeAngelo (1990) analyze the annual data of U.S firms for the time period of 1980 to 1985. They find that main reason behind dividend reduction is volatility and declining of earnings. They further state that earning problem is beyond the control of managers, i.e. it can be accredited to weak production market or general economic condition. It is also quoted in this study that managers of the firms with historical dividend paying behavior are reluctant to reduction and dividend cuts. Similar argument are given in the study of Georgen et al. (2003), they also study the impact of cash flow fluctuation on dividend cut. Authors collect annual data of 221 German firms for the period of 1984 to 1993. This study uses Order Probit and Binomial Probit estimation technique for empirical analysis. They find that cash flow fluctuation facilitate dividend reduction. Similarly, using different econometric technique such as 2SLS (two stage least square) and 3SLS (three stage least square) on forty years data of 8549 U.S firms for the period of 1965 to 2004, Stepanyan (2003) claims that firms facing higher cost of external capitals reduce their dividend payment in order to prevent excessive reliance on external funds. He also states that dividend reduction is positively correlated with cash flow volatility while negatively correlated with financial slack. In the context of U.K, Benito and Young (2003) conduct a study to examine the rationale behind reduction and omission of dividend. In this study they collect annual data of 2963 firms and applied Probit model for empirical analysis. Econometric findings of this study reveal that dividend reduction and omission is a function of financial characteristic like cash flow uncertainty, Size, investment opportunities and leverage.

Kale and Noe (1990) find that firms with more stable cash have high level of internal funds and pay attractive amount of dividend to their shareholders. Authors claim that stability of cash flow is important factor of dividend payment. They also quote that dividend acts as stability of future cash flow. Furthermore, Lie (2005) conduct a study to examine the causes of dividend change, special dividend and share repurchase. This study uses Binomial and

Multinomial econometric technique on firm level data obtained from Centre for Research in Security Prices (CRSP) for the period of 1980 to 1987. It is found that firms with stable income (low volatile income) and having easy access to external capital market increase dividend payment, pay special dividend and repurchase shares when positive shock occur in their income. They also state that decision to cut dividend convey information about future expected income and change operating risk (operating cash flow volatility).

Leary and Michaely (2011) conduct a study to examine the determinants of dividend smoothing by using annual data of 1335 firms. They uses Probit, Logit and Weighted Least Square (WLS) method in this study for empirical analysis. Authors find that dividend smoothing is correlated with low level of information asymmetry. They further claim that firms which tend to smooth dividend have low volatile cash flow and this indicate that cash flow volatility and dividend smoothening are indirectly related with each other. In the context of Korea, Jeong (2013) conduct a study on factors of dividend smoothing. For empirical results he collects data of 279 Korean firms for the time period of 1980 to 2012. Author find that beside firm specific characters like cash flow, leverage, size and profitability, macroeconomics factors also influence dividend smoothing of Korean firms.

### **2.2.1 Studies on cash flow volatility in Pakistan**

Ahmad and Attiya (2008) examine five years data of non-financial firms listed at Karachi Stock Exchange (KSE) to study the factors that affect dividend payout policy of firms. They apply Linter (1956) model of dividend policy and its extended version. Authors argue that firms mostly rely on current EPS (earnings per share) and past DPS (dividend per share) while setting its dividend payment. Results illustrate that profitable firms with stable net income have high level of cash flow and pay high amount of dividends to their shareholders. However, investment opportunities and leverage negatively affect dividend payment of the firms. Using data of non-financial firms along with financial firms, Malik et al. (2013) find

that leverage, liquidity, size and earnings per share are positively correlated with payout ratio whereas growth opportunities and profitability are found insignificant. These results are also supported by Mirza and Afza (2014), but they state that most significant determinants of dividend behaviour are individual ownership, managerial ownership, operating cash flow and firm size, whereas leverage and cash-cash flow sensitivity are insignificant or have little contribution to dividend decisions of a firm.

Khan and Ashraf (2014) investigate the determinants of dividend policy by taking 26 firms listed at KSE. Authors apply OLS estimation technique in this study. They find that dividend policy of firms not only influenced by profitability, tax, debt-equity ratio and sale growth but cash flow and several others variables also play vital role in dividend decisions of the firms.

## 2.3 Summary of the Empirical Literature

The following tables represent a summary of the literature review on cash flow volatility, corporate investment and dividend policy.

**Table 2. 1: Summary of Empirical Review on cash flow volatility and investment**

<i>Title</i>	<i>Author (s)</i>	<i>Sample Period/Region</i>	<i>Methodology</i>	<i>Findings</i>
The impact of cash flow volatility on discretionary investment and the costs of debt and equity financing	Minton and Schrand (1999)	1989-1995 Quarterly data, U.S firms	Descriptive analysis and OLS	Cash flow volatility negatively affects corporate investment and increase cost of capital.
Investigating the Impact of Conditional Cash Flow Volatility on Investment: Empirical Evidence from Companies Listed in Tehran Stock Exchange	Abadeh and Janatpour (2014)	1979 -1991 Iranian firms	Fixed Effect and GLS	Cash flow volatility is insignificant determinant of corporate investment.
The Role of Volatility in Forecasting	Minton et al. (2002)	1986-1997 Quarterly data, U.S firms.	OLS	Cash flow volatility negatively effects corporate investment and future performance
Investment, cash flow and corporate hedging	Deshmukh and Vogt (2005)	1992-1996 Annual data U.S firms.	Fixed effect and Random Effect	Cash flow volatility is negatively related with corporate investment and its impact can be reduced by hedging.
Employment, Corporate Investment and Cash Flow Uncertainty	Bhagat and Obreja (2013)	1987-2011 U.S corporate data.	GMM, Fixed effect and Random effect	Cash flow volatility is negatively related with corporate investment and employment.
Cash Flow Volatility, Financial Slack and Investment Decisions	Booth and clear (2006)	1981-1998 Annual data Australia, Canada, France, Germany, Japan, U.K , U.S	Fixed effect model	Financially constrained firms which face high volatility in cash flow decrease investment.
Is the relationship between investment and conditional cash flow volatility ambiguous, asymmetric or both?	Keefe and Tate (2013)	1965-2011 Annual data U.S firms.	Difference estimation.	Financially constrained firm's investment and cash flow volatility negatively correlated with each other.

International corporate investment and the relationships between financial constraint measures	Cleary (2006)	1987-1997 Australia, Canada, France, Germany, Japan, U.K and U.S companies	Fixed effect	Firms which experience higher cash flow volatility are found to be less investment-cash flow sensitive
Investment Cash Flow Sensitivity: The Role of Cash Flow Volatility	Mulier et al. (2014)	1996-2008 Belgium, France, Finland, Sweden, Czech Republic and Hungary	GMM.	Cash flow volatility has negative impact on investment-cash flow sensitivity.
The determinants and implications of corporate cash holdings	Olper et al. (1999)	1952-1994 Annual Data U.S firms.	Cross sectional regression, Fixed effect and OLS.	Firms which have strong growth opportunity, volatile cash flow and involve in riskier activities hold more liquid assets and cash out of their cash flow.
Corporate precautionary cash holdings	Han and Qui (2007)	1997-2002 Quarterly data U.S firms.	GMM	Cash flow volatility is positively correlated with the cash holding and negatively correlated with the investment for financially while this relation is insignificant for unconstrained firms.
Financial Constraint, Investment, and the Value of Cash Holdings	Denis and Sibilkov (2009)	1985-2006 Annual Data, U.S firm.	OLS, 3SLS and Fixed effect.	Volatility in cash flow leads to decrease investment and increase cash holding.
Why Do U.S. Firms Hold So Much More Cash than They Used To?	Bates et al. (2009)	1980-2006 U.S firms	OLS, Fixed effect and descriptive statistics.	Firms with volatile cash flow and poor access to external capital market hold more cash out of their cash flow.
Earnings volatility, cash flow volatility, and firm value.	Allayannis and Weston (2003)	1986-2000 annual and quarterly data	OLS and Fixed effect	Cash flow and earnings volatility are negatively related to firm value.
Do investors value smooth performance?	Rountree et al. (2008)	1987-2002 firms U.S	OLS	Indirect relation between volatility and firm value. Firm with volatile cash flow negatively value by investor.
Determinants of Corporate investment.	Saquido (2003)	1989 - 2002. Philippines Firms	OLS and GLS	Cash flow is found highly significant which indicate that neoclassical theory is not sufficient to explain investment level.
The impact of negative cash flow and influential observation on Investment-cash flow sensitivity estimate.	Allayannis and Mozumdar (2004)	970-1984 U.S firms	OLS and pooled regression	when a firm incur loss of cash then its investment behaviour is independent of cash flow



Determinants of corporate cash holding: evidence from Pakistani corporate sector.	Rizwan and Javed (2011)	Firms listed on KSE.		Firms increase cash holding with an increase in cash flow volatility, net asset, cash flow, market to book ratio.
Impact of Cash flow Volatility on Cash-Cash Flow Sensitivity of Pakistani Firms	Ahsan and Ullah (2013)	2005-2010 Annual Data, Firms listed on KSE.	GARCH (1,1) variance model, Common effect, Fixed effect and Random effect models.	Cash flow volatility has a strong positive impact on cash-cash flow sensitivity.
The Impact of Cash Flow Volatility on Cash-Cash Flow Sensitivity	Tahir and Ullah (2014)	2005-2010 Annual Data, Firms listed on KSE.	Common effect, Fixed effect and Random effect model.	Cash flow and cash flow volatility are positively correlated with cash holding.
Determinants of corporate cash holdings in Pakistan	Shabbir et al. (2016)	2004-2012 Annual data, firms listed on KSE.	Common effect, Fixed effect and Random effect model.	Cash flow and cash flow volatility have a positive and significant effect on cash holding.
Impact of internal finances on corporate investment in Pakistan textile firms.	Haque et al. (2014)	1998-2011 textile firms listed at KSE	Fixed effect Model.	Cash flow is turned out to be significant with positive sign. Managers of the firms utilize internally generated funds for corporate investment over external funds.

**Table 2. 2: Summary of Empirical Review on cash flow volatility and dividend payment**

<i>Title</i>	<i>Author (s)</i>	<i>Sample Period/Region</i>	<i>Methodology</i>	<i>Findings</i>
Dividend policy and cash flow uncertainty	Bradey et al. (1998)	1985-1992 Annual data RIETs firms	One period two date model	Cash flow volatility is negatively correlated with firm dividend payment and probability of dividend payment
Determinants of Share repurchase: International Evidence.	Lee and Suh (2008)	2000-2005 Australia, Canada, France, Germany, Japan, U.K and U.S.	Tobit and Logit model.	Cash flow volatility has a positive impact on share repurchasing.
Payout policy and cash-flow uncertainty.	Chay and Suh (2009)	1994-2005 Annual data, Australia, Canada, Japan, France, Germany, U.K, and U.S.	Tobit and Logit model.	Cash flow volatility is negatively correlated with dividend payment and probability of paying dividend.
Dividends, investment and cash flow uncertainty: Evidence from China	Deng et al. (2013)	2000-2010 Annual Data, Chinese firms.	Descriptive statistics and OLS.	Cash flow volatility is negatively related with investment and dividend payout ratio.
Determinants of the Dividend Policy of Companies Listed on Emerging Stock Exchanges: The Case of the Gulf Cooperation Council (GCC) Countries	Al-Kuwari (2009)	1999-2003 Gulf firms listed at Gulf Co-operation Council (GCC) country stock exchanges.	Random Effect and Tobit model.	Measured business risk through volatility of earnings and found that it is negatively related with payout ratio of the firms
Determinants Of Dividend Payout Policy Among Non-Financial Firms On Nairobi Securities Exchange, Kenya.	Musiega et al. (2013)	2007-2011 Kenyan Firms	OLS and descriptive statistics.	Earning volatility adversely affects predictability of earnings. Managers feel hesitant to pay dividend when earning of the firm is volatile and future is uncertain.
Dividend Policy and Financial Distress: An Empirical Investigation of Troubled NY SE Firms	DeAngelo and DeAngelo (1990)	1980-1985 U.S listed firms	Probit model	The main reason behind dividend reduction is the earning volatility and low or declining of earnings.
When do German firms change their dividends?	Georgen et al. (2003)	1984-1993 German firms	Order probit and Binomial probit model.	Cash flow fluctuation facilitates dividend reduction of the German firms.

Do Managers Cut Dividends Because They “Have To”?	Stepanyan (2003)	1965-2004 U.S firms	Logistic regression, 2SLS and 3SLS.	Dividend reduction is positively related with cash flow volatility while negatively related with financial slack.
Hard Times or Great Expectations? Dividend Omissions and Dividend Cuts by UK Firms	Benito and Young (2003)	1974-1999 U.K firms	Probit model	Dividend reduction and omission is a function of financial characteristic like cash flow uncertainty, leverage, investment opportunities, investment and company size.
Financial Flexibility, Performance, and the Corporate Payout Choice.	Lie (2005)	1980-1997 U.S firms	Binomial logistic and Multinomial regression.	Firms with stable income and having easy access to external capital market increase dividend payment when positive shock occur in income
Determinants of Dividend Smoothing: Empirical Evidence	Leary and Michaely (2011)	1985 – 2005 U.S firms	Tobit and Probit model and WLS	Firms with more stable cash have high level of internal funds and pay attractive amount of dividend to their shareholders.
Determinants of dividend smoothing in emerging market: the case of Korea	Jeong (2013)	1980- 2012 Korean firms	Multivariate regression	Beside firm specific characters like cash flow, leverage, macroeconomics factors also influence dividend smoothing of Korean firms.
The determinants of dividend policy in Pakistan	Ahmad and Attiya (2008)	2001-2006 Annual Data, Pakistan firms listed on KSE.	GMM, Common Effect (POOL) Fixed effect and Random effect model.	Profitable firms with more stable net earnings can afford larger free cash flows and therefore pay larger dividends.
Factors Influencing Corporate Dividend Payout Decisions of Financial and Non-Financial Firms	Malik et al. (2013)	2007-2009 Annual Data, Firms listed on KSE.	Panel OLS regression, Fixed effect model and Probit model.	Liquidity, leverage, earning per share, and size are positively related to dividend payment.
Impact of Corporate Cash Flows on Dividend Payouts: Evidence from South Asia.	Mirza and Afza (2014)	2006-2010 Companies of Bangladesh, India, Pakistan and Sri Lanka.	OLS, censored regression and Tobit model	Cash flow is positively correlated with dividend payment.
In Pakistani Service Industry: Dividend Payout Ratio as Function of some Factors	Khan and Ashraf (2014)	2011-2012 Firms listed at KSE.	OLS	Dividend policy not only influence by Profitability, Tax, and Sales Growth except Debt to Equity ratio but also by cash flow.

## Chapter 3

### Data Description and Methodology

This chapter consists of various sections such as econometric models, criteria of financial status, sample selection, data source, construction of variables and estimation techniques. Section 3.1 of this chapter explains the models that are used in our study for final estimations. Section 3.2 discusses the criteria on the base of which financially constrained and unconstrained firms are separated. Section 3.3 presents overview on data sources, sample selections and variables construction.

#### 3.1: Models Specification

This section explains the models which show how cash flow volatility effects investment spending and dividend decision of the firm.

##### 3.1.1: Investment model

To get clear view on investment attitude of the firms under volatile cash flow, this study employs the empirical model of Minton and Schrand (1999). Investment spending of the firm is sensitive toward cash flow fluctuation after controlling for several firms specific characters such as leverage and sale growth.

The following model examines the relationship between investment and cash flow volatility:

$$INV_{i,t} = \beta_1 + \beta_2 \sigma_{it} + \sum \beta_j Control_j + \varepsilon_{i,t} \dots \dots \dots (1)$$

Whereas  $INV_{i,t}$  and  $\sigma_{it}$  denote investment spending and cash flow volatility (measure through three year moving average standard deviation approach) of ith firm in time t respectively. Investment can be defined as the total expense of a firm on fixed assets including machinery, equipment and plant, whereas, cash flow volatility is the degree of variations in operating cash flow of the firm.

To control for investment opportunities we use two proxies: (1) Market-to- Book ratio (2) Sale growth. Cleary (2006) and Bhagat and Obreja (2013) used Market-to-Book ratio as a proxy to capture investment opportunities. It is the market value of equity scaled by book value of equity. Fazzari et al. (1988) claim that sale growth is most significant determinant of investment spending of the firm. Sale growth is annual change in sales of the firm scaled by sales of beginning period. The benefit of using sale growth (which is growth in net sale) as second proxy for investment opportunities unlike Market-to-Book ratio, it is non-price-based measure of investment opportunities. Further this study uses additional control variable such as operating cash flow and leverage ratio.

Equation (1) may be extended according to our study objectives as:

$$INV_{i,t} = \beta_1 + \beta_2 CF_{i,t} + \beta_3 \sigma_{it} + \beta_4 MBR_{i,t} + \beta_5 SG_{i,t} + \beta_6 Lev_{i,t} + \varepsilon_{i,t} \dots \dots \dots (2)$$

Whereas:

$INV_{i,t}$  = Investment of i firm in time t

$CF_{i,t}$  = Cash flow from operation

$\sigma_{i,t}$  = Cash flow volatility

$MBR_{i,t}$  = Market to Book ratio

$SG_{i,t}$  = Sale growth

$LEV_{i,t}$  = Leverage ratio

$\varepsilon_{i,t}$  = Error term

We estimate equation (2) for the whole sample to study the relationship between volatility and investment. Further, we divide the sample into financially constrained and unconstrained firms on the basis of total assets and dividend payout ratio measure in order to examine the intensity of cash flow volatility on investment spending of financially constrained and unconstrained firms and again we estimate equation (2) separately for both set of firms.

### 3.1.2: Dividend model

We follow the methodology of Bradley et al. (1998) in our study to examine the effect of cash flow volatility on dividend paying behaviour of the firms. The standard form of model derived by Bradley et al. (1998) is:

$$D_{i,t} = \beta_1 + \beta_2 CF_{i,t} + \beta_3 \sigma_{it} + \sum \beta_j X_{i,t} \dots \dots \dots (3)$$

Bradley et al. (1998) state that dividend is influence by cash flow level (*CF*), volatility in cash flow ( $\sigma$ ) and set of other financial variables (*X*) such as firm size, profitability and leverage etc. They measure anticipated changes in future cash flow by actual change in cash flow (which is volatility in realized cash flow). It is the sign of  $\beta_3$  (coefficient of cash flow volatility) which enables us to differentiate between agency cost and signalling theory of dividend. Under agency cost theory,  $\beta_3$  is positive<sup>14</sup> as this theory states that firms having volatile cash flow, agency costs are higher for them because investors are less capable to evaluate fluctuation in future cash flow therefore higher dividend yield are require for these firms to lessen the retention and sub-optimal use of free cash flow. In contrast, signalling theory states that managers cut dividend payment when cash flow is more volatile, in other words this theory states that  $\beta_3$  is negative.

Furthermore, we include other important control variables in the model which influence dividend payment of the firms such as leverage, Market-to-Book ratio, size, return on equity, current ratio and age of the firm. We use dividend payout ratio as a proxy for dividend payment.

The above model can be extended according to study objective for final estimation as:

$$DY_{i,t} = \beta_1 + \beta_2 CF_{i,t} + \beta_3 \sigma_{it} + \beta_4 MBR_{i,t} + \beta_5 ROE_{i,t} + \beta_6 LEV_{i,t} + \beta_7 SZ_{i,t} + \beta_8 Cr_{i,t} + \beta_9 Age_{i,t} + \mu_{i,t} \dots \dots \dots (4)$$

Whereas:

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<sup>14</sup> Under agency cost theory, cash flow volatility and dividend are directly related to each other.

$DY_{i,t}$  = Dividend yield of ith firm in time t

$CF_{i,t}$  = Cash flow from operation

$\sigma_{i,t}$  = Cash flow volatility

$MBR_{i,t}$  = Market to Book ratio

$ROE_{i,t}$  = Return on Equity

$LEV_{i,t}$  = Leverage ratio

$SZ_{i,t}$  = Size of firm

$Cr_{i,t}$  = Current Ratio

$Age_{i,t}$  = Age of the firm

$\mu_{i,t}$  = Error term

## **3.2 Description of variables**

This section deals with the definition, construction and the distinction between dependent and independent variables.

### **3.2.1 Dependent variables**

Our study focuses on impact of cash flow volatility on corporate investment and dividend payment as well, so we use two separate equations for investment and dividend. In the first equation we have investment as dependent variable whereas dividend in the second equation.

#### **1. Investment (INV)**

Investment can be defined as the total expenses of a firm on fixed assets including machinery, equipment and plant. Investment includes all corporate capital expenditures, Research and development cost and advertisement expenses. It is calculated as current year's fixed assets at cost less prior year's fixed assets at cost plus depreciation cost. Whereas depreciation includes annual wear and tear of fixed assets. Formula for investment is:

$$I_{it} = K_{it} - K_{it-1} + D_{it}$$

Where  $I_{it}$  is the investment of current period,  $K_{it}$  is the current period fixed assets at cost,  $K_{it-1}$  is fixed assets at cost of preceding year and  $D_{it}$  indicates the annual depreciation cost of current year. Investment is a significant indicator which is used to measure the performance and the growth of a firm and also play an important role in the sustainable growth of a country. High level of investment means firm has a higher production capacity, which in turn increase net worth of the firm. Minton and Schrand (1999) use similar proxy for measuring investment spending of the firm.

## **2. Dividend (DP)**

Dividend is defined as the portion of earnings, firm is paying to its shareholders from its total income. Dividend includes cash payment, shares of stock or other property. The study uses dividend payout ratio as a proxy for dividend payment. It can be calculated as:

$$Payout\ ratio = \frac{Total\ Dividends}{Net\ Income}$$

Dividend payment is an important issue because in corporate finance, value of a firm can be understood in term of dividend. Higher paying dividends are highly valued by investors and a reduction in dividend decrease value of the firm. Studies like Bradey et al. (1998) and Ahmad and Attiya (2008) use dividend payout ratio as a proxy for dividend payment.

### **3.2.2 Independent variables**

Definitions of independent variables use in this study are given below:

#### **i. Operating cash flow (CF)**

Operating cash flow is defined as the level of cash generated by firms from operating activities. It is a proxy for internal funds. Cash flow can be obtained as sales less cost of goods sold (CGS) less selling, general and administrative expenses (G & A) plus depreciation expense less tax provision plus/minus the change in working capital (WC) for the period.



Whereas working capital is obtained as current assets<sup>15</sup> less current liabilities.<sup>16</sup> It can be represented as:

$$CF = Sale - CGS - G \& A \text{ expense} + Depreciation - Tax \pm \Delta NWC.$$

Cash flow is an important factor for the firms because higher cash flow shows that high levels of internal funds are generated by a firm which can be used as a source for dividend payment and financing of investment opportunities. It is a cheaper source of finance.<sup>17</sup> Numerous studies like Minton and Schrand (1999), Deshmukh and Vogt (2005), Booth and Cleary (2006), Deng et al. (2013) and Bhagat and Obreja (2013) use cash flow as an explanatory variable in the investment equation while Bradley et al. (1998) and Mirza and Afza (2014) use it explanatory variable in dividend equation.

## ii. Cash flow volatility ( $\sigma$ )

Cash flow volatility is defined as the degree of variations in operating cash flow of the firm.

It can be calculated by three years moving average standard deviation approach as:

$$\text{Cash flow volatility} = \sigma = \sqrt{\frac{(CF_{it} - \bar{CF})^2}{n-1}}$$

Volatility in cash flow is of vital importance as it causes shortage of internally generated funds that can be used for financing the investment opportunities and dividend payment. Cash flow volatility lead to reduction in investment and dividend payment.<sup>18</sup> Deshmukh and Vogt (2005), Booth and Clear (2006), Bhagat and Obreja (2013) and Keefe and Tate (2013) use cash flow volatility to examine its association with corporate investment. However, Bradley et al. (1998) and Lee and Suh (2008) examined its association with Dividend payout ratio.

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<sup>15</sup> Current asset = sum of account receivable, inventory, and other current assets.

<sup>16</sup> Current liability = sum of account payable, income tax payable, and other current liabilities.

<sup>17</sup> See Bond and Meghir (1994) Hierarchy of finance theory for detail.

<sup>18</sup> See Minton and Schrand, (1998), Deng et al. (2013) and Bhagat and Obreja, (2013) for more detail.

### iii. Sale growth (SG)

Sale growth can be defined as the average annual change in sales of a firm. It can be calculated as current year's sale less previous year's sale scaled by previous year's sale.

Mathematically represented as:

$$SG = \frac{\text{Current year Sale} - \text{Previous year Sale}}{\text{Previous year Sale}}$$

Sale is an important variable for the firm. It indicates revenue generated by the firms. The main objective of the firm is to maximize the sale for the purpose of growth. This variable is included in the study because it captures investment opportunities for the firms. Sale growth gives a signal to the firms for expected future demand. Sale growth is taken as independent variable in investment regression by Minton and Schrand (1999), Cleary (2006) and Mulier et al. (2014) as a determinant of investment.

### iv. Market-to-Book ratio (MBR)

Market-to-Book ratio of a company indicates the market value of a company compared to its book value. It can be obtained as the market value of equity divided by book value of equity. Whereas the market value of equity is the market price of the share time total number of outstanding shares, while book value of equity is equal book value per share time total number of outstanding shares.

$$MBR = \frac{\text{Market value of equity}}{\text{Book value of equity}}$$

Another way to find Market-to-Book ratio is dividing the market price per share by book value per share of a firm. Whereas the book value per share is total asset less total liabilities divide by total numbers of outstanding shares.

$$MBR = \frac{\text{Market price per share}}{\text{Book value per share}}$$

Market-to-Book ratio is an important variable because it is used as a proxy to capture investment opportunities. This variable is used in the studies Minton and Schrand (1999) and

Cleary (2006) in investment regression whereas Ahmad and Attiya (2009) and Chay and Suh (2009) use it in dividend regression.

**v. Firm size (SZ)**

Size of the firm can be measured as natural log of total assets. Total assets include both fixed and current assets.

$$SZ_{it} = LN \text{ of } TA_{it}$$

This variable is used in regression because a lot of studies have use total assets to divide the firms into small, medium and large size to examine that whether dividend paying behaviour of firms is homogenous across these different size groups or not.<sup>19</sup> Ahmad and Attiya (2008) and Chay and Suh (2009) claims that firm's size is important determinant of dividend policy.

**vi. Return on equity (ROE)**

Return on equity ratio shows the profitability of a firm and the efficiency of management in using its shareholders funds to generate earnings. It is a primary source of fund generation. It is the ratio of net income to shareholders equity of a firm. Mathematically, it is:

$$ROE = \frac{Net \ Income}{Shareholders \ Equity}$$

Reason behind the inclusion of profitability in regression is that it is considered as a primary source of fund generation. Higher ROE means that firm is efficient in generating revenue which in turn directly effects the dividend payment of the firms. Those firms which are suffering from losses are not capable of paying dividend due to shortage of funds and/or risk of bankruptcy. ROE is taken as explanatory variable in the studies of Lee and Suh (2008) and Chay and Suh (2009).

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<sup>19</sup> Large firms hold more assets and they have more diversification in their business line, further the chances of bankruptcy are less for large firms and they easily raise capital at lower cost in external capital market (Titman and Wessels, 1988).

### **vii. Financial Leverage (LEV)**

Financial leverage ratio represents the amount of total assets that are levered by debt. This ratio also indicates the ability of a firm to meet its obligation. It is the ratio of firm total debts to total assets. Whereas total debts include both short term and long term debts. It can be calculated as dividing total debt by total assets of the firm. Mathematically represented as:

$$\text{Financial leverage ratio} = \frac{\text{Total liabilities}}{\text{Total assets}}$$

The leverage decreases shareholders' return and it also increase risk for the firm because when a firm acquire debt, it must pay fixed financial charges (interest) on that and repay the borrowed principal amount, so failing of these (principal and interest) repayment cause liquidation of a firm. In order to repay the borrowed amount firm holds good liquidity position and this in turn negatively affects investment outlay and dividend payment of the firm. Cleary (2006) and Deng et al. (2013) use this variable in investment equation whereas Bradley et al. (1998), Ahmad and Attiya (2008) and Afza and Mirza (2014) use it in dividend equation.

### **viii. Current ratio**

Current ratio is used as a proxy for measuring liquidity of a firm and it measures a firm's ability to pay short term and long term obligations. It is the ratio of current assets to current liability of a firm.

$$\text{Current ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

Liquidity is as an important factor in dividend decision because firms in better liquid position are able to pay high level of dividend. Liquidity provides financial flexibility and protection against uncertainty. Malik et al (2013) use this variable in dividend decision.

### **ix. Age**

Age of the firm can be defined as the total number of years that a firm has been in existence. It can be calculated as the difference between current year of operation and the birth year of

the firm. Age is included in the regression because investment opportunities decline with age of the firm which in turn affect cash flow and dividend decision of the firm. Age is used as explanatory variable of payout ratio in the study of Al-Malkawi (2008).

### **3.3 Description of Data**

This section deals with the data selection, data time period and data sources.

#### **3.3.1 Sample Selection**

This study use a panel data of 274 non-financial firms of Pakistan listed on Karachi Stock Exchange (KSE). Firms' selection is purely based on the availability of the complete data set. The sample cover total time span of ten years started from 2006 to 2015.

#### **3.3.2 Data sources**

Data is taken from "Balance Sheet Analysis of Joint Stock Companies listed on the Karachi Stock Exchange" published by the State Bank of Pakistan (SBP).

### **3.4 Classification criteria for financially constrained and unconstrained**

In order to examine impact of cash flow volatility on investment expenditures of financially constrained and unconstrained firms we need to identify financial status of a firm. This section discusses the criteria used in earlier studies such as Cleary (2006) and Han and Qui (2009) for separating financially constrained firms from unconstrained firms. The financial status of a firm can be identified on the base of total assets and payout ratio.

#### **1) Total assets**

Firms having sufficient amount of total assets (large in size) are considered as financially unconstrained due to the fact that these firms can easily access external capital market to obtain external finance with lower cost. On the other hand, firms with low level of total assets (small in size) are financially constrained since they face high degree of information asymmetry and high cost of external funds therefore they are reluctant to go for external financing. Firms which have total assets above the sample median for a given years will be

classified as large firms while those having total assets below the sample median are considered as small firms.

## **2) Payout Ratio**

Payout ratio is the ratio which indicates the specific percentage of a firm profit distributed among shareholders. Firms which do not pay dividend signify that they do not have sufficient internal funds to distribute among shareholders, therefore, they avoid dividend payment and will be classified as financially constrained firms. On the other hand, firms with a positive payout ratio indicate that they are financially healthy and pay dividend. These firms will be classified into financially unconstrained firms.

## **3.5 Estimation technique**

In the panel data we have different conventional estimation techniques such as Fixed Effect (FE), Random Effect (RE) and Pooled OLS. However, the problem with these methods is that they could not tackle the problem of endogeneity caused by reverse causality. As in our study we face the problem of reverse causality running between investment and cash flow. In the presence of the problem of potential endogeneity these methods produce bias estimates, which could not be further for any policy option. So in such a situation the best available option is to move towards the Two Stage Least Square (2SLS) technique. However, in the presence of the heteroscedasticity the 2SLS does not provide efficient estimates, and this could obviously suspect the significance pattern of the parameters estimates.<sup>20</sup> Furthermore, the 2SLS is a static technique where we could not include the lag of the dependent variable as a regressor to correct the problem of autocorrelation. A prominent econometric technique to avoid the aforementioned problems of endogeneity, reverse causality, heteroscedasticity and autocorrelation is Generalized Method of Moment (GMM). GMM is the extension of

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<sup>20</sup> Due to the diversified financial nature of firms in our panel set we suspect to have the problem of Heteroscedasticity in our model.

Instrumental Variable (IV) technique. The Basic advantage of GMM approach is that the model to be estimated is not necessarily to be homoscedastic and serially independent (Blundell and Bond, 1999). Thus GMM produce consistent and efficient estimates even in the presence of heteroskedasticity (Perera and Lee, 2013). For dynamic panel data modelling, GMM has mainly been used by Arellano and Bond (1991), then by Arellano and Bover (1996) and later on, Blundell and Bond (1999) specifically used GMM to cope the problem of endogeneity in the production function. In order to avoid problem of endogeneity and reverse causality, this study favours to use system GMM technique.<sup>21</sup> System GMM estimates a set of two equations, one in level form which uses suitable lag level as an instrument and the other one is difference form that utilizes lag first difference as an instruments. System GMM combines both sets of moment conditions as a linear GMM estimator which cover both level and difference equations. In this study System GMM is applicable because the basic condition for applying GMM is that number of cross section (N) should be greater than number time series (T), and in our case number of cross section is two hundred and seventy four (i.e., N=274) while number of time series is ten (i.e., 10).

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<sup>21</sup> We also have estimated FE, RE and Pooled OLS but we only rely on the results of GMM because the result of these methods probably be effected by the aforementioned problems.

## Chapter 4

### Empirical Results and Interpretation

In previous chapter, we discussed about model specification and econometric methodology, in this chapter we estimate investment and dividend models in order to analyse the impact of cash flow volatility on investment spending and dividend payment of the firms. This chapter consists of following sections; Section 4.1 describe descriptive statistics about data, section 4.2 deals with aggregated analysis and section 4.3 explains disaggregated analysis of financially constrained and unconstrained firms.

#### 4.1 Descriptive statistics Analysis:

This section reports descriptive statistics of main variables used in this research. In table 4.1

**Table 4.1: Descriptive Statistics**

Variables	Observations	Mean	Std. Dev	Minimum	Maximum
Log investment	2,668	14.12173	1.765626	4.574711	19.32341
Dividend payout ratio	2,739	0.0035548	0.0074098	0	0.8339005
Log cash flow volatility	2,462	11.39556	1.938648	3.439678	16.73392
Log cash flow	1,991	12.82431	1.821417	4.844187	17.99114
Market-to-Book ratio	2,533	1.389	1.357	0.663	1.577
Size	2,740	14.93833	1.667552	8.774776	20.1323
Sale growth	2,740	0.1310795	0.4006565	-1	3.579315
Leverage	2,740	2.189939	1.399898	0.5273476	12.55399
Current ratio	2,473	1.59625	1.638443	0	15.36
Return on equity	2,737	11.57794	28.09531	-125.28	127.21
Age	2,740	27.08029	6.086943	11	37

log cash flow volatility has a mean value of 11.39 with standard deviation 1.93 and it ranges from 3.43 to 16.73. These indicate that non-financial firms of Pakistan exhibit massive volatility in their cash flow. Further, average value of log investment is 14.12 with standard



deviation 1.76. The dividend payout ratio has average of 0.0035 having standard deviation 0.007 and it ranges from 0 to 0.83. Other variables of our study concern are summarized as well, which effect corporate investment and dividend payment of the firms. These are size, sale growth, leverage ratio, current ratio, return on equity, investment opportunities and age of the firms.

**Table 4.2: Correlation Matrix**

	LINV	DP	LCFV	LCF	SZ	SG	LEV	ROE	CR	AGE
LINV	1.00									
DP	0.05	1.00								
LCFV	0.63	0.05	1.00							
LCF	0.75	0.02	0.65	1.00						
SZ	0.89	0.10	0.72	0.82	1.00					
SG	0.04	0.01	0.00	0.08	0.03	1.00				
LEV	-0.03	0.06	0.02	0.06	0.00	-0.09	1.00			
ROE	0.08	0.11	0.15	0.34	0.20	0.16	0.11	1.00		
CR	-0.13	0.14	0.04	0.04	-0.04	-0.07	0.53	0.09	1.00	
AGE	-0.03	0.02	-0.03	-0.03	-0.03	-0.02	0.06	-0.05	-0.01	1.00

Table 4.2 shows correlation matrix which explores the dependency between multiple variables used in this study. The results illustrated in table 4.2 indicate that for most of the variable correlation coefficient is lower than 0.3 advocating that there is no multicollinearity problem among these variables.

## **4.2: Aggregated analysis**

This section provides an explanation of the results for aggregate sample. Under aggregate sample results, all 274 firms are included in estimation procedure to gauge the effect of cash flow volatility on investment expenditures and dividend payment of the firms.

### **4.2.1: Cash flow volatility and corporate investment:**

Table 4.3 presents the results presenting the association between cash flow volatility and other control variables with investment expenditures of the firms. Before moving to interpreting the results through GMM, we check the appropriateness and adequacy of the

model. The appropriateness and adequacy of model and estimation technique is tested by using Arellano-Bond AR (2) test and Hansen test of over identifying restrictions. The null hypothesis of Arellano-Bond AR (2) test states that instruments are valid.<sup>22</sup> P-value of Arellano-Bond AR (2) in table 4.3 is reported (0.921) which is enough high to accept null hypothesis that instruments are valid. While, the null hypothesis of Hansen test<sup>23</sup> states that instruments as a group are exogenous. P-value for Hansen test is (0.107) indicating that instrument as a group are exogenous.

All the variables are found significant except sale growth. Lag of investment is positive and significant at 1%. Positive sign indicates the presence of smooth investment process and spill over of investment to the next year. The result regarding lagged of investment is compatible with the studies of Bond and Meghir (1994) and Keefe and Tates (2013). The coefficient associated to log cash flow is found positive and significant. Results indicate that 1% increase in cash flow increase investment spending of the firms by 17%. This is due to the fact that internally generated funds (Cash flow) are the dominant source of financing for most of the firms. Firms finance their investment spending from internally generated cash flow, therefore, any increase in these funds raise their investment (Minton and Schrand, 1999). This result is consistent with Pecking order theory which states “firms at first prefer to utilize internal funds and then go for external financing”. Similar result is found by Minton and Schrand (1999), Deshmuk (2005), Denis and Sibilkov (2009), Hovakimian (2009) and Deng et al. (2013). Cash flow volatility which is the primary concern of our study is turned out significant with negative sign. Finding of the study illustrates that 1% increase in cash flow volatility will decrease investment spending of firms by 13%. The economic rationale behind this negative sign is that firms generally prefer to utilize internally generated funds for investment purpose which are available to them at lower cost. Firms face cash flow

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<sup>22</sup> Instruments are not correlated with error term.

<sup>23</sup> When robust standard error is used then p-value of Hansen test should be taken into consideration instead of Sargan test.

shortage when internal cash flow becomes volatile and in response they cut investment spending instead of acquiring external financing. This is because cash flow of non-financial firms is not hedge hence their investment expenditures are more sensitive to cash flow volatility. When cash flow of the firms is hedge their investment spending are stable and less sensitive to cash flow fluctuation (Froot et al. 1993). This result is consistent with the studies of Minton and Schrand (1999), Keefe and Tate (2013) and Deng et al. (2013).

**Table 4.3: Impact of Cash flow volatility and other factors on corporate investment (full sample): Dependent Variable is Log Investment**

<b>Explanatory Variables</b>	<b>Coefficients</b>
Lag Investment	0.9263386*** (0.0420254)
Log Cash flow	0.1761328** (0.07573)
Log Cash flow Volatility	-0.1301197** (0.0626554)
Market-to- Book ratio	0.0012274* (0.000656)
Sale growth	0.0336778 (0.0769498)
Leverage	-0.0639413 ** (0.0283864)
Intercept	0.4552114 ** (0.1828959)
Arellano- Bond AR (2) (P-value)	0.921
Hansen test of overid: restrictions (P-value)	0.107
No of observation	1432

- GMM estimates.
- Robust standard errors are given in parenthesis.
- Arellano- Bond AR (2) test is for instruments validity under the null hypothesis that instruments are valid.
- Hansen test used for exogeneity under the null hypothesis that instrument as a group are exogenous.
- Statistical significance at 1%, 5% and 10% are denote by \*\*\*, \* \* and \* respectively.

The impact of Market-to-Book ratio on corporate investment is positive and significant at 1% level of significance. Result reveals that 1 unit increase in Market-to-Book

ratio of the firms will increase their investment spending by 0.1%. The positive association is due to the fact that investment opportunities increase sales of the firms which in turn increase generation of internal funds and facilitate investment spending. This result is reliable with findings of Minton and Schrand (1999) and Cleary (2006). Sale growth is included in the model because it captures the investment opportunities for the firm. Sale growth shows positive but insignificant relation with investment. Positive sign indicate that firm will invest more whenever growth opportunities appear. The possible reason behind positive sign is that sale growth increase internal cash flow that in turn raises investment spending of the firms. The result regarding sale growth is in line with the studies of Aivazian et al. (2003) who also report insignificant relation of sale growth with investment outlay of the firms. Leverage ratio is found negative and significant at 1% significance level. Table 4.2 point out that 1 unit increase in leverage ratio of the firm will decrease investment expenditures by 6%. Negative sign is because of tax-bankruptcy cost associated with level of the debt. Firms have to bear bankruptcy cost with increase in debt level which in turn reduces investment spending (Bond and Meghir, 1994). Another reason given by Lang et al. (1996) who argue that higher leverage ratio reduce cash amount available with firm that can be used for investment. Bond and Meghir (1994), Cleary (2006) and Deng et al. (2013) also report negative impact of leverage on investment spending of firms in their respective studies.

#### **4.2.2: Cash flow volatility and Dividend payment**

Further to examine the association between cash flow volatility and dividend payout ratio of the firms, the study estimates the dividend model. Table 4.4 reports the results examining the effect of cash flow volatility on dividend payment. The probability value (P-value) of Arellano-Bond AR (2) and Sargan tests is higher than 0.1 which confirm that instruments used in dividend regression are valid and exogenous as a group. Lag of dependent variable is found significant with positive sign which indicates that if firms pay dividend in one year

they will pay it in next year as well in order to continue smooth policy. Ahmad and Attiya (2009) also show positive correlation of payout ratio with its lag. The association between cash flow and dividend payout ratio is significant at 1% significance level. The direction of relation is positive. Value for coefficient of this variable is 0.11 which indicate that if cash flow increases by 1% dividend payout ratio of the firms will increase by 0.11 units. This positive association due to the fact that free cash flow is the main source of dividend payment as firms distribute free cash flow among their shareholders in the form of dividend hence increase in cash flow directly effects dividend amount. This finding is consistent Mirza and Afza (2010) who also report positive correlation between cash flow and dividend in their study.

The key variable of our concern for analysis is cash flow volatility which is found significant at 10 % level of significance with negative sign. Result reveals that 1% increase in cash flow volatility decrease dividend payment by 0.08 units. Negative sign can be justified that variations in cash flow cause cash shortfall and firms overwhelm this problem through cutting their dividend payment.<sup>24</sup> Another possible reason is given by Alemeida et al. (2004) who argue that firms with volatile cash flow face future financial constraints and respond to it by accumulating cash today which in turn negatively effects cash dividend of the company. Similar result regarding impact of volatility on dividend are reported by Bradley et al. (1998) and Chay and Suh (2009) in their respective studies.

According to the results reported in table 4.4, MBR depicts positive association with dividend payment. Results describe that 1 unit increase in MBR increase dividend payment by 0.33 units. It is due to the fact that firms with higher investment opportunities pay more dividends amount to their shareholders to attract new investors and avoid negative response from existing shareholders in order to preserve goodwill of the firms. This result is

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<sup>24</sup> Fazzari et al. (1998) document that whenever firms face cash shortage they cut dividend payment in order to increase cash amount.

compatible with signalling theory which states “in order to attract investor, firm uses dividend to signal their current and future performance.” This finding is compatible with the study of Chay and Suh (2009) they state that growing companies with more investment opportunities pay high dividends to their shareholders.

**Table 4.4: Impact of Cash flow volatility and other factors on dividend payment (full sample): Dependent Variable is Dividend payout ratio**

<b>Explanatory Variables</b>	<b>Coefficients</b>
Lag dividend payout	0.4235964*** (0.1089298)
Log Cash flow	0.1153987*** (0.0405455)
Log Cash flow volatility	-0.0787097* (0.0475304)
Market-to-Book ratio	0.3327358** (0.1555374)
Return on equity	0.000345 (0.0017495)
Leverage	-0.1016804** (0.0467763)
Size	-0.393155** (0.1836008)
Current ratio	0.2058458** (0.0819477)
Age	0.0373716* (0.0224593)
Intercept	-0.4797043 (0.7599848)
Arellano- Bond AR (2) ( <i>P-value</i> )	0.965
Sargan test of overid: restrictions ( <i>P-value</i> )	0.249
No of observation	1918

- GMM estimates.
- Standard errors are given in parenthesis.
- Arellano- Bond AR (2) test is for instruments validity under the null hypothesis that instruments are valid.
- Sargan test used for exogeneity under the null hypothesis that instrument as a group are exogenous.
- Statistical significance at 1%, 5% and 10% are denote by \*\*\*, \* \* and \* respectively.

Leverage ratio shows negative and significant effect on dividend payout ratio of the firms. Results reported in table 4.4 depict that 1 unit increase in leverage ratio decreases dividend payout ratio of the firm by 0.1 units. Reason behind this negative association is that higher bankruptcy cost is associated with high level of debt. As the level of debt increase tax-bankruptcy cost increase which in turn negatively effects dividend payment. Lang et al. (1996) claim that leverage ratio reduce cash amount available with firm therefore due to cash shortage these firms reduce dividend payment. Bradley et al. (1998), Mirza and Afza (2010) and Malik et al. (2013) also find negative correlation between leverage and dividend payout ratio. Further, return on equity (ROE) shows positive but insignificant effect on dividend payment. This finding is in line with the studies of Mirza and Afza (2010) and Avazian et al. (2003) who also report insignificant impact of ROE on payout ratio in the case of Pakistan. The coefficient of size appears with negative and significant sign. The negative sign can be justified by the argument of Ahmad and Attiya (2009) who states that large-sized firms invest in their assets instead of paying dividend. They prefer to retain earnings in order to avoid external financing which are costly. Results illustrate that 1 unit increase in size will decrease dividend payment by 0.39 units. Similar results are reported by Ahmad and Attiya (2009) and Mirza and Afza (2010).

The impact of current ratio is observed positive and significant at 5 % level of significance. Current ratio is considered as vital ratio for calculation of liquidity. Table 4.4 signifies that 1 unit increase in current ratio will increase dividend payment by 0.20 units. Positive sign shows that firms with high amount of liquid assets pay more dividends to their shareholders. The positive association between current ratio and payout ratio is due to the fact that if a firm has good liquid position it will pay more dividends in order to maintain goodwill of the firm and to attract new investors. The result regarding positive impact of liquidity on dividend payout ratio is reliable with the studies of Ahmad and Attiya (2009) and

Malik et al. (2016). Age of the firms is found positive and significant at striking 10% level of significance. Finding of the study indicates that as firms become one year older their dividend payment increase by 0.03 units. The fact behind positive sign is that when firms become mature their growths opportunities are start to decline that in turn lower capital expenditures and increase the availability of cash flow (which is the main source of dividend payment). The result about firm age is consistent with the study of Al-Malkawi (2007).

### **4.3: Disaggregated Analysis**

After explaining aggregate sample results, we now proceed to interpret the results of sub samples (financially constrained and unconstrained firms). The economic rationale behind performing disaggregated analysis is that results of whole sample may be biased due to diversified nature of financially constrained and unconstrained firms in data set. As evident in earlier studies<sup>25</sup> financially constrained firms face difficulties in acquiring funds from external capital market so investment spending of financially constrained firms are more sensitive to cash flow and these firms response differently to cash flow shock. Hence, it seems necessary to separately analyse the effects of cash flow volatility on investment spending of financially constrained and unconstrained firms.

#### **4.3.1: Cash flow volatility and investment of financially constrained and unconstrained firms: (Comparison based on total assets)**

In this section we categorize the firms into financially constrained and unconstrained on the basis of total assets in order to check whether they response differently to cash flow volatility. Those firms which have total assets above the sample median for a given years are classified as financially unconstrained firms while firms having total assets below the sample median are classified as financially constrained category.

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<sup>25</sup> (Cleary, 2006; Han and Qui, 2007; Denis and Sibilkov, 2009 and Kefee and Tates, 2013)



Similar to the aforementioned procedure here also the calculated P-value of Arellano-Bond AR (2) and Hansen tests is larger than 0.1 which show that the instruments used in investment model of financially constrained and unconstrained are valid and also exogenous as a group. Likewise aggregated analysis, here in disaggregated analysis the lag of investment is found significant at 1% significance level and shows positive sign for both set of firms (financially constrained and unconstrained firms). The positive sign indicates that if firms invest in one year they will also invest in next year to continue smooth investment policy. From these results it is clear that non-financial firms of Pakistan listed at KSE show stable investment policy. These results regarding lagged of investment spending in case of financially constrained and unconstrained firms are consistent with the study of Keefe and Tates (2013). Cash flow depicts positive and significant effect on investment expenditures of financially constrained and unconstrained firms. Findings reported in table 4.5 reveal that 1% increase in cash flow increases the current investment outlay of financially constrained and unconstrained firms by 7.5% and 9% respectively. The value of coefficient associated to cash flow is higher for financially unconstrained than constrained firms, these results can be justified by arguments of Cleary (2006) who claims that financially unconstrained firms are internally less constrained but they are more sensitive to internal funds as these firms have great business and/or high financial risk. These findings are compatible with the studies of Allayannis and Mozumdar (2004) and Cleary (2006).

The coefficient associated to cash flow volatility has negative and significant impact on investment spending of both financially constrained and unconstrained firms. However, the scale is high in case of financially constrained than unconstrained firms. Results illustrate that 1% increase in cash flow volatility decreases current investment of financially constrained and unconstrained firms by 42% and 15% respectively. The possible explanation for these results is provided by Keefe and Tates (2013) who document that the strength of

indirect relation between cash flow volatility and investment increases with degree of financial constraint. From these findings it is confirmed that investment spending of financially constrained firm are more sensitive toward any shock in internally generated funds. These results are reliable with the studies of Keefe and Tates (2013) and Mulier et al. (2014).

**Table 4.5: Impact of Cash flow volatility and other factors on investment of financially constrained and unconstrained firms (Comparison based on Total Assets): Dependent Variable is Log Investment**

Explanatory Variables	Coefficients	
	Financially constrained firms (Based on Total Assets)	Financially Unconstrained firms (Based on Total Assets)
Lag Investment	0.7923265*** (0.0645847)	0.8439882*** (0.0375064)
Log Cash flow	0.0750427** (0.036004)	0.0897664* (0.0510153)
Log Cash flow Volatility	-0.4224258** (0.1728175)	-0.1492146* (0.0865164)
Market to Book ratio	0.5405501*** (0.1460873)	0.2192248*** (0.0787103)
Sale growth	0.0033663 (0.004454)	0.0909985*** (0.0056853)
Leverage	-0.0251986*** (0.0055719)	-0.0218888** (0.0099647)
Intercept	-1.211734 (0.7615628)	-0.4840929* (0.2902901)
Arellano- Bond AR (2) (P-value)	0.109	0.216
Hansen test of overid: restrictions (P-value)	0.115	0.219
No of Observation	678	953

- GMM estimates.
- Robust standard errors are given in parenthesis.
- Arellano- Bond AR (2) test is for instruments validity under the null hypothesis that instruments are valid.
- Hansen test used for exogeneity under the null hypothesis that instrument as a group are exogenous.
- Statistical significance at 1%, 5% and 10% are denote by \*\*\*, \* \* and \* respectively.

The impact of MBR on investment is significant and positive at 1% significance level for both set of firms. Findings indicate that when 1 unit increase occurs in MBR it increases current investment outlay of financially constrained and unconstrained firms by 54% and 21% respectively. Nevertheless, the above table 4.5 indicate that the coefficient value is much larger for financially constrained firms, this is because financially constrained firms face constrained amount of external funds hence increase in growth opportunities enable them to generate internal cash flow and decrease reliance on external finance that in turn directly effects their investment spending. Similar results are found by Denis and Sibilkov (2009).

Sales growth is found significant at 1% level of significance with positive sign for financially unconstrained firms while insignificant for financially constrained firms. Findings describe that 1 unit increase in sale growth increases current investment of financially unconstrained firms by 9%. This is due to the fact that financially unconstrained firms avail every profitable investment opportunities and their past year sales push them to invest more in current year however, financially constrained firms are risk averse and do not involve in every investment until the project is beneficial for them in monetary terms. The results regarding sale growth are in lines with the studies of Bhagat et al. (2004) and Cleary (2006). Further, the estimated coefficients of leverage ratio indicate negative impact on investment spending of both types of firms at 1% significance level. The results reveal that 1 unit increase in the leverage ratio will decrease investment expenditures of financially constrained and unconstrained firms by 2.5% and 2.1% respectively. The magnitude is slightly higher in case of financially constrained firms because investment of these firms are high sensitive to cost of external funds hence any increase in debt level will increase bankruptcy cost that in turn reduces their investment spending. Cleary (2006) and Hovakimian (2009) also report negative association between leverage ratio and investment outlay of financially constrained and unconstrained firms.

#### **4.3.2: Cash flow volatility and investment of financially constrained and unconstrained firms: (Comparison based on payout ratio)**

For robustness check this study also differentiates the firms into financially constrained and unconstrained using their payout ratio. Since, it is quite possible that results obtained in section 4.3.1 might be methodological specific (outcomes might be associated with the technique used to separate the firm into financially constrain and unconstrained nature). Hence, it seems necessary to examine the effects of cash flow volatility into two forms of firms utilizing the average payout ratio technique. We calculate the average payout ratio of each firm and classify those firms to financially constrained category which do not pay dividend while dividend paying firms are grouped in financially unconstrained category.

Table 4.6 reports the regression results. Instruments used in investment regression of financially constrained and unconstrained are found valid and exogenous as clear from the P-values of Arellano-Bond AR (2) and Hansen tests (P-values are higher than 0.1 in both case). We find that lag of investment is positive and significant for financially constrained and unconstrained firms at 1% significance level which indicates the presence of smooth investment policy. The estimated coefficients of cash flow show positive and significant effect on investment for both types of firms. The coefficients for financially constrained is 0.15 and 0.13 for financially unconstrained which reveal that 1% increase in cash flow increases the current investment of financially constrained and unconstrained firms by 15% and 13% respectively. The economic rationale behind this larger coefficient for financially constrained firms is that these firms face constrained amount of external funds therefore increase in their cash flow make them enable to take profitable investment opportunities that may be otherwise bypassed while there is no such case for financially unconstrained firms as they can easily get external finance at lower cost. These findings are consistent with the study of Denis and Sibilkov (2004).

The impact of cash flow volatility on investment is found significant with negative sign in case of financially constrained however no such effect is found for financially unconstrained firms. This is due to the fact that investment spending of financially constrained firms are highly sensitive to internal cash flow therefore adverse shock in cash flow enforces these firms to cut down their investment spending. Our results regarding cash flow volatility are compatible with the study of and Keefe and Tates (2013).

**Table 4.6: Impact of Cash flow volatility and other factors on investment of financially constrained and unconstrained firms (Comparison based on Payout Ratio): Dependent Variable is Log Investment**

Explanatory Variables	Coefficients	
	Financially constrained firms (Non Dividing paying firms)	Financially Unconstrained firms (Dividend paying firms)
Lag Investment	0.4566892*** (0.1055473)	0.4267557*** (0.0644589)
Log Cash flow	0.1505837*** (0.0541172)	0.1364586** (0.0588647)
Log Cash flow Volatility	-0.0412422* (0.0231977)	- 0.0296837 (0.0184805)
Market-to-Book ratio	0.4462852*** (0.1202416)	0.4140855*** (0.0719378)
Sale growth	-0.0002843*** (0.0000543)	0.0682946*** (0.0059434)
Leverage	-0.0024206 (0.0251173)	-0.0488285* (0.027449)
Intercept	-0.3191335 (0.3083343)	0.6343928 (0.4521057)
Arellano-Bond AR(2) (P-value)	0.236	0.116
Hansen test of overid: restrictions (P-value)	0.215	0.157
No of Observations	515	1119

- GMM estimates.
- Robust standard errors are given in parenthesis.
- Arellano- Bond AR (2) test is for instruments validity under the null hypothesis that instruments are valid.
- Hansen test used for exogeneity under the null hypothesis that instrument as a group are exogenous.
- Statistical significance at 1%, 5% and 10% are denote by \*\*\*, \* \* and \* respectively.

Market-to-Book ratio turn out statistically significant and positively relate with investment expenditures for both categories of firms (financially constrained and unconstrained firms) which signifies that firms invest more as investment opportunities increase. Influence of MBR on investment is high in magnitude for financially constrained than financially unconstrained firms. Potential detail for this is that marginal profitability of investment is high for financially constrained firms hence they invest more as growth opportunities and resources (cash flow and cash amount) increase.<sup>26</sup> Denis and Sibilkov (2004) report similar results in their study. Further, sale growth show mixed results, in case of financially constrained firm coefficient of sale growth is significant with negative sign while it is positive for financially unconstrained firms. The possible explanation for this negative sign is that these firms cut down their investment spending as sales tend to grow due to shortage of funds and unavailability of investment opportunities. These firms are supposed to be disposed towards financial distress therefore they cut much portion of investment spending due to lack of internal funds.<sup>27</sup> However, financially unconstrained firms increase investment expenditures as their sales tend to grow. Further, the estimated coefficient of leverage appears with negative sign for both set of firms but it is insignificant for financially constrained firms. Therefore increase in leverage reduces the cash amount which in turn decreases investment spending and dividend payment. These results are in line with findings of Bond and Meghir (1994) who also report insignificant impact of leverage on corporate investment in case of financially constrained firms.

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<sup>26</sup> See Denis and Sibilkov (2004) for further discussion.

<sup>27</sup> See Bhagat et al. (2005) for more detail.

## Chapter 5

### Summary and Conclusion

The main objective of the study was to empirically examine impact of cash flow volatility on investment spending and dividend payment of the firms by using firm level data of 274 non-financial firms of Pakistan listed at Karachi Stock Exchange (KSE) for the period 2006 to 2015. This study employed Generalized Method of Moments (GMM) estimation technique to overcome the endogeneity problem. We measured volatility associated with cash flow by using three year moving average standard deviation approach. All financial variables used in this study were constructed from more than 1500 financial statements of non-financial firms of Pakistan. Initially, we estimated investment and dividend model for the whole non-financial sectors. Afterward, firms are divided into two sub classes i.e. financially constrained and unconstrained firms on the basis of total assets and payout ratio in order to check how the impact of volatility on investment spending varies across both set of firms. Estimation results of this study show that cash flow volatility negatively affects investment spending and dividend payment of non-financial firms of Pakistan. Further, we found that financially constrained firms are more sensitive to cash flow variation because these firms cut their investment spending in high magnitude whenever their internal cash flow fluctuates. The main reason behind this is that financially constrained firms face constrained amount of external funds hence increase in cash flow volatility further worsen internally generated funds which in turn negatively affect investment spending of these firms.

#### 5.1 Policy implications:

On the base of analysis presented above, this study suggest the following policy recommendations

- The study confirmed that investment and dividend decision of non-financial firms of Pakistan depend upon internally generated funds. Therefore, government must take steps to keep the economic environment stable so that cash flow of these firms becomes smooth and certain.
- To maintain smooth investment and dividend pattern firms should sustain financial health through accumulating cash in favourable economic times in order to avoid any shock to internal funds in future.
- Empirical results suggest policy that external funds must be kept at lower cost so that a large pool of firms can have access to the funds at lower cost. This will increase investment spending and dividend payment of the firms and reduce level of financial constraint.
- It is confirmed from the above analysis that investment outlays of financially constrained firms are more sensitive to cash flow shocks. Therefore, these firms need to check their business activities and review R and D expenditures in order to reduce cash flow variation.

## **5.2 The way forward**

This study can be further extended in several ways:

- i. Future research can be done on the sample of financial firms of Pakistan.
- ii. Researchers can expand the data period and adopt different methodology for analysis which will give more information and improved results.
- iii. Finally, other variables such as net income margin, interest coverage ratio, current ratio and cash flow sensitivity etc. can be introduced into the model of investment and dividend to further explore the issue.



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