Financial Frictions and Substitution between Internal and External Funds: Case of Pakistani Non-Financial Firms

Noshaba Jabeen

Reg No. 132-FE/MS EF (2)/F13

Supervisor: Dr. Abdul Rashid

Associate Professor, IIIE

January, 2016

International Institute of Islamic Economics (IIIE),

International Islamic University (IIU), Islamabad, Pakistan

Cash flow

Credit multiplier

Financial frictions

APPROVAL SHEET

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by

Noshaba Jabeen
Reg. No: 132-FE/MS (EF-2)/F13

Accepted by the International Institute of Islamic Economics, International Islamic University, Islamabad, as partial fulfillment of the requirements for the award of degree of MS in Economics and Finance.

Supervisor:

Dr. Abdul Rashid
Associate Professor, IIIE
International Islamic University Islamabad

Internal Examiner:

Dr. Miraj-ul-Haq
Assistant Professor, IIIE
International Islamic University, Islamabad

External Examiner:

Dr. Muhammad Mazhar Iqbal
Associate Professor
Quaid-i-Azam University, Islamabad

Head
School of Economics, IIIE
International Islamic University, Islamabad

Director
International Institute of Islamic Economics
International Islamic University, Islamabad

Date of Viva Voce: 29-2-2016

Certificate

The thesis entitled ***"Financial Frictions and Substitution between Internal and External Funds: Case of Pakistani Non-Financial Firms"*** submitted by **Ms. Noshaba Jabeen** in partial fulfillment of MS degree in Economics and Finance has been completed under my guidance and Supervision. It is certified that the student has incorporated the necessary changes suggested by the Examiners during viva voce exam on February 29, 2016. Now the thesis is ready for further process.

Signature: _____

Dr. Abdul Rashid

Associate Professor, IIIE

(Supervisor)


بسم الله الرحمن الرحيم

Dedication

Dedicated to My Beloved Parents Whose Prayers Always

Pave the Way to Success for Me

Declaration

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Noshaba Jabeen

Acknowledgement

First, I would like to thank Allah (SWT) who has made it possible for me to complete this programme successfully and equally thank him for his continued mercy and blessing. Secondly my humblest thanks from the core of my heart to our beloved prophet HAZARAT MUHAMMAD (S.A.W.W) who is the eternal fountain of knowledge and guidance for the whole mankind. I would like to express my sincere gratitude to my supervisor Dr. Abdul Rashid for his continuous support patience, motivation, and immerse knowledge. His guidance helps me in time of research and writing of this thesis. I could not have imagined having a better supervisor and mentor for my MS study. I would like to express my special appreciation and thanks to my teachers since my class prep for their kind supervision. All my respected teachers contributed a lot in my knowledge and carrier building. Special thanks to my friends Faria Shaukat and Hajra Rasheed for their moral support throughout my research work. A special thanks to my Family. Words cannot express how grateful I am to my mother Fareeda Begum and my father Khadim Hussain for all of the sacrifices that you've made on my behalf. Your prayer for me was what sustained me thus far. I would also like to thanks my brothers Nouman Ahmed and Naveed Ahmed who supported to achieve my goal. Appreciation of a very different kind goes to my nieces and nephews, for their precious smiles and zest for life. At the end I would like express appreciation to my beloved sister Dr. Nadia Jabeen for her loving care and was always my support in the moment when there was no one to answer my quires.

Abstract

This study explores the relationship between external financing and cash flow by comparing financially constrained and unconstrained firms in Pakistan. The study uses firm level data covering the period from 2000 to 2013. We use three alternative measures to divide the firm-year observations into financially constrained and unconstrained type. These measures are KZ index (Kaplan and Zingales index), debt to asset ratio, and interest coverage ratio. We utilize firm-specific variables, namely, firm size, growth, cash, inventory, plant property and equipments and the debt to equity ratio as control variables in our empirical analysis. Ordinary least squares method with robust standard errors and the two-step system-GMM estimator are used for estimation of empirical models.

We postulate that in case of financially constrained firms investment is determined endogenously as these firms are strongly dependent on cash flow (internally generated funds). In contrast, financially unconstrained firms investment is determined exogenously. Hence, unconstrained firms are free to decide the investment as they face less adverse selection costs. The results from the external financing-cash flow relationship under financial restrictions reveal that there exists a negative relationship between external financing and cash flow. Yet, we show that this negative relationship is weak in case of financially constrained firms.

We also analyze how credit multiplier affects external financing decisions of financially constrained and unconstrained firms. Estimating panel model using the two-step system-GMM estimator, we show that financially constrained firms invest excess of their cash

flow in tangible assets. Hence, there exists a positive relationship between credit multiplier and external financing in case of financially constrained firms.

Keywords: constrained; cash flow; credit multiplier; financial frictions; internal funds; panel data; system-GMM estimator

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List of Abbreviations

CH	Cash Holdings
DIV	Dividend
GMM	Generalized Method of Moments
KSE	Karachi Stock Exchange
KZ index	Kaplan and Zingales index
LEV	Leverage
OLS	Ordinary Least Square
Q	Investment Opportunities
SBP	State Bank of Pakistan
WW index	White and Wu index

Chapter 1

Introduction

1.1 Background

Financial frictions mean financial constraints that prevent corporate firms from funding all desirable investments from external resources. This financing inability is might be due to inability to issue new equity and debt instruments, inability to borrow financial intermediaries, more dependence on bank loans, credit constraints or illiquidity of assets. Corporate managers claim that one of the primary objective of firms' financial policies is to maintain their financial flexibility. Their stated policy is not to ensure funds for the present but also for the future investments undertaking in the world where financing restrictions compel the organizations to pass up some profitable opportunities (Graham & Harvey (2001)). Previous research on capital structure concluded that at higher cost those firms that are financially constrained get less funds and they are more affected by financial restrictions as compare to unconstrained firms (Faulkender & Petersen (2006), Hubbard (1998), Fazzari, Hubbard, & Petersen (1988), and Carpenter & Petersen (2002)).

The focus of the most of existing empirical studies was on cost of issuing equity versus debt financing (Sunder & Myers (1999) and Fama & French (2002, (2005)), security returns dynamics (Welch (2004)), market timing by Baker & Wurgler (2002), and the elements of the trade-off theory (Hovakimian, Opler, & Titman (2001)). Indeed, all of these aspects are very important to understand financial policies of corporate firms.

The pecking order theory arguments that the asymmetric information cost has an important part in determining the capital structure choice. In this sense, financially unconstrained firms depend less on internal funds as compare to financially constrained firms because the former being affected more by information asymmetries (Myers & Majluf (1984)). On a similar basis, when firms go for external funds they choose debt relative to equity. Firms issue equity as its last option. The standard pecking order theory argued that financially constrained firms should show stronger negative relationship between cash flows and external financing relative to financially unconstrained firms because information asymmetry increase the external financing cost. Financially constrained firms less likely to tap the external capital market because for a given level of investment profitable constrained firms require less external financing and should show low security issuance activity. This argument assumes that investment is determined before the firm decides the optimal amount of debt and equity to issue (Myers (1984)).

The trade-off theory of capital structure by Modigliani & Miller (1963) argued that firms choose their optimal level of capital structure by adjusting advantages and expenses of debt financing. Advantages of debt contain tax savings, cost reduction, profit retention. However, including debt in the capital structure is not free of cost. There is also certain cost attached with debt financing like the cost of debt includes personal tax, debt overhang, financial distress cost, and agency problem between corporate managers and financers. The trade-off theory likewise suggests that the relationship between profitability and external financing is positive because in deciding the capital structure of firms, profitability has an important role. Further, firms having high profit choose debt financing in order to fulfill their financial needs.

Another highlighting theory is the market timing theory by Baker & Wurgler (2002). They suggested that firms did not issue stocks until there exists a favorable equity market conditions for them. According to Baker & Wurgler (2002) corporate firms time their equity issues and wait until the market condition for issuing stocks become favorable for them. The corporate managers prefer external financing and choose debt financing when the cost related to issuing debt is low and if the cost related to issuing debt is high, they issue equity otherwise. Therefore, the market timing theory states that the corporate managers mostly time their security issues and they do not have any exact targets related to capital structure.

Starting with Fazzari et al. (1988), a few different studies have proposed that the investment behavior of a firm is affected by financing constraints. According to researchers the investment-cash flow relationship is highly sensitive for financially constrained firms as compared to unconstrained firms. Specifically, a number of studies pointed out that for raising the funds financially constrained firms face higher cost (Carpenter & Petersen (2002)). However, several later studies for example, Cleary (1999), Kaplan & Zingales (1997), and Chen & Chen (2012) do not support the prediction of Fazzari et al. (1988). The above studies demonstrated that the relationship between investment-cash flow and financially constrained is non linear. These studies showed that financially constrained firms have lower investment-cash flow sensitivity than financially unconstrained firms. This evidence is quite opposite to Fazzari et al. (1988). One possible reason can be the way the firms are divided as financially constrained and unconstrained, as these studies have used the classification criteria different than the ones used by Fazzari et al. (1988).

The greater part of the empirical literature concentrates on the relationship between profitability and leverage (see, for example, Ozkan (2001), Strebulaev (2007), Myers (1993), Fama & French (2002), Sunder & Myers (1999), Hovakimian, Hovakimian, & Tehranian (2004), Lipson & Mortal (2009), and Huang & Ritter (2009)). They found that the relationship between profitability (cash flow) and leverage is negative, supporting the pecking order theory of capital structure. Reviewing recent empirical papers, we find very less work done on the relationship between internal and external financing under financial frictions (see for example, Almeida & Campello (2010), Portal, Zani, & Silva (2012), and Gracia & Mira (2014)).

An interesting discussion has been created by Gracia & Mira (2014) organized to identify whether the trade-off theory or pecking order theory portray the best financing choice of firms or not. They stated that information asymmetric had an important part in deciding the capital structure of organizations and showed that the relationship between cash flow and external financing is negative in the presences of financial restrictions. This external financing and cash flow relationship is more negative for financially constrained firms as compared to unconstrained firms. The pecking order theory of capital structure pays no attention to the possibility that firms' investment may become endogenous to external financing choice when firms are financially constrained.

However, the recent researches stated that although information asymmetric plays a significant role but it's not the whole story. As stated by Almeida & Campello (2010), financially constrained firms are more reliant on internal funds and they are not allowed to make decision regarding investment. Hence, for financially constrained firms investment is endogenous. In contrast, financially unconstrained firms are free to make

decisions regarding investment. In other terms, investment is exogenous for unconstrained firms. Thus, they concluded that when firms are financially constrained the relationship between external financing and cash flow is fundamentally influenced by the endogeneity of investment. They showed that the relationship between external financing and cash flow is less sensitive for financially constrained firms and the relationship between external financing and cash flow is more negative for financially unconstrained firms. They also indicated that external financing is also a function of profitability of firms, firm size, firm growth, and the tangibility of assets.

An intense debate has been take place about the role of credit multiplier on external financing-cash flow relationship. The credit multiplier is considered as an additional instrument which makes the relationship between cash flow and external funds less negative. Financially constrained firms have more adverse selection costs as compared to financially unconstrained firms. Therefore, creditor claim loan guarantees in order to save their contracts. Hence, the financially constrained firms invest excess of their internal funds in tangible assets such as plant, property, and equipment. Hence, tangibility eases new external funds to financially constrained firms. Campello & Hackbarth (2012), Almeida & Campello (2007), Bemanke, Gertler, & Gilchrist (1996), and Kiyotaki & Moore (1997) suggested that tangible assets increase the capability of financially constrained firms to seek new funds. Almeida & Campello (2007) revealed that firms increase their tangible assets when they face positive income shocks which in turn give rise to new credit and as a result more tangible assets and so on. and Almeida & Campello (2010) and Gracia & Mira (2014) demonstrated that financially constrained firms are more sensitive to increase the holdings of tangible assets. Therefore, the credit

multiplier effect is more prominent in financially constrained firms relative to unconstrained firms.

1.2 Gap in the Literature

Previous empirical research on this topic is scant. The pecking order theory pays no attention to the possibility that investment choice of the firms may become endogenous to external financing choice particularly when the cost associated with external financing is high. It is worth highlighting the study of Almeida & Campello (2010), where both types of firms are compared at North-American market. Similarly, Gracia & Mira (2014) did empirical analysis for the sample of Spanish firms and found different relationship between external financing and cash flow for both listed and unlisted firms. Schoubben & Van Hulle (2011) have also focused on the financial flexibility of financially constrained and unconstrained firms in Belgium capital market. The above mentioned studies showed that the relationship between external financing and cash flow is negative in the presence of financial frictions and this negative relationship is more prominent in case of financially constrained firms.

However, when we review the literature for developing countries, we observe that researchers have not paid considerable attention on external financing-cash flow relationship. Rather, most of the previous studies in emerging and developing countries have focused on exploring the capital structure determinants. Examples of these studies are (Shah, Hijazi, & Javed (2004), Hijazi & Tariq (2006), and Sheikh & Wang (2011)). With reference to Pakistan, the literature is also silent on the issue how firms' make external financing decisions when they face financial constrains. Yet, in developing

the determinants of capital structure. Therefore, it is very necessary for developing countries, like Pakistan, to study the relationship between cash flow and external funds where the firms face more problems to get external funds.

Similarly, another highlighting issue in corporate finance is impact of credit multiplier effect on external financing-cash flow relationship. As developing countries have fewer resources so, tangibility of assets plays an important role for financially constrained firms in increasing their external funds. The research on credit multiplier effect is limited to developed countries. So, it is very important that research on these aspects should also be done for developing countries.

1.4 Objectives of the Study

Our objectives of the study are as follows:

i. To investigate the sensitivity of external financing to internally generated cash flow and to compare financially constrained and unconstrained firms.

ii. To analyse the external financing-cash flow sensitivity by controlling pre-existing stocks of capital in the presence of financial frictions.

iii. To examine the role of credit multiplier effect on external financing and cash flow relationship in the presence of financial frictions.

1.5 Significance of the Study

The main purpose behind this study is to further contribute on external financing-cash flow relationship when firms face financial frictions. The previous empirical studies also

include the firm-specific determinants in order to explain the capital structure decisions. There are few studies in developing countries regarding the relationship between cash flow and firms' external financing decision in the presence of financial restrictions. Hence, for designing efficient policies regarding external capital market, it is necessary to know the relationship between external financing and cash flow. Thus, the empirical findings of this study help corporate managers to make better policies and financial decisions, when they face the financial frictions. This study additionally helps corporate managers to settle on financial choices and policies while making their firms' external financing decisions. In addition, this study also contributes to a better understanding of how financially constrained firms anticipate in the presence of credit multiplier effect. Our study is significantly different from previous studies done in Pakistan[1]. Furthermore, the focus of our study is not just identifying the financial restrictions and capital structure. Rather the main aim of our study is to see the external financing-cash flow relationship under financial restrictions.

1.6 Scheme of the Study

The remaining structure of the study is as follows. Chapter 1 includes background, problem statement, objective and significance of study. Chapter 2 reviews the important capital structure theories and the empirical literature. Data and methodology will be presented in Chapter 3. Chapter 4 discusses the empirical results and their analysis. Chapter 5 describes the conclusion and future directions.

[1] Shah et al. (2004) and Sheikh & Wang (2011).

Chapter 2

Literature Review

In order to properly understand the impact of financial frictions on the relationship between external financing and cash flow by comparing financially constrained and unconstrained firms, we divide the literature in two sections. First, we present capital structure theories. Second, we briefly explain the past empirical literature associated with capital structure of firms.

2.1 Theoretical Literature

In this section, we review some important finance theories that explain the most favorable capital structure for a corporation. Particularly, Section 2.1.1 describes the pecking order theory by Myers & Majluf (1984), Section 2.1.2 presents the trade off theory by Modigliani & Miller (1963), and finally, Section 2.1.3 explains the market timing theory by Baker & Wurgler (2002).

2.1.1 Pecking Order Theory

The pecking order theory of capital structure is given by Myers & Majluf (1984). Myers & Majluf (1984) explained two major parts of the pecking order theory. First, they suggested that corporate managers rely mostly on internal financing rather than external funds. Secondly, firms' preferred debt financing rather than equity financing if external financing is required. There are three main sources of financing namely common equity, debt, and retained earnings (savings). The pecking order theory suggested that corporate

managers first prefer internal financing and then go for external source of financing. The most common resource of firms' internal financing is cash (the most easily available liquid asset) or retained earnings and the most common source of external financing is debt or shareholders' equity.

Corporate managers claimed that they always prefer internal funds (cash flow) rather than external financing because the cost associated with the external financing is high (Myers (1984)). Referring to the standard pecking order theory argument would propose that firms choose internal cash flow to finance their investment because the asymmetric information among the firm managers and shareholders increases the external financing cost. The problem associated with the asymmetric information among the outside investors and firm managers are more in case of equity financing rather than debt financing. This is because outside investors have less information related to market value and risk of a firm than the corporate managers. In the existence of asymmetric information corporate managers are less trends toward equity rather than debt.

Myers & Majluf (1984) and Myers (1984) suggested that there are different sources of financing but firms first priority is internal funds. When the financing needs of a firm are not fulfilled with the internally generated funds then in order to fulfill their needs the firm moves toward the debt financing. Likewise, when there is no possibility to finance with debt financing then firm moves toward the equity financing as least preferred source of financing. When the cost related to debt financing exceeded then the firm managers use equity financing to fulfill their financing needs. When firms take too much debt then issuing more debt caused extra debt issuance cost (financial distress cost, bankruptcy cost, and debt overhang). So, in this position, the corporate managers prefer cheap equity

financing relative to costly debt financing. In the existence of asymmetric information among firm managers and investors, and transaction cost, firm managers optimally choose between debt and equity financing. So, the relationship between external financing and cash flow is negative.

Sunder & Myers (1999) take into consideration 157 U.S. firms and concluded that mostly firms fund their financing shortage with debt. Henceforth, they stated that the pecking order theory provides a good estimation of financing behavior. Similar to this analysis, Fama & French (2002) found that debt mostly absorbed short-term fluction in investment and earnings. Fama & French (2002) argued that due to the presence of asymmetric information, firm has a greater benefit to follow the pecking order theory. They explored that mature, large firm more strongly go behind the pecking order theory as compared high growth, small firms. Similarly, Frank & Goyal (2003) supported the pecking order theory and suggested that firms will follow equity financing more easily than debt financing if internal funds are not enough for financing.

The standard pecking order theory states that firms utilized external financing if investment is more than internally generated funds. But if internally generated funds are more than investments, then there is no need to go for external financing, firms can fulfill their financing need with internally generated funds. The financially unconstrained firms can easily access the external market because of less insolvency cost as compared to the financially constrained firms. They showed that the relationship between firm size and external financing is positive for both financially constrained and unconstrained firms. Similarly, the pecking order theory states that the growth of the firm positively affects the

external financing choice. Thus, the large growing firms can easily capture the external market (Fama & French (2002) and Carpenter & Petersen (2002)).

The pecking order theory suggested that financially constrained firms have less possibility to tap the external market. So, financially constrained firms should show even more negative relationship between external financing and cash flow as compared to financially unconstrained firms. In the presence of incomplete contractibility, agency related issues, or asymmetric information, financially constrained firms faces higher expense of external financing. The pecking order theory suggested that for a given level of investment, the constrained firms show lower security issuance activity and requires less external financing. In the light of above argument totally assumed that firms decide ideal measure of debt and equity issue after the investment is determined. In other terms, the pecking order theory ignored that investment choice of the firms might become endogenous to external financing when the cost associated with external financing is higher (Almeida & Campello (2010)).

The pecking order theory of capital structure suggested that the relationship between internal funds and external financing is negative due to an information asymmetric problem between firm managers and financers. Firms first prefer internal funds because of low cost of information asymmetry and least prefer debt and equity issue because it has higher cost of information asymmetry. The higher information asymmetry makes rational managers' to finance their investment through internally generated funds because information asymmetric increases the cost associated with external financing.

2.1.2 Trade-off Theory

The trade-off theory of capital structure was presented by Modigliani & Miller (1963). They explained that without changing the market capitalization, firms finance its financial requirements through debt financing in such a manner that cost and advantages associated with debt financing were adjusted. Trade-off theory of capital structure is also believed as contender theory to the pecking order theory. The main idea behind this theory is that firms partially used both debt and equity to fulfill their financial needs. In that state, there is benefit to finance with debt because of tax advantages associated with debt. Whereas, the financial distress costs including bankruptcy cost of debt and non bankruptcy cost persuade corporate managers to decrease the use of debt financing.

Modigliani & Miller (1963) unconfined the personal taxes and corporate taxes assumption. The firms' finance their financial needs in a manner that most favorable level of capital structure is attained. In the existence of bankruptcy cost and tax advantages of debt financing, the corporate managers finance their financial needs through tradeoff among the costs and advantages of debt and equity financing. Myers (1977) examined that there is certain cost associated with the debt financing which is financial distress cost, dead weight cost of bankruptcy, non bankruptcy costs, agency cost between managers and investors. Similarly, Titman & Wessels (1988) suggested that firms in their capital structure holds both debt and equity financing. They concluded that Firms' first preferred debt financing, but when the cost associated with debt financing exceeded than the capacity, then they moved toward the equity.

Profitability of a firm plays an important part in explaining the firm's capital structure of firms. According to the trade-off theory, firms having high profit take more debt because of tax advantage associated with the debt financing. In the presence of difference between firm managers and financers, agency cost and bankruptcy cost, corporate managers prefer to finance their capital structure through debt financing. So according to the trade-off theory, the relation between profitability (cash flow) and external financing is positive. However, the recent capital structure theories such as Hennessy & Whited (2005), Strebulaev (2007), and Lewellen & Lewellen (2006) suggested that for financially constrained firms the relationship between internal funds and external financing is negative. Strebulaev (2007) explained dynamic trade-off theory with small adjustment cost and concluded that due to the existence of inactive firms there exists a negative cross-section relationship between profitability and leverage. Lewellen & Lewellen (2006) and Hennessy & Whited (2005) explained that the relationship between cash flow (profitability) and external financing is negative that was based on tax considerations. In their work, if tax advantage associated with debt is less attractive then firms moves towards the internal finance because internal finance permit the firm to concede taxes on payment to equity holders. As a result, firms having high profits demand less debt than firms having low profits.

On the other hand, firms' growth and size are positively correlated to the firm external financing. The large size and high developed firms are well diversified and have easy access to the capital market. The cost attached with the debt financing is less for large size firms relative to small size firms. The trade-off theory of capital structure concludes that the relationship between growth and external financing is positive.

2.1.3 Market Timing Theory

Market timing theory of capital structure was given by Baker & Wurgler (2002), describe that firms favored external equity when the expenses associated with equity is low, and if the expenses associated with equity is high then firms favor external debt. Baker & Wurgler (2002) described index of financing that reveals how much financing was done during hot debt period and how much financing was done during hot equity period. The market timing theory of capital structure has confronted both the pecking order theory and static trade-off theory. By market timing theory, corporate managers time their security issue and stay unless the market condition and expense of issuing equity is low. Henceforth, if the equity market is not in good condition and cost associated with issuing equity is high, then corporate managers repurchases their equity and decrease the amount of issuing stock and used debt financing as an external source of finance.

Similarly, this theory states that corporate managers prefer to finance with equity when the market value of equity is high, and issue debt otherwise. Firms' capital structure is affected by the market timing of equity in such a way that in short run the firms tend to be low levered when there is higher market value of stock issue. Likewise, the firms are over-levered when there is lower market value of stock issuance. Market valuation enforces corporate managers to optimally choose between debt and equity financing.

Many researches such as Alti (2006), Huang & Ritter (2009), and Bayless & Chaplinsky (1996) empirically supported the market timing theory and confirmed that market had effect on debt and equity financing. Similarly, Welch (2004) suggested that the change in

equity is not due to the fluction in stock price. Huang and Ritter (2009) point out that firm used more external equity when the returns on stock are higher.

2.2 Empirical Literature

There is an extensive empirical literature on firms' capital structure decisions of firms. Most of the empirical capital structure literature put emphasis on the firm specific determinants. However, the focus of this study is to see the impact of financial frictions for both financially constrained and unconstrained firms. We divide the empirical literature into two parts, in order to examine the empirical evidence that how a firm choose their capital structure. First, we review the empirical evidence on how firm substitute between internally generated funds and external financing in the existence of financial constraints. Next, we review the studies that examined the impact of credit multiplier on external financing-cash flow relationship.

2.2.1 Endogenous Investment and Substitution between Internal and External Financing

Previous literature on capital structure highlighted the serious importance of being affected by financial frictions when it comes to seek funds (Fazzari et al. (1988), Hubbard (1998), and Faulkender & Petersen (2006)). Fazzari et al. (1988) were the pioneer to examined the relation between investment-cash flow and financial constrains. By sorting US firms over the year 1970 to 1984 they concluded that the relation between investment-cash flow and financial constraints is positive. They defined the financially unconstrained firms as high payout, large, and low investment and cash flow relationship than financially constrained firms, which confirmed information asymmetry theory of

Myers & Majluf (1984). Similarly, Hubbard (1998) also found that investment is significantly positively related with internal funds. Faulkender & Petersen (2006) took into consideration US firms for the years 1986 to 2000 and examined how firms choose their capital structure. They found that small firms are credit constrained as compared to large firms. They also showed the relationship between firm size and leverage is week.

On the other hand, several later studies do not support the findings of Fazzari et al. (1988) For example, Kaplan & Zingales (1997) compared with the results of Fazzari et al. (1988) following the sample of fifteen years, 1970 to 1984 and showed that the relationship between financial frictions and investment-cash flow sensitivity is non linear. They developed new index to classify the firms into financially constrained and unconstrained types, popularly known as KZ index. They explained that most highly financially constrained and unconstrained firms have higher relationship between investment and cash flow sensitivity then middle class firms. They showed that financially constrained firms have lower relationship between investment and cash flow then unconstrained firms. Several other empirical papers also supported this finding including Kadapakkam, Kumar, & Riddick (1998), Cleary (1999) and Chen & Chen (2012).

The confusion in the relation between financial frictions and investment-cash flow sensitivity is demonstrated by Almeida & Campello (2007), they studied the relationship between investment and cash flow for American manufacturing firms over the year 1985-2000. They have applied GMM and concluded that the asset tangibility increases the relationship between investment and cash flow sensitivity for the constrained firms. Their results are not according to the results of Kaplan & Zingales (1997). Rather they suggested that financing restrictions affect significantly the investment choices of

corporate firms. Almeida & Campello (2007) divided the financial constrained firms on the basis of bond rating, commercial paper rating, on the basis of total asset, and payout ratio. Another analysis by Kim (2014) taking data period from 1990 to 2008 examined that financially unconstrained firms have higher sensitive between investment and cash flow than for financially constrained firms. He explained that the substitutability between free cash flow and reserved cash holdings can also showed that the relation between financially constrained and investment-cash flow sensitivity is negative. High level of external financing is one of the reason that why constrained firms depend so much on the internal financing. Furthermore, financially constrained firms usually depend on external financing because they have less internally generated cash flow. They used four different proxies to measure financially constrained and unconstrained firms.

Majority of the studies examined the relationship between the profitability and debt to equity ratio. Rajan & Zingales (1995) examined the American firms and showed that the relationship between the profitability and debt to equity ratio is negative, as much of the literature on capital structure demands the relation between internal and external financing is negative. Lemmon & Zender (2010) study is related to the external financing pattern of the firms and their access to capital market. Their focus was on the determinant of debt and equity. However, Lemmon & Zender (2010) concluded that some of the pattern observed in the data was relate to pecking order theory. Likewise, much of the literature supports pecking order theory and preferred internal financing over the external financing. Sunder & Myers (1999) using a sample of 157 US firms, suggested that most firms use debt financing to fund their financing deficit and support pecking order theory thus, they showed negative relationship between profitability (cash flow) and external

financing. Fama & French (2002) and Myers (1993) also supports the pecking order theory and concluded that firm first prefers internal cash flow and then use the external funds. Brav (2009) examined large United Kingdom firms and analyzed their financial behavior. They divide data set into private and public firms and analyzed that private firms (financially constrained firms) have less financial flexibility because they experience more information asymmetry as compared to public firms (financially unconstrained firms). While constrained firms face high adverse selection and floating cost as they are less diversified, small and opaque.

The negative external financing-cash flow relationship seems inconsistent with the trade-off theory of capital structure. They explained that more profitable firms used more external financing (debt) because of tax shield. According to them, if tax benefits are more attractive then they prefer debt financing instead of internal funds. Graham (2000) found that firm could get benefit from the taxes until the cost associated with taxes are less. Therefore, large and higher profitable firms used debt conservatively. Recent literature, suggested that the relationship between internal financing and external financing is negative because of adjustment cost (Strebulaev (2007)). He presented negative relationship between profitability and leverage for those firms which are not able to readjust their capital structure.

Carpenter & Petersen (2002) taking US firms over the year 1980 to 1992 examined that growth of small firms constrained by internally generated funds. They used data set of more than 1600 small firms and concluded that development of small size firms is constrained by internal financing. Chittenden, Hall, & Hutchinson (1996) empirical research was based on UK listed and non listed firms. They have applied OLS regression

over a sample of 172 listed and 3308 unlisted companies and investigated the capital structure of small firms and emphasized on growth and access to capital market. They established that small firms rely more on short term debt seen that size and growth positively related to external financing. Gul (1999) using 5308 observation of Japanese listed firms over the year 1988 to 1992. He showed the relationship between capital structure, growth opportunities, and dividend policies. His results showed a negative relationship between growth for both debt financing and dividend yield after controlling firm size and profitability.

Previous literature on capital structure showed a positive relationship between firm size and external financing (Titman & Wessels (1988), Rajan & Zingales (1995), and Hovakimian, Opler, & Titman (2001)) showed that large size firms are more diversify, low probability of default, low volatility, and easy access to external financing. Byoun (2007) examined small US firms and found that small firms maintain low debt to equity ratio not because of additional debt financing or internal cash flow but because of extra equity financin; They found that small size firms do more financing with equity.

Firms that are fa ng higher cost of external financing not only care about their present investment but also worried about their future spending. Almeida, Campello, & Weisbach (2004) tal · into consideration US manufacturing firms from 1971 to 2000 period and examined c ·h-cash flow sensitivity. They used four categories to divide the firms into financially strained and unconstrained type. These are size, dividend, commercial KZ index, and ;r rating. They have applied GMM methodology and concluded that financially constrained firms have more tendencies to save cash and have a positive cash-cash flow relationship as compared to financially unconstrained firms. Fazzari & Petersen

(1993) applied OLS technique on US manufacturing firms over the period 1970 to 1979, their study concluded that companies with higher external financing cost (financial constrained firms) when they observed high profitability they may found it positive to direct cash flow toward liquid assets.

Opler. Pinkowitz, Stulz, & Williamson (1999) take data of US firms from 1971-1994 and found evidence in support of static trade-off model. Small firms with strong growth opportunities preferred liquid cash holding instead of non-cash assets and large firms preferred less liquid cash holdings as they have easy access to external market. Most of the literature showed positive relationship between cash holdings and external financing. Denis & Sibilkov (2010) take into consideration US financially firms and examined that financially constrained firms hold greater amount of liquid asset for the investment purpose. When financially constrained firms have high cash holdings then they can increased their investment projects. Some financially constrained firms hold less liquid asset because of low cash flow. On the other fold, Gracia & Mira (2015) take data of Spanish firms from 1996 to 2010 and explored cash-cash flow relationship. They divide the firms into two type financially constrained (unlisted firms) and unconstrained firms (listed firms). They found that financially unconstrained firms hold lesser amount of cash as compared to financially constrained firms as financially unconstrained firms found easy in accessing the external capital market.

Chay & Suh (2008) take data of thirty five countries over the period 1998-2004 and showed that in majority of countries the investment of financially constrained firms is insensitive to internal funds. Although financially constrained firms found difficulty while accessing the external funds even then financially constrained firms' use external

financing. Hovakimian (2011) found that during the recession, when external financing costs is higher, conglomerates improve the efficiency of external capital market while during non-recession period when external capital market is easy to access, internal capital market is inefficient and conglomerates allocate more funds to lower growth opportunities relative to higher growth opportunities. In another study, Succurro (2014) take Italian manufacturing firms and found that some complementary exist between internal financing and external funds in more developed Italian region.

In order to check the impact of financial restrictions on relationship between internally generated funds and external financing, we see the recent empirical capital structure literature and focus on the firm financial decision that how they raise fund in the capital market. Almeida & Campello (2010) worked on panel data of US firms covering the period of over 30 years. They used four different firm characteristic to identifying financially constrained and unconstrained firms and found negative external financing-cash flow relationship for financially unconstrained firms. One the other hand in case of financially constrained firms, external financing is less negative or insignificance to internal funds. They suggested that due to the endogenous investment on external financing decision there exist a complementarity between the internally generated funds and external financing for financially constrained firms. Similar results are also presented by Portal et al. (2012). They take into consideration Brazilian firms and divide firms into two categories financially constrained and unconstrained. Their study revealed negative and statistically significant external financing-cash flow relationship under financial constraints.

There are different opinions in the literature regarding external financing-cash flow relationship. Gracia & Mira (2014) investigated Spanish firms and explore relationship among external funds and internally generated funds and divide firms into financially constrained and unconstrained types. They found that both financially constrained and unconstrained firms showed that the relationship between external financing and internal funds is negative but for the financially constrained firms this relationship is less negative. They postulated that for unlisted firms investment is endogenously determined and theses firms are strongly depended on the internal funds. In turns, for listed companies investment is exogenously determine and for raising external cash flow they may lessen leverage.

2.2.2 Impact of Credit Multiplier on Firms External Financing Decisions

The credit multiplier mechanism implies that financially constrained firms face more complementary between cash flow and external funds. According to Almeida & Campello (2007), financially constrained firms should show more complementary between external financing-cash flow relationship because of higher tangible assets. Credit multiplier is more stronger for those firms which have more tangible assets. Henceforth, tangible assets positively affect the internal funds sensitivity of investment in financially constrained firms but not for unconstrained firms. Campello & Hackbarth (2012) take data from 1971-2005 and studied the affect of asset tangibility on corporate finance and found that financially constrained firms invest more in tangible assets in order to get the maximum benefits. They also argued that firms that face higher financial frictions can get more benefit from large debt capacity that is generated by tangible assets.

Gracia & Mira (2014) results also match with the macroeconomic literature and found that in order to overcome the problem for external financing constrain, financially constrained firms preferred to hold more tangible assets. Their results showed the negative relation between tangibility and cash flow coefficient for financially constrained firms. This negative relationship is due to the higher flexibility to adjust the external financing when they boost more tangibility. Almeida & Campello (2010) test the external financing-cash flow relationship through collateral channel and found that cash flow coefficient is more positive for financially constrained firms (those firms who can easily liquidate their assets) as compare to unconstrained firms. Similar results are also presented by Bemanke et al. (1996) and Kiyotaki & Moore (1997). They also support the macroeconomic literature where more collateral helps to relax external financing frictions.

While analyzing the empirical capital structure literature regarding external financing-cash flow relationship. Most of the empirical capital structure literature focused on developed countries. Several studies investigated the external financing-cash flow relationship under financial constraints (see for example, Almeida & Campello (2010), Gracia & Mira (2014), and Portal et al. (2012)). Furthermore, observing the developing countries literature, most of past studies only focused on the capital structure determinants (Sheikh & Wang (2011) and Shah et al. (2004)). However, none of study in Pakistan focused on external financing and cash flow relationship under financial restrictions. Additionally, for the better understanding of the role of credit multiplier effect on external financing and cash flow relation, there is a need to examine the external financing and cash flow relationship under financial frictions in developing countries. For

this we are taking the credit multiplier effect to examine the financially constrained and unconstrained firms in case of Pakistan.

Chapter 3

Data and Methodology

This chapter presents the data and methodology used to analyze external financing-cash flow relationship in case of Pakistan. We start with the definition of variables. Definitions of variables provide detailed information about each variable use in the model and their expected signs. Next, we present the model used to estimate the external financing sensitivity to cash flow under financial frictions. Next, we show the augmented model to examine the impact of credit multiplier effect on external financing-cash flow relationship under financial frictions. Next, we present the financial constrain criteria to divide the firms into financially constrained and unconstrained. Lastly, we present the estimation technique use to analyse these models.

3.1 Data and Sample Description

In order to investigate the external financing and internal cash flow relationship for financially constrained and unconstrained firms, we have taken a large panel of manufacturing firms listed at Karachi Stock Exchange KSE. In particular, we create an annual panel dataset covering the period from 2000-2013 using the Balance Sheet Analysis of Non-Financial Firms published by State Bank of Pakistan (SBP). As the capital structure of financial firms is different from non-financial firms therefore, we excluded the financial firms.

3.2 Definition of Variables

The main aim of this study is to find the relationship among the internal funds and demand for external funds under financial restrictions. Therefore, we incorporate several other firm-specific variables in our analysis which also affect the external financing of firms. These variables include firm growth, firm size, cash, inventories, PPE (Plant, Property and Equipments), and debt to equity ratio. In order to measure the external financing-cash flow relationship under financial restrictions, we used three measures, namely, KZ index (Kaplan and Zingales index), debt to asset ratio, and the interest coverage ratio to divide the firm-year observations into financially constrained and unconstrained type. Gracia & Mira (2014), Portal et al. (2012), Almeida & Campello (2010), Lemmon & Zender (2010), and Chay & Suh (2008) also have used the above firm-specific control variables in their studies.

Table 3.1: Variables Definitions

Variable	Expected Signs		Definition
	Constrained firms	Unconstrai-ned firms	
Dependent Variable EXTERNAL_FINANCING			External financing is the ratio of change in long term debt plus change in shareholders' equity to total assets
Independent Variables CASH_FLOW	-ve	-ve	The net profit before tax plus depreciation for the year divided by total assets
Control Variables			
GROWTH	-ve/+ve	+ve	Percentage change in total sales
SIZE	-ve/+ve	+ve	Natural logarithm of book value of sales
CASH	+ve	-ve/+ve	Sum of cash and liquid securities divided by total assets
INVENTORY	-ve/+ve	-ve	The ratio of inventories to total assets
PPE (Plant Property and Equipment)	-ve/+ve	-ve	The fixed assets divided by total assets
DEBT/EQUITY	-ve	-ve/+ve	Total liabilities divided by equity.

3.3 Models and Variables

In order to see the relationship between external financing and cash flow, we draw our models by following Almeida & Campello (2010), Portal et al. (2012), and Gracia & Mira (2014). We consider two different models that enable us to analyze the external financing and cash flow relationship for both financially constrained and unconstrained firms.

3.3.1 Empirical Model for External Financing-Cash flow Sensitivity

Our first standard model includes external funds as a function of internally generated cash flow. Our model also includes firm growth and firm size as control variables. The main focus of our study is to see the effect of the cash flow on the external financing choices under financial restrictions. We also take into consideration firm size because large firms can easily substitute between external and internal funds, and benefiting from economies of scale. Also, our model includes growth opportunities in our examination as is likely to have positive impact on external financing. Specifically, our standard empirical model can be express as follow

$$\text{EXTERNAL\_FINANCING}_{i,t} = \alpha_1 \text{CASH\_FLOW}_{i,t} + \alpha_2 \text{GROWTH}_{i,t} + \alpha_3 \text{SIZE}_{i,t} + \eta_i + \eta_t + \epsilon_{i,t} \quad (1)$$

where EXTERNAL_FINANCING $_{i,t}$ is the main dependent variable and it shows change in external financing for ith firm at the time t. η_i and η_t are firm- and time-specific effects,

respectively, and $\epsilon_{i,t}$ is the disturbance term and is used to capture the unobserved shocks in the model.

Another empirical model of the external financing and cash flow relation, extended model henceforth, influence the baseline model presented in equation (1) by taking into consideration a firm's a previous internal financing structure and its internal liquidity level. In order to avoid the cash flow shocks, we control already available stock of internal funds and other working capital. Moreover, following earlier researches including Almeida et al. (2004), Fazzari & Petersen (1993), Almeida et al. (2004), Almeida & Campello (2010), and Rajan & Zingales (1995), we concluded that firms could get new external financing through stock of fixed assets and its lagged capital structure. For this purpose we used external financing as dependent variable. Specifically, the extended model takes the following form:

$$\begin{aligned} \text{EXTERNAL\_FINANCING}_{i,t} = {} & \alpha_1 \text{CASH\_FLOW}_{i,t} + \alpha_2 \text{GROWTH}_{i,t} + \alpha_3 \text{SIZE}_{i,t} \\ & + \alpha_4 \text{CASH}_{i,t-1} + \alpha_5 \text{INVENTORY}_{i,t-1} + \alpha_6 \text{PPE}_{i,t-1} \\ & + \alpha_7 \text{DEBT/EQUITY}_{i,t-1} + \eta_i + \eta_t + \epsilon_{i,t} \end{aligned} \quad (2)$$

We model the external financing similar to equation (1) and also as a function of the beginning-of-the-year stock of cash and liquid securities (CASH), accounts receivables and inventory items (INVENTORY), gross plan, property, and equipment (PPE), and debt/equity ratio (DEBT/EQUITY). As the focus of this study is to check whether the external financing and cash flow relationship differs across financially constrained and unconstrained firms, therefore following existing capital structure literature, we estimate equation (2) separately for financially constrained and unconstrained firms.

3.3.2 Credit Multiplier Test

Tangible assets could help the financially constrained firms to look for new financing as it provides the required collateral to give guarantees to financers. Positive shocks in income increase the tangible asset which in return raises new credit and then additional tangible assets accordingly. This procedure is named as credit multiplier effect and is considered an additional mechanism which make the external financing and cash flow relation less negative (Almeida & Campello (2007) and Gracia & Mira (2014)). Financially Constrained firms hold more tangible assets because in future they suffer from more financing problems. Therefore, the credit multiplier effect is more observable in financially constrained firms because they often experience complexity in seeking new funds. Our previous empirical models set up external financing-cash flow relation along with the control variables. In order to see the different effect of internal funds on external financing, we consider the credit multiplier effect. We take asset tangibility and an interaction term as additional variables. Therefore, our third external financing model is:

$$\begin{aligned} \text{EXTERNAL\_FINANCING}_{i,t} = {} & \alpha_1 \text{CASH\_FLOW}_{i,t} + \alpha_2 \text{GROWTH}_{i,t} + \alpha_3 \text{SIZE}_{i,t} \\ & + \alpha_4 \text{TANGIBILITY}_{i,t} + \alpha_5 (\text{CASH\_FLOW} \times \text{TANGIBILITY})_{i,t} \\ & + \alpha_4 \text{CASH}_{i,t-1} + \alpha_5 \text{INVENTORY}_{i,t-1} + \alpha_6 \text{PPE}_{i,t-1} \\ & + \alpha_7 \text{DEBT/EQUITY}_{i,t-1} + \eta_I + \eta_t + \epsilon_{i,t} \end{aligned} \quad (3)$$

Where external financing, cash flow, growth, size, cash, inventory, PPE, and debt to equity ratio are defined in the same way as in equation (2). Following Gracia & Mira (2014) we used tangibility as dummy variable. So, if the value of tangibility is above the

sample mean, we assign those variables as 1 otherwise 0. Furthermore, an interaction term in the model is tangibility×cash flow, resulting from the multiplication between tangibility (which is used as dummy variable) and cash flow. Finally, η_i and η_t absorb firm- and time- specific effects, respectively, and $\epsilon_{i,t}$ is the disturbance term.

3.4 Financial Constraints Criteria

In order to examine the implications of our model, we divide the firms as indicated by the previous measures of the financial constraints that they experience. We do not have any strong prior about which approach is finest. There are different approaches to divide the firms into financially constrained and unconstrained type like asset size, annual payout distribution, commercial paper ratings, bond ratings, cost of external financing, interest coverage ratio, Wu Whited index (Whited & Wu (2006)). We proposed the following criteria for classifying the firm's as financial constraints: KZ index, debt to asset ratio, and the interest coverage ratio.

Scheme 1: We make an index of firm financially constrained following Kaplan & Zingales (1997) which is also known as "KZ index". To compute the KZ index we use the original variable definitions of Kaplan & Zingales (1997)

$$\text{KZindex}_{i,t} = -1.002 \times \text{CF}_{i,t} + 0.283 \times \text{Q}_{i,t} + 3.139 \times \text{LEV}_{i,t} - 39.368 \times \text{DIV}_{i,t} - 1.315 \times \text{CH}_{i,t} \quad (4)$$

where

$\text{CF}_{i,t}$ represents cash flow

$Q_{i,t}$ is investment opportunities which is measured as market/book ratio

$LEV_{i,t}$ represents firms' leverage and it's a total liabilities/total assets

$DIV_{i,t}$ is the dividend payout

$CH_{i,t}$ represents cash holdings of the Firms

Annual data from 2000 to 2013 is used. We rank firms into two groups on the basis of KZ index. Firms with the KZ index above the sample mean is considered as financially unconstrained and considered constrained otherwise. The same weights are also used by Almeida et al. (2004), Kim (2014), Cleary (1999), and Chen & Chen (2012).

Scheme 2: We rank the firms into two groups based on interest coverage ratio over 2000 to 2013. The interest coverage ratio is ratio of earnings before interest and tax to financial expenses. Greater the interest coverage ratio, fewer the problem the firm would have to face in repaying its debt. Thus, if the company's interest coverage ratio is above or below the sample mean it is more or less likely to be considered as financially constrained. This variable is very common measure to divide the financially constrained firms (see, for example, Whited (1992), Caballero, Teruel, & Solano (2014)). We are taking the mean value of interest coverage ratio to divide the firm-year observation into financially constrained and unconstrained type. Firms with interest coverage ratio above the mean is considered as financially unconstrained and below the sample mean is financially constrained as constrained.

Scheme 3: We also rank firms based on debt to assets ratio. Arugaslan & Miller (2006) also used debt to asset ratio to divide the firms into financially constrained and unconstrained types. The debt to asset ratio is sum of short-term and long-term debt to

book value of assets. We separate the organizations into two groups based on debt to asset ratio. If the firms debt to assets ratio less than the mean value it is considered as financially constrained and unconstrained otherwise.

3.5 External Financing

External financing provides information that how much company holds external funds to fulfill its financial needs. Higher external financing means that firm depend more on external source of funds. Rashid (2014), Gracia & Mira (2014), Portal et al. (2012), Almeida & Campello (2010), and Chay & Suh (2008) used different measures of external financing. Following Chay & Suh (2008) we define external financing as sum of total equity issued and long term borrowings to total assets.

3.6 Cash Flow

To see the external financing and cash flow sensitivity we take the sum of net profit before tax and depreciation for the year divided by total assets. This ratio tells us that how efficient managers of a firm use its internal funds to converse into net income. It is predicated that cash flow had negative impact on external financing. Most of the previous empirical studies such as Gracia & Mira (2014), Leary & Roberts (2005), and Almeida & Campello (2010) documented that cash flow of a firm decreases with the increase in external fund. The pecking order theory states less external financing is demanded by more profitable firms. According to them profitable firms fulfill their investment needs through internal cash flow. The internal source of financing includes cash and retained earnings and feasible external source of financing includes debt and equity. Firms having higher profitability (cash flow) prefer internal funds. Therefore, the relation between

profitability (cash flow) and external financing is negative (Frank & Goyal (2003) and Portal et al. (2012)).

Alternatively the trade-off theory predicted that the relation between profitability and external financing is positive. Firms prefer debt relative to equity due to the tax advantage and less bankruptcy cost associated with debt financing. The profitable firms prefer more debt financing which supports the trade-off theory (Modigliani & Miller (1963)). Later, some recent theories however, suggested that the external financing and cash flow relationship is negative (Lewellen & Lewellen (2006), Strebulaev (2007), and Hennessy & Whited (2005)).

3.7 Control Variables

In order to see the relationship between internal and external funds, it is very important to control the other firm-specific variables, because these variables also have a greater influence on firms' capital structure. Therefore, following the studies of Almeida et al. (2004), Gracia & Mira (2014), Portal et al. (2012), Almeida & Campello (2010), and Lemmon & Zender (2010), we utilize following control variables which have significant impact on the external financing of firms. We find that different capital structure theories state different relationship between external financing and firm-specific variables. We define these control variables in detail and also show the empirical evidence to these variables. The control variables in the study are defined as follows.

3.7.1 Growth

The growth of firm is calculated by taking percentage change in total sales. The market timing theory showed a positive relationship between growth and external financing. Higher growing firms prefer more external funds as compare to low growing firms. Most of the empirical literature suggested that when the growth of firms increases the external financing of firms also increased. In particular, Gracia & Mira (2014) took growth as a control variable to see external financing-cash flow sensitivity under financial frictions and suggested that the relation between growth and external financing is positive for both financially constrained and unconstrained firms. In case of financially constrained firms the relationship between growth and external financing is negative. This relationship is also confirmed by Lemmon & Zender (2010), Carpenter & Petersen (2002), Musso & Schiavo (2008), and Blasco & Teruel (2011).

3.7.2 Firm Size

$SIZE_{i,t}$ shows size of firm i in year t. The natural log of sales is used to measure the size of firm. Several previous empirical literatures showed positive impact of firm size on external financing. The large size firms are well diversified, having less chance of bankruptcy, and also enjoy economics of scale. The cost associated with external financing like bankruptcy cost and agency cost is less in large size firms as compared to small size firms. Therefore, the large size firms (firms those are financially unconstrained) can easily access external funds as compared to small size firms (firms those are financially constrained). Most of theories such as Almeida & Campello (2010),

Gracia & Mira (2014), and Portal et al. (2012) also confirmed that the relation between firm size and external financing is positive.

According to the pecking order theory, the large size firms have less asymmetric problem and have more ability to retain their earnings. Therefore, large firms mostly preferred internal funds as compare to the external financing. Modigliani & Miller (1963) also showed that the relation between firm size and external financing is negative. This negative relation is also confirmed by Fama & French (2002), Titman & Wessels (1988) and Hovakimian (2011).

3.7.3 Cash

The cash holding of a firm is calculated by taking cash and liquidity securities. This control variable tells the amount of cash the firm holds in their capital structure. Firms hold more amounts of cash if ratio of cash holding is higher. Furthermore, lower the ratio of cash lower will be the cash holdings. According to the Myers & Majluf (1984), asymmetric information had a fundamental role in deciding the firm's capital structure. Firms prefer to finance investment with internal source of funds (cash) and then use external funds as last option due to the existence of asymmetric information between firm managers and financer. Denis & Sibilkov (2010) and Almeida et al. (2004) also confirmed that the relation between cash and external financing is negative.

However, the relationship between cash and external financing is also positive. This positive relationship is confirmed by Gracia & Mira (2014), Portal et al. (2012), Almeida & Campello (2010), and Almeida et al. (2004). Almeida & Campello (2010) showed a positive relationship between cash holdings and external financing for both financially

constrained and unconstrained firms. This shows that when cash holding of a firm increases it also increase their external financing.

3.7.4 Inventory

Inventory of a firm is calculated by taking ratio of inventories to total assets during the year *t*. Most of the empirical literature confirmed a negative relationship between inventory and external financing. This negative relationship shows that when the firm stock of asset increases, it decreases their amount of external financing. However, several other studies showed a positive relationship for both financially constrained and unconstrained firms. This positive relationship shows that when inventories of the firm increase, it also increases their external financing. These relationships are also confirmed by Hale & Long (2011), and Zakrajsek (1997).

3.7.5 PPE

PPE stands for Plant Property and Equipments. Fixed asset to total assets is used to measure the PPE. The pecking order theory suggests that PPE has negative impact on external financing of firms. Therefore, the firms holding large amount of PPE can go for less external financing. The existing empirical studies of Frank & Goyal (2003), Feidakis & Rovolis (2007) and Rashid (2012) supports pecking order theory and showed that the relation between PPE and external financing is negative. Similarly, the trade-off theory by Modigliani & Miller (1963), states that firms holding large amount of tangible assets (PPE) preferred to finance investments with external funds (debt). Firms having large amount of fixed assets have less chance of being bankrupt. Fama & French (2002) also

supports trade-off theory and showed the relationship between PPE and external financing is positive.

3.7.6 Debt/Equity

The firms' debt to equity ratio is calculated by taking ratio total liabilities to total equity during the year *t*. Debt to equity ratio tells us that how much debt firms holds to fulfill its financial needs. Previous studies showed the negative relationship between debt to equity ratio and external financing is negative (Byoun (2007) and (Portal et al., 2012)). This means that when financially constrained and unconstrained firms' increases the amount of debt to asset ratio it will decrease the demand for external funds. However, the relationship between debt to equity ratio and external financing is positive for both financially constrained firms and financially unconstrained firms and this relationship is confirmed by Almeida & Campello (2010).

3.8 Estimation Technique

Following previous empirical literature we see that to examine relationship between external financing and cash flow under financial restrictions different researches have used ordinary least square, fixed effects, generalized method of moments, and instrumental variable approach. Almeida & Campello (2010) and Gracia & Mira (2014) used ordinary least square and generalized method of moments to measure the relation between external financing and cash flow for financially constrained and unconstrained firms. Frank & Goyal (2003) have used panel regression approach to see the external financing decisions. Almeida et al. (2004) used generalized method of moments and

ordinary least square to study the management of internal funds in the presence of financial constraints.

In this study, we follow Gracia & Mira (2014), Almeida & Campello (2010), Rashid (2012), and Portal et al. (2012) used ordinary least square (OLS) to solve equation (1). To remove the problem of hetroskedasticity of error, we use robust test. In contrast to ordinary lest square and first-difference GMM estimators, we use two-step system GMM to solve equation (2) and (3) which not only mitigate the problem of potential endogenity but also controls hetrogenity among the individual firms. The two-step system GMM also allow us to make use of different instruments with different lag formation. In order avoid the problem of "many instruments" we will use Hansen (1982) test and Arellano and Bond (1991) test. Therefore, to check the validity of instruments and to satisfy the orthogonality condition we apply the Hansen J-statistic test. To test the existence of second-order serial correlation in the residuals for two-step system-GMM we use Arellano-Bond AR (2) test.

Chapter 4

Empirical Results

In this chapter, we present the empirical results and analysis of those results. To evaluate the empirical external financing-cash flow relationship in Pakistan, we start our empirical investigation by presenting summary statistics. Summary statistics provides the overview of the data set. Next, we present the estimation results of the external financing and cash flow relationship for financially constrained and unconstrained firms. We use three different ways to classify financially constrained and unconstrained firms. These ways are KZ index (Kaplan and Zingales index), debt to asset ratio, and the interest coverage ratio. Next, we present the results of our augmented model for both types of firms. Particularly, in augmented model, we include CASH, INVENTORY, PPE (Plant, Property and Equipment), and DEBT/EQUITY as additional explanatory variables. Finally, we present another set of results to examine the credit multiplier effects for financially constrained and unconstrained firms.

4.1 Descriptive Analysis

Table 4.1 reports summary statistics. Specifically, the table presents the mean value, standard deviation (SD), first quartile (Q_1), median, and third quartile (Q_3). Mean is the average value of variables and it is the measure of the central tendency. Standard deviation provides information about the volatility of the particular variable. It shows how much a variable is deviated from its average value. Q_1 is the first quartile and its

value lies between smallest value and the median. Q_2 is the median and it's the middle value of data set. Q_3 is the third quartile and its lies between the median and largest value.

Table 4.1: Descriptive Statistics

Variables	Mean	Std. Dev.	Q_1	Median (Q_2)	Q_3
EXTERNAL_FINANCING	0.5225	0.2679	0.4004	0.5515	0.6998
CASH_FLOW	0.0869	0.3188	0.0145	0.0693	0.1475
GROWTH	0.2834	2.7863	-0.0640	0.0864	0.2692
SIZE	7.2811	1.6792	6.1912	7.1486	8.3290
CASH	0.0748	0.1306	0.0055	0.0223	0.0820
INVENTORY	0.1506	0.3025	0.0000	0.1140	0.2480
PPE	0.8477	0.4565	0.5850	0.8208	1.0576
DEBT/EQUITY	0.2756	42.8457	0.5752	1.3745	2.61729

Note: Table 1 presents the summary statistics. Table reports the mean, standard deviation, Q_1, Q_2, andQ_3values of the variables used in our regression model. Dependent variable is EXTERNAL_FINANCING while independent variables are CASH_FLOWS, GROWTH, SIZE, CASH, INVENTORY, PPE, (Plant Property and Equipment) and DEBT/EQUITY.

We can observe from the table that the mean value of external financing is 0.5225 and median is 0.5515 showing that external financing is negatively skewed, while the mean value of cash flow is 0.0869 and median is 0.0693. The estimates indicate that mean value of growth is 0.2834 and median is 0.0864, whereas the mean value of size is 7.2811 and median is 7.1486. The mean value of cash is 0.0748 and median is 0.0223. The value of mean for inventory, PPE (Plant Property and Equipment), and debt/equity is 0.150, 0.8477, and, 0.2756, respectively and median is 0.1140, 0.8208, and 1.3745. The standard deviation of external financing and cash flow is 0.2679 and 0.3188, respectively, while the standard deviation of growth, size, and cash is 2.7863, 1.6792, and 0.1306, respectively. The standard deviation of inventory, PPE, and debt/equity is 0.3025, 0.4565, and 42.8457, respectively.

As the primary aim is to see the relation between external financing and cash flow for financially constrained and unconstrained firms, we classify firm-year observations into financially constrained and unconstrained groups. For this purpose, we utilize three different measures, namely, KZ index, debt to asset ratio and interest coverage ratio. We present classified firm-year observations under each criteria to observe the external financing and cash flow relationship. In order to simplify, we assign letters (CF) for financially constrained firms and (UCF) for financially unconstrained firms.

Table 4.2: Financial Constraint Types

Financial Constraints Criteria	Constrained firms (CF) (Firm-Year Obs.)	Unconstrained firms (UCF) (Firm-Year Obs.)	No of Obs.
$KZ\ Index_{i,t}$	2890	2062	4809
$Debt\ to\ Asset\ Ratio_{i,t}$	2956	1996	4809
$Interest\ Coverage\ Ratio_{i,t}$	3920	970	4809

Note: KZ Index stands for Kaplan and Zingales index.

Our first measure is KZ index, which is developed by Kaplan & Zingales (1997). We used the mean value of KZ index to divide the firms-year observation into financially constrained and unconstrained type. If the value of KZ index in year *t* for a firm is greater than the mean value of the KZ index for the firm over the sample period we consider that firm-year observation as financial unconstrained and if the value of KZ index is less than its mean in year *t* for firm *i* we consider that firm-year observation as financially constrained. According to this criteria, 2890 firm-year observations are classified as financially constrained, whereas, 2062 firm-year observation are categorized as financially unconstrained firms. Our second measure is based on debt to asset ratio.

Specifically, we used mean value of debt to asset ratio to categorize the firms included in the sample into financially constrained and unconstrained type. If the value of debt to asset ratio is greater than its mean we assign those firm-year observations as financially unconstrained and if it is less than its mean value we consider those firm-year observations as financially constrained. According to this criteria, we observed that 2956 firm-year observations for the financially constrained firms and 1996 firm-year observation for the financially unconstrained firms. Finally, we used the interest coverage ratio to divide the firm-year observations into financially constrained and unconstrained type. Specifically, if the value of interest coverage ratio is greater than its mean value in the year t for firm i we consider that firm-year observations as financially unconstrained and if the value of the interest coverage ratio is less than its mean value we consider that firm-year observations as financially constrained. According to this criteria, we note 3920 firm-year observations for financially constrained firms and 970 for the financially unconstrained firms.

4.2 Estimating Cash Flow Sensitivity of External Financing

We start examination of how external financing decisions of firms correlate with cash flow by estimating equation (1) for the complete sample (combining both financially constrained and unconstrained firms). We do so with the objective to verify the relation among external financing and cash flow for firms involved in the sample. The estimated coefficients are presented as follows, where the values in parentheses are p-value. We estimate this model using OLS method.

$$\text{EXTERNAL\_FINANCING}_{i,t} = \underset{(0.000)}{-0.0938} \times \text{CASH\_FLOW}_{i,t} + \underset{(0.012)}{0.0089} \times \text{GROWTH}_{i,t}$$

$$+ \underset{(0.008)}{0.0153} \times \text{SIZE}_{i,t} \qquad (6)$$

$$R^2 = 0.143$$

The coefficient related with the cash flow shows a negative and statistically significant external financing-cash flow relationship. The given findings holds the pecking order theory but do not holds the trade-off theory of capital structure. The standard pecking order model show negative external financing-cash flow relationship. Myers (1984) showed that firm first prefer internal cash flow and then demand for external financing. The traditional trade-off theory of capital structure presented by Modigliani & Miller (1963) examined that because of tax benefits the relationship between profitability and external financing is positive. However, later studies show that the relationship between profitability and external funds is negative.

In economic terms, the above negative external financing-cash flow relationship suggests that for each Pak rupee of internally generated cash flow shortfall the firms gets 9 percent in new external financing. The negative coefficient of the external funds and cash flow relationship is similar to the (cash flow) coefficients presented by Fama & French (2002), Leary & Roberts (2005), and Almeida & Campello (2010). The coefficient related with growth tells that the relationship between growth and external fund is positive. This result indicates when the growth of a firm increases the firm can easily access to external financing. This positive relation between firm growth and external fund is consistent with Lemmon & Zender (2010), Gracia & Mira (2014), and Carpenter & Petersen (2002).

Similarly, the coefficient associated with size shows that the relationship between firm size and external financing is positive and statistically significant. This finding suggests that when the size of a firm increases the firm can easily access to the external financing. This positive relation of firm size and external financing is also confirmed by Fama & French (2002), Titman & Wessels (1988), and Hovakimian (2011).

4.2.1 Baseline Empirical Findings

In order to investigate the external financing-cash flow sensitivity under financial restrictions. We have applied Ordinary Least Square (OLS) with robust standard errors and divide the firm-year observations into two groups: financially constrained and unconstrained firms. The robust standard errors are used to circumvent some limitation of tradition parametric and non parametric methods. Specifically, we use OLS with robust in order to overcome the problem of heteroscedastic errors and presence of outliers. There are total 6 estimated equation presented in Table 4.3: three constraint criteria (KZ index, debt to asset ratio and interest coverage ratio) and two constrained categories (constrained firms and unconstrained firms).

Table 4.3: Cash Flow Sensitivity of External Financing: Baseline Model

	Independent Variables				
Dependent Variable: EXTERNAL_FINANCING	**CASH_ FLOW**	**GROWTH**	**SIZE**	**R^2**	**No. of Obs.**
Panel A: KZ Index					
Constrained firms (CF)	-0.0357 (0.270)	0.0083 (0.000)	0.0229 (0.000)	0.39	2890
Unconstrained firms (UCF)	-0.1092 (0.000)	0.0180 (0.021)	0.0304 (0.006)	0.17	2062
Panel B: Debt to Asset Ratio					
Constrained firms (CF)	-0.0181 (0.000)	0.0020 (0.059)	-0.0108 (0.000)	0.27	2956
Unconstrained firms (UCF)	-0.1088 (0.000)	0.0218 (0.020)	0.0273 (0.006)	0.17	1996
Panel C: Interest Coverage Ratio					
Constrained firms (CF)	-0.0231 (0.417)	0.0125 (0.063)	0.0548 (0.000)	0.42	3920
Unconstrained firms (UCF)	-0.1819 (0.053)	0.0378 (0.000)	0.0252 (0.024)	0.27	970

Note: Table 3 displays the results of OLS estimations for the baseline regression model (equation (1)). The dependent variable is EXTERNAL_FINANCING, while the independent variables are CASH_FLOWS, GROWTH, and SIZE. Above Table reports three constrained criteria to divide the firms into constrained and unconstrained categories (KZ Index, debt to asset ratio, and the interest coverage ratio).We also reported p-values in parenthesis. Last two columns show R^2 and number of observations.

Table 3 presents the results of estimated regression with external financing as dependent variable and cash flow, firm growth, and firm size as independent variables. The fifth column of the table shows R^2 estimates. The estimated value of R^2 indicates that the estimated model explains 27 to 42 percent variability of external financing for the constrained firms and 17 to 27 percent of external financing for the unconstrained firms. The last column reports firm-year observations. The above table shows that the estimated results of external financing and cash flow relationship for the financially constrained sample are much less sensitive and statistically significant except for panel B (i.e., debt to asset ratio) for all three classification criteria (KZ index, debt to asset ratio and interest coverage ratio). In economic terms, the estimated results for the financially constrained

sample suggest when each Pak rupee of internal cash flow decreases the constrained firms seeks between 1 to 3 percent in fresh external funds. Similarly, the estimated results of external funds and cash flow relationship for the financially unconstrained sample are much more negative and statistically significant for all three classification criteria (KZ index, debt to asset ratio and interest coverage ratio). Specifically, the estimated results for the unconstrained sample suggest that when each Pak rupee of internal cash flow decreases the financially unconstrained firms seek between 10 to 18 percent in new external financing.

The standard pecking order theory of capital structure states that financially unconstrained firms face lower cost of external financing relative to financially constrained firms because financially constrained firms face more asymmetric information problem. Asymmetric information increases the value of external funds because information is not equally available to everyone and one party has better information as compare to other party. So, financially constrained firms should show more negative relationship between the cash flow and external fund as compared to their unconstrained counter parts (Myers (1984) and Myers & Majluf (1984)). The results presented in Table 4.3 reveals that external financing-cash flow relationship is more concentrated among the financially unconstrained firms (those firms that face less amount of financial frictions) as compared to the financially constrained firms. So, our results only support the pecking order theory in case of financially unconstrained firms. The negative relationship between internal cash flow and external funds for financially constrained firms is consistent with Almeida & Campello (2010), Gracia & Mira (2014), and Portal et al. (2012).

The impact of growth on firm external financing is significantly positive for all the three constrained criteria (KZ index, debt to asset ratio, and the interest coverage ratio). The finding suggests that growing firms increase their external financing, regardless whether they are financially constrained or unconstrained. The positive relationship between growth and external financing also confirmed in the literature. In particular, Musso & Schiavo (2008) conducted study on French manufacturing firms and concluded that firm's growth had positive impact on external financing. Blasco & Teruel (2011) analysis the effect of financial resources on firms growth and reported that small firms growth depend on internal funds while large firms growth depend on external funds. Hence, they showed that the relationship between growth and external financing is positive for financially unconstrained firms and for financially constrained firms this relationship is negative.

The impact of firm size on external fund is positive and statistically significant. First, we use KZ index and find that the relation between size and external financing is positive. In particular, the relation between external financing and size is positive which implies that both types of firms have easy access to debt and equity. Next, we use debt to asset ratio and observe that the relationship between external financing and size is negative for financially constrained firms and positive relationship for the financially unconstrained firms. This result indicates that large firms (unconstrained firms) have easy get to external financing as compared to small firms (constrained firms). According to the trade-off hypothesis, large firms can easily get the external financing due to the lower level of bankruptcy and agency cost. Finally, we use the interest coverage ratio and find that the relationship between external financing and size is positive. Similar results are

also reported by Almeida & Campello (2010), Gracia & Mira (2014), and Portal et al. (2012).

4.2.2 Empirical Findings: Extended External Financing Model

Following previous studies including Rajan & Zingales (1995), Almeida & Campello (2010), and Gracia & Mira (2014), we argument the baseline mode to find the external financing-cash flow relationship. Further, our extended model also considers already existing stock of internal funds because firms can use these internal stocks of capital to favor the cash flow shocks. Specifically, in order to control the firm's a priori internal wealth, we extend the model by including CASH, INVENTORY, PPE (Plant Property and Equipment), and DEBT/EQUITY as an additional explanatory variables. We have included lagged of dependent variable as well our model is dynamic and for dynamic model system GMM is more suitable. The two-step system GMM was developed by Blundell & Bond (1998) and it allows introduction of more instruments and can dramatically improves efficiency.

4.2.3 The Validity of Instruments

We are using the Arellano & Bond (1991) AR (2) test and Hansen J-statistic test developed by Hansen (1982) to check the validity of instruments. In particular, we apply the Hansen J-statistic test in order to check that the instruments used for the two-step system-GMM estimator are valid and fulfill the orthogonality condition. The Arellano-Bond AR (2) test observes the presence of second-order serial correlation in the residuals. The estimated results of Hansen J-statistic and AR (2) test are presented in last two columns of Table 4.4, respectively. These tests confirm that the instruments used in our

model are valid, thus our two-step system-GMM results are efficient and consistent. The p-value associated with Hansen J-statistic test indicates that the instruments used in two-step system-GMM estimations are suitable and fulfills the orthogonality conditions. The Arellano-Bond AR (2) test does not give us any proof for the existence of second-under serial correlation in the residuals. This shows that the instruments that we used in our estimation are suitable.

Having established the relation between external financing and cash flow across financially constrained and unconstrained firms, we next turn to investigate the extended external financing model by taking into account the firms pre-existing stock of capital as shown in equation (2), presented in the methodology chapter. Table 4.4 shows the results of the two-step system GMM considering external financing as dependent variable and cash flow, growth, size, cash, inventory, PPE, and debt/equity as independent variables. We use cash, inventory, PPE, and debt/equity as endogenous regressors. In particular, we used three financial constrained criteria to divide the firm-year observations into financially constrained and unconstrained type. These measures are KZ index, interest coverage ratio, and debt to asset ratio. Based on the previous empirical literature[2], we hypothesized that the relationship between external financing and cash flow is negative and statistically significant.

The estimated results presented in Table 4.4, indicate that both groups of firms exhibit a negative sensitivity to external financing-cash flow relationship. Our results also suggest that the external financing is relatively more sensitive to cash flow shocks for financially

[2] See, for example, Leary and Roberts (2005), Fama and French (2002), and Alemida and Campello (2010).

Table 4.4: Cash Flow Sensitivity of External Financing: Augmented Regression Model

	Independent Variables								
Dependent Variable: EXTERNAL_FINANCING	**CASH_ FLOW**	**GROWTH**	**SIZE**	**CASH**	**INVEN_ TORY**	**PPE**	**DEBT/ EQUITY**	**Hansen's J-stat (p-value)**	**AR(2)**
Panel A: KZ Index									
Constrained firms (CF)	-0.0109	-0.0025	0.0142	0.0110	-0.0106	-0.0069	-0.0038	0.106	0.102
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		
Unconstrained firms(UCF)	-0.0120	0.0147	0.0234	-0.1514	-0.0236	-0.0057	-0.0006	0.288	0.182
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		
Panel B:Debt to Asset Ratio									
Constrained firms (CF)	-0.0023	0.0014	-0.0349	0.0144	0.0867	-0.0606	-0.0028	0.242	0.526
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		
Unconstrained firms(UCF)	-0.0227	0.0166	0.0497	-0.0163	-0.0375	-0.0302	-0.0012	0.893	0.106
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		
Panel C: Interest Coverage Ratio									
Constrained firms (CF)	-0.0165	0.0020	0.0831	0.0114	-0.0297	-0.0384	-0.0063	0.120	0.842
	(0.000)	(0.581)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		
Unconstrained firms(UCF)	-0.2505	0.0031	0.0423	0.0543	-0.0207	-0.0524	0.0018	0.183	0.524
	(0.000)	(0.309)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)		

Note: Table 4 displays the results of two-step system-GMM estimations for the extended regression model (equation (2)). The Dependent variable is EXTERNAL_FINANCING, while the independent variables are CASH_FLOWS, GROWTH, SIZE, CASH, INVENTORY, PPE, (Plant Properity and Equipment) and DEBT/EQUITY. Above Table reports three constrained criteria to divide the firms into constrained and unconstrained categories (KZ Index, debt to asset ratio, and the interest coverage ratio).We also reported p-values in parenthesis. Last two columns show Arellano-Bond AR (2) test and Hansen J statistic test.

unconstrained firms then that of financially constrained firms for all three financial constrained criteria (i.e., KZ index, interest coverage ratio, and debt to asset ratio). According to Almeida & Campello (2010), the relation between external funds and cash flow is less sensitive which indicated that financially constrained firms depends on internally generated cash flow and not independent to decide the investment. Hence, investment is endogenous to this category of firms. In contract, financially unconstrained do not depend on internally generated funds firms and free to decide the investment due to less asymmetric information and agency cost problems. Therefore, investment is exogenous to this type of firms As a result both types of firms show negative relationship but this relationship is more intense in case of financially unconstrained firms.

According to KZ index, the growth coefficient present in the table above indicates significantly negative relationship between growth and external financing in case of financially constrained firms. This result implies that small developing firms (financially constrained firms) decrease the demand for external funds. Similarly, the financially unconstrained firms show positive relationship between growth and external financing. This indicates that when the growth of large firms (unconstrained firms) increases, they also increase their external demand for funds. The finding of debt to asset ratio and an interest coverage ratio for both types of firms suggest that there exist positive relationship between growth and external financing. These results are also in accord with Blasco & Teruel (2011), Chittenden et al. (1996), and Portal et al. (2012).

In case of KZ index and the interest coverage ratio criteria the influence of the firm size on external financing is positive and statistically significant for both types of firms. The debt to asset ratio criteria indicates that the relationship between firm size and external

funds is negative for financially constrained firms. This finding impels that when size of firms' increases, they fulfill their financial needs with internal funds rather than external financing. For the unconstrained firms, the relation between size and external funds is positive. Sign of these results are common with Graham, Lemmon, & Schallheim (1998), Titman & Wessels (1988), Hovakimian et al. (2001), and Rajan & Zingales (1995).

We used KZ index and the debt to asset ratio criteria and find negative relationship between cash (liquid asset) and external financing for financially unconstrained firms and positive relationship for financially constrained firms. This shows that financially constrained firms hold more liquid asset in their hands usually take more external financing. On the other fold, when financially unconstrained firms have more cash in hands they demand less external financing. Next, we used interest coverage ratio and find that the relationship between cash and external financing is positive for types of firms. The estimated coefficient is significant at 1% level of significance. These relationships are also confirmed by Denis & Sibilkov (2010) and Almeida et al. (2004).

The impact of inventory on external funds is statistically significant and negative in case of KZ index and interest coverage ratio criteria for both types of firms. The finding indicates that when firms stock of the assets is more at closing date then they do not prefer external financing for the investment. According to debt to asset ratio criteria, the inventory is statistically positive relate with external financing for financially constrained firms and statistically negative related with external financing for financially unconstrained firms. These findings are in line with Hale & Long (2011), and Zakrajsek (1997).

The relationship between PPE and external fund is statistically significant and negative. This indicates that the PPE is easy to value, resulting lower asymmetric problem between corporate manager and financer. Therefore, less information asymmetric makes external financing less costly. The pecking order theory of capital structure states that the relationship between PPE and external financing is negative for both types of firms. These findings are also presented by Frank & Goyal (2003), Rashid (2012), and Feidakis & Rovolis (2007).

In addition, the KZ index and debt to asset ratio criteria evidence that the relationship exist between debt/equity and external financing is negative for financially constrained and unconstrained firms. In particular, the negative relationship between debt/equity and external financing indicates that when debt to equity ratio of a firm increases it will decrease the demand for external funds. Next, we use the interest coverage ratio criteria, the results in the table show that the relationship between debt to equity ratio and external funds is statistically significant and negative for financially unconstrained firms and positive relationship for financially constrained firms. These findings are also consistent with the studies of Byoun (2007) and Almeida & Campello (2010).

4.3 Measuring the Impact of Credit Multiplier on Firms' External Financing Decision

In this section, we seek to examine how credit multiplier affects the external financing decision for both groups of firms. To test for the possibility that credit multiplier exerts differential effect on both groups of firms, we estimate equation (3) presented in methodology chapter. We used three different measures to separate the firms into

financially constrained and unconstrained type. These measures are KZ index, debt to asset ratio, and the interest coverage ratio, respectively. While estimating the impact of credit multiplier on firms' external financing, we used external financing as dependent variable and cash flow growth, size, cash, inventory, PPE, debt/equity, tangibility (TANGIBILITY), and tangibility×cash flow (TANGIBILITY×CASH FLOW) as independent variables. Here we used two-step system GMM. This technique is quite flexible and permits the researcher to make different use of instrument with different lag structure. Specifically, this approach joins equations in difference of variables with equations in levels. This controls possible endogenity problems by using lagged values of the regressors as instruments. In order to ensure the validity of instruments used in the two-step system-GMM, We use the Arellano-Bond AR (2) test and Hansen J-statistic test. These tests verify that the instruments we use in our model are valid, thus our two-step system-GMM result are efficient and consistent. Thus, the p-value associated with Hansen J-statistic test reported in last column in Table 4.5 indicates that the instruments we are using in two-step system-GMM estimations are suitable and fulfills the orthogonality conditions. The AR (2) test reported in second last column in the table do not give any proof for the existence of second-under serial correlation in the residuals. This shows that the instruments that we used in our estimation are suitable.

The estimated results of cash flow, growth, size, cash, inventory, PPE, and debt/equity on external financing are similar as mention in Table 4.4. Specifically, the results presented in Table 4.5 provide evidence that cash flow and external financing is negatively correlated for both types of firms. Furthermore, the external financing and cash flow

financially constrained and unconstrained type. These measures are KZ index, debt to asset ratio, and the interest coverage ratio, respectively. While estimating the impact of credit multiplier on firms' external financing, we used external financing as dependent variable and cash flow growth, size, cash, inventory, PPE, debt/equity, tangibility (TANGIBILITY), and tangibility×cash flow (TANGIBILITY×CASH FLOW) as independent variables. Here we used two-step system GMM. This technique is quite flexible and permits the researcher to make different use of instrument with different lag structure. Specifically, this approach joins equations in difference of variables with equations in levels. This controls possible endogenity problems by using lagged values of the regressors as instruments. In order to ensure the validity of instruments used in the two-step system-GMM, We use the Arellano-Bond AR (2) test and Hansen J-statistic test. These tests verify that the instruments we use in our model are valid, thus our two-step system-GMM result are efficient and consistent. Thus, the p-value associated with Hansen J-statistic test reported in last column in Table 4.5 indicates that the instruments we are using in two-step system-GMM estimations are suitable and fulfills the orthogonality conditions. The AR (2) test reported in second last column in the table do not give any proof for the existence of second-under serial correlation in the residuals. This shows that the instruments that we used in our estimation are suitable.

The estimated results of cash flow, growth, size, cash, inventory, PPE, and debt/equity on external financing are similar as mention in Table 4.4. Specifically, the results presented in Table 4.5 provide evidence that cash flow and external financing is negatively correlated for both types of firms. Furthermore, the external financing and cash flow

relation is more intense for financially unconstrained firms as compare to financially constrained firms (Almeida & Campello (2010) and Gracia & Mira (2014)).

Table 4.5 reports the estimated results of impact of credit multiplier on firms' external financing decision. Specifically, the results presented in the table provide evidence that tangibility coefficient be statistically negative correlated with external financing, regardless whether firms are financially constrained or unconstrained. The pecking order theory of capital structure also suggests that the relationship between tangibility and external financing is negative. As tangible assets are easy to value than intangible asset, they lower the information asymmetric between managers and financer. This low information asymmetries decrease the cost of issuing new equity.

Table 4.5: Cash Flow Sensitivity of External Financing: Credit Multiplier Model

Dependent Variable: EXTERNAL_FINANCING	Independent Variables										
	CASH_ FLOW	GROWTH	SIZE	CASH	INVEN_ TORY	PPE	DEBT/ EQUITY	TANGI_ BILITY	CASH_ FLOW × TANGI_ BILITY	Hansen's J-stat (p-value)	AR(2)
Panel A: KZ Index											
Constrained firms (CF)	-0.0116	0.0019	0.0123	0.0636	-0.0111	-0.0627	-0.0055	-0.0208	0.0110	0.117	0.100
	(0.000)	(0.028)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		
Unconstrained firms(UCF)	-0.0127	0.0139	0.0191	0.0139	-0.0263	-0.0512	-0.0026	-0.0189	-0.0312	0.323	0.144
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		
Panel B:Debt to Asset Ratio											
Constrained firms (CF)	-0.0031	0.0018	-0.0266	0.0226	0.0541	0.0541	-0.486	-0.0918	0.0776	0.209	0.474
	(0.025)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		
Unconstrained firms(UCF)	-0.0391	0.0321	0.0321	0.0203	-0.0362	-0.0324	-0.0016	-0.0647	-0.0203	0.435	0.113
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		
Panel C: Interest Coverage Ratio											
Constrained firms (CF)	-0.0012	0.0031	0.0310	0.0103	-0.0281	-0.0019	-0.0012	-0.0845	-0.0612	0.180	0.317
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		
Unconstrained firms(UCF)	-0.0776	0.0087	0.0251	0.0752	-0.0109	-0.0305	0.0013	-0.0695	-0.0866	0.409	0.923
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		

Note: Table 5 displays the results of two-step system-GMM estimations for the credit multiplier model (equation (3)). The Dependent variable is EXTERNAL_FINANCING, while the independent variables are CASH_FLOWS, GROWTH, SIZE, CASH, INVENTORY, PPE (Plant Property and Equipment), DEBT/EQUITY, TANGIBILITY, and CASH_FLOW × TANGIBILITY. Above Table reports three constrained criteria to divide the firms into constrained and unconstrained categories (KZ Index, debt to asset ratio, and the interest coverage ratio).We also reported p-values in parenthesis. Last two columns show Arellano-Bond AR (2) test and Hansen J statistic test.

In case of KZ index and debt to asset ratio criteria, the cash flow and tangibility relation suggests significantly negative relationship for financially constrained firms and positive relationship for financially unconstrained firms. The given results shows that for financially constrained firms external-internal financing sensitivity are increasing in asset tangibility, while unconstrained firms sensitivity show no or little response to tangibility. However, an interest coverage ratio criterion shows a negative relationship between interaction term cash flow × tangibility and external financing for both financial constrained types. This relationship is more negative for unconstrained firms as compared to financially constrained firms. This negative estimated coefficient for financially constrained firms can be explained by the higher flexibility to adjust the external financing when they boast more tangibility. This is apparently obvious when financially constrained firms go through a funding surplus period. In contrast, financially unconstrained firms boasting more tangibility do not react in a different way to such cash flow shocks as they are supposedly unconstrained and determine external financing exogenously. Our findings are according to the macroeconomic literature. It is assumed that those firms get more external financing which holds more tangible assets, which will lead to new tangible asset and in future new external financing and so on (Bemanke et al. (1996) and Kiyotaki & Moore (1997)). So, according to this, it is assumed that the financially constrained firms try to accumulate more tangible asset and more sensitive to credit multiplier effect.

Chapter 5

Conclusion

5.1 Background of Thesis

Most of the previous and existing capital structure literature support pecking order theory and concluded that the relation between cash flow and demand for external financing is negative for both financially constrained and unconstrained firms. Similarly, when we observed literature for developed countries, most of the empirical work is related to the relationship between profitability and leverage and ignored external financing-cash flow relationship. Alternatively, when we see the literature for developing countries, their focused is on firms' capital structure determinants. Further, they did not observed the role of cash flow on firms' external financing decisions.

The purpose of our study is to see the relation between cash flow and external financing. Specifically, we predict that the relation between external financing and cash flow is less negative for financially constrained firms as compared to unconstrained firms. In principal, we also aim to see the role of asset tangibility on external financing-cash flow relationship. By doing this, we understand how credit multiplier affect the relationship among the both types of firms. We used panel data set of all non-financial firms listed at the Karachi Stock Exchange (KSE) during the period from 2000 to 2013. We use ordinary least square (OLS) and two-step system GMM to study the impact of external financing-cash flow relationship under financial frictions.

5.2 Key Findings

In this study, we examine the external financing-cash flow relationship under financial frictions in case of Pakistan to understand that why more profitable firms need less external funds. We take long term debt plus shareholders' equity as proxy for external financing. In this study we take three different firm-year observations to divide firms into financially constrained and unconstrained group namely, KZ index, the interest coverage ratio, and debt to asset ratio. Our results show a significant negative relation between cash flow and external financing. The empirical results of OLS and the two-step system-GMM regression show that this negative relationship is more for the financially unconstrained firms and less for the financially constrained firms.

Thus, when constrained firms face shock, they tend to reduce very less amount of external financing as compared to financially unconstrained firms. Presumable, under financial frictions the information asymmetries are not the core of the decision. As an alternative, what is important and accountable for this decision is endogeneity of investment for financially constrained firms because they are facing financial frictions while seeking external funds. These results also suggest that the pecking order have a greater impact on deciding the firm's capital structure. Furthermore, our results are also according to the existing empirical literature, such as, Almeida & Campello (2010), Gracia & Mira (2014), and Portal et al. (2012), they demonstrated that the relation between external financing and cash flow is negative and this relationship is less negative in case of financially constrained firms.

Further, we investigated the impact of tangibility over the substitution effect for both types of firms. Our findings suggest that for financially constrained firms tangibility plays an important role in adjusting the capital structure of firms. Our empirical results indicate that financially constrained firm's faces higher flexibility to seek external funds when they have higher amount of tangible assets.

5.3 Policy Recommendations

From policy point of view, our study would be useful for corporate managers and financial investor. The finding of this study also recommends that firms meet their investment opportunities from both internal and external funds. Further, the less sensitivity relationship between internal funds and demand for external funds in case of financially constrained firms gives insight to corporate managers that investment is determined endogenously when firm are financially constrained. The findings also suggest that corporate managers should draw their external financing policy when there is lack of internal cash flow to meet their investment opportunities. Specifically, our study suggests that for financially constrained firms the sensitivity of external financing-cash flow relationship is increasing in presence of tangible assets. This implies that financially constrained firms invest more in tangible assets. Tangible assets will also facilitate to seek new external funds. Cash flows have vast and notable role in making the financial decision of firms. Therefore, the results also suggest the policy makers to manage the cash flow shocks in order to finance investment.

5.4 Areas for Future Research

The prime focus of our study is to see the external funds and cash flow sensitivity under financial restrictions. Although we explicitly investigate that the relation between external financing and cash flow is less negative for financially constrained firms as compare to unconstrained firms. In our study by using annul firm level data we find the relation between external financing and cash flow across industries. On the other hand, this could be useful to extend the study separately to find the debt financing and cash flow relationship and equity financing and cash flow relationship under financial restrictions. Furthermore, we apply firm level annual data in our study one can improve this work by using quarterly data to investigate the role of profitability in firms' external financing decisions. There is a possibility for doing analysis on other developing countries such as Bangladesh, Iraq, Iran, India, Sirilinka, Afghanistan etc. A more useful research can be done by looking at external financing-cash flow relationship over the period of economic crises.

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