Essays on the Financial Constraints and Related Firm Behaviour: The Case of Pakistan

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Abstract

The aim of this thesis is to enhance the understanding of the suitable measures of financial constraints for the case of a developing country and the effects of financial constraints on firm's activities. In this respect, we employ data for Pakistani listed non-financial firms from 2006 to 2015, check the presence of financial constraints, evaluate measures of financial constraints and examine the effects of financial constraints on a firm's behaviour.

A number of studies check the presence of financial constraints at firm level for the case of developed countries. However, Due to different set up of financial markets between developed and developing countries, the effects of financial constraints on firm's activity may differ for developing country. Moreover, the measures of financial constraints have been introduced in the setup of developed countries; using those measures for the case of developing country without evaluation can misguide the findings. Besides, literature does not give any accurate measure of financial constraints. By addressing these gaps, our first empirical chapter of this study uses two different estimation frameworks: q model and error correction model to check the presence of financial constraints at firm-level. The findings in the first empirical chapter indicate the presence of financial constraints in the listed Pakistani firms, where large and dividend-paying firms are found to be less financially constrained than small and non-dividend-paying firms. We further use the latest measures of financial constraints: KZ index, WW index, HP index, and assets tangibility to sort firms into financially constrained statuses. We find that WW index, HP index, and assets tangibility are performing better, showing the difficult access to external finance among Pakistani listed firms. In addition, to evaluate the applicability of these measures for the setting of Pakistan, we regress the accounting variables of the latest measures on the financial constraint status of

the firms. We find cash flow, total debt, age, and cash holdings as continuous significant determinants of a firm's financial status in different modelling estimations.

We explore the role of financial constraints on firms' export entry decisions in our second empirical chapter. Previous studies show a link between financial health and export participation decision leaving a gap for us to check the role of financial constraints in export participation decision. Moreover, most of the previous studies examine this relationship for the developed economies; while studies on this relationship in the context of an emerging developing economy like Pakistan is very important for the policy makers of the country. Our empirical study finds exporters are significantly different from non-exporters in terms of the level of financial constraints. By using different estimators to estimate the export market empirical specification, a firm's financial constraint status appears to be a determining factor of an export entry decision. Consistent results are found for two different measures of financial constraints. In addition, we find Export entrants are less financially constrained in terms of assets tangibility, before entering the export market. Inconsistent with previous studies, we do not find that liquidity level of the firm is playing any significant role in export participation decisions for the case of Pakistani firms.

In the third empirical chapter, we study the relationship between financial constraints, political connections and performance of the firms. Some studies show a relationship between political connections and financial status of the firms, while some other studies show a relationship between firms' financial status and firms' performance. This is the first study which checks the direct relationship between political connections, financial constraints and performance of the firms. Literature shows that political relationship has been used as useful

resources of the firms, studies in this context for the case of developing country can be particularly important for policy makers to use these resources for the benefit of the firms. By using two different measures of political connections and instrumental variable approach, our study shows that firms' formal political connections make firms less financially constrained. In addition, we find strong evidence that politically connected firms are performing badly. These results are robust to three different measures of a firm's performance. We further find some evidences that the effects of political connections on firms performance do vary across different financial statuses of the firms.

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Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction

This chapter gives a synopsis of the framework of the thesis. It starts with the background of the research. The contribution and aim of the thesis is provided in the next section, followed by a section giving the structure of the thesis and summary of each empirical chapter.

1. Research Background

Studying the effects of finance on investment has a long history. It was started to emerge in the 1950s and 1960s (e.g. Meyer and Kuh, 1957; Kuh, 1963) and renewed in the 1980s following the advancement of investment models and empirical development in 1988 (e.g. Fazzari, et al., 1988). Financial constraint has been extensively defined as a result of capital market imperfections (information asymmetries and agency cost). Hence, these imperfections may halt interest rates and prices of securities from full adjustment to permit firms to undertake all desired investment projects; consequently, the availability of internal finance may pressure investment directly. Some studies define financial constraints as inelastic supply of capital (e.g. Almeida and Campello, 2001; Tirole, 2006; Farre-Mensa and Ljungqvist, 2016). The recent development in the literature of financial constraints has opened new avenues by exploring the effects of financial constraints on other activities of firms, such as firm growth, export participation decision, R&D investment, and so on.

An extensive knowledge of the effects of financial constraints on firms' activities is equally crucial from both a macroeconomics and microeconomics viewpoint. The literature of imperfect capital markets has established a strong bond between finance and real activities. A good understanding of this relationship assists to withdraw such a monetary policy, which could efficiently affect the real activities to achieve the short run and long run objectives

from a macroeconomics perspective. On the other hand, from a microeconomic point of view, a good insight into the relationship between finance and real activities helps to understand the significance of corporate finance and the heterogeneity of a firm on a firm's activities.

Despite the significance of financial constraints on firms' activities, a large number of studies are concentrating on developed countries to explore this link and introduce measures of financial constraints. However, this relationship and its results could be more intense for the case of underdeveloped countries with inefficient financial and legal systems and a higher level of corruption. Only a few studies have tried to explore this relationship for the case of Pakistan (such as Zia, 2006; Saeed and Sameer, 2015; Riaz, et al., 2016). Most of these studies intend to see the effect of financial constraints on investment, except for the study of Zia (2005), who explores the effects of subsidized export loans on financial constraints and the growth of a firm. The aim of this thesis is to fill this gap by not only exploring the effect of financial constraints on investment and export decisions, but also evaluating existing measures of financial constraint for the case of a Pakistani setting. We further explore the relationship between financial constraints, political connections, and performance of the firm, as political connections have been found as a source of lending bias in Pakistan.

Given the significance of finance for firm growth, investment, and other activities, the measures of financial constraints at firm level play a vital role. The literature consists of a number of measures of financial constraints, but each measure has been criticised for some shortcomings. One of the most well-known measures of financial constraints is investment-cash flow sensitivity given by Fazzari et al. (1988). By using firm-level data, Fazzari et al. (1988) estimate an investment equation on Tobin's q and cash flow. The argument behind

this approach is a firm's incapability to afford external funds; therefore, firms may rely more on internal funds. Subsequently, constrained firms will exhibit a positive and significant relationship between investment and cash flow. This approach classifies firms' priori as constrained and unconstrained, based on their dividend policy, age, size, and so on. The critics to this approach argue that the relationship between investment and cash flow could be the result of correlation between cash flow and mismeasured investment opportunities, instead of being caused by financial constraints[1] (Bond and Cummins, 2001; Bond, et al., 2003). The Euler equation and error correction models are used to overcome the shortcomings of q model, but these models have their own shortcomings. The criticism given by Kaplan and Zingales (1997) against the suitability of investment-cash flow sensitivity as a measure of financial constraints opened a new debate in literature. Following Kaplan and Zingales (1997), some other studies (such as Cleary, 1999; Allayannis and Mozumdar, 2004; and Cleary, et al., 2007) also found higher investment-cash flow sensitivity among the least financially constrained firms. Cleary et al. (2007) and Lyandres (2007) found a u-shaped relationship between investment and cash flow with respect to constraint.

To address the limitations of existing measures, a combination of different types of variables is used (depicting different information on the balance sheet of the firm), such as indices to measure firms' constraints. KZ index regresses a firm's level of financial constraints, based on qualitative and quantitative information, and is regressed on a number of different determinants of constraints. These determinants are those features of the firms that are more likely to able to get external finance, while the WW index is built on Euler equation approach and does not require qualitative information of the firm. Whited and Wu (2006) used the

[1] Particularly Tobin's q. Q could be influenced by measurement error. Besides, an inefficient stock market can also lead to failing of q model.

structural parameter of the Whited (1992) model, the shadow cost of equity finance, which is regressed on observable firm characteristics. Consequently, they get a vector of coefficients, which are used to build the index. Hadlock and Pierce (2010) evaluated the existing two indices and other famous measures of financial constraints to find the most prominent features of the firm which could be used to categorise firms by financial status. To formulate HP index, Hadlock and Pierce (2010) regressed firm's level of financial constraints, based on both qualitative and quantitative information, on a number of different determinants of constraints. Subsequently, they build a simple size-age index using the coefficients of these two variables. One major concern about using these indices is that estimated coefficients (calculated in indices) are sample-specific, so their use to other economic realities could be challenging. Therefore, it is very important to first check the suitability of these measures for the case of the Pakistani system.

Throughout the course of this thesis, this line of enquiry is pursued further by applying the latest and most suitable measures of financial constraints, to see the effects of financial constraints on a firm's investment, export decision, and performance.

2. Contribution and Aim of the Thesis

To conduct this study we use data from Pakistan, which provides a unique setting to investigate the nexus between financial constraints and firms' activities. First, despite undertaking a financial liberalization process with the aim to reduce the financial complications to the corporate sector, listed firms are still found to be financially constrained in Pakistan. In terms of banking sector liberalization, Pakistan is playing a leading role in

emerging economies (Bonaccorsi and Hardy, 2005). However, the macroeconomic indicators of the country are giving a gloomy picture. Fixed investment can be a driving force of the economy of any country but the continuous fluctuations in investment to gross domestic product (GDP) ratio in Pakistan is alarming. Even though the corporate sector is the largest borrower of banks' lending, the overall macroeconomic indicators are still dismal. Given the poor and insufficient state of a financial modernization process and a weak legal system, the level of financial constraints and its impact on firms' activities are likely to be greater in Pakistan when compared to other developing countries. Therefore, it is interesting to see whether Pakistani firms are financially constrained, and especially what types of firms are likely more financially constrained in this particular setting.

The objective of choice to see the effects of financial constraints on investment and export decisions, and the effect of political connection on financial constraint, and subsequently on firms' performance as the focus of this thesis is given below.

First, the development of the country mainly depends upon the investment level of the country. Without a continuous and consistent growth in fixed investment, it becomes challenging for the country to put itself on the path of development. The growth rate of investment in Pakistan is giving a disappointing picture; even though we can see some improvement in growth rate of investment, it is still not up to the mark. It is both necessary and interesting to see whether firms are financially constrained, which could lead to the poor performance of investment. If firms are financially constrained, it is of further significance to see what kinds of firms are more financially constrained. This research provides the policy makers with targeting the particular kinds of firms that are more financially constrained while

designing financial policies. This further provides the information to equip financial markets with modern techniques to make them more efficient in the lending process. Inspired by the need the initial part of the first empirical chapter aims to see the effects of financial constraints on investment. Given the significant role of financial constraint in firms' activities, the appropriate measure of financial constraint for the setup of the Pakistani economy is also equally important. Due to the emerging debate against the investment models to estimate investment on growth opportunities and cash flow of the firm, it has become highly important to use a reasonable measure of financial constraint. None of the studies has evaluated the existing popular measures for the case of the Pakistani setting; therefore, we try to address this issue in the second part of the first empirical chapter. The aim of this exercise is to get the confidence on existing measures.

Second, exports are playing an invigorating role in boosting a country's economy across the globe. Export-led growth economies are the proof of the considerable importance of export for the country. For the case of Pakistan, the annual growth rate of export of the country shows a downward trend for most of the last decade. As a backdrop of the gloomy picture of export growth of the country, the Pakistani government has introduced a number of programmes and policies to extend trade promotion efforts. However, the effectiveness of these programmes closely relies upon the clear understanding of determinants of export. Chaney (2005) suggests that financially stable firms are more likely to export to international market because of being able to bear sunk cost and additional expenditures. There are few studies that check the relationship between financial health and export participation, but for the case of developed countries, we extend this research for the case of a developing country like Pakistan. We further introduce the latest measures of financial constraints to see the role of finance in export decision. The previous studies mainly rely on the proxies of a firm's

financial health. Our research tries to make it clear whether firms should be financially less constrained to participate in foreign export. Through this research, we may be able to identify some particular criteria that is required for firms to export; specifically, it could help the policy makers to take the right steps that are needed to promote firms to export.

Our third empirical study is motivated by the fact of presence of lending bias among Pakistani capital markets on the basis of political connections of the firms (Khwaja and Mian, 2005). The linkage between a firm's political connections and financial status has been highlighted by a number of studies (such as Charumilind, et al., 2006; Fan, et al., 2008; Faccio, 2009; Cooper, et al., 2010). However, the role of political connections to make firms less financially constrained has not been widely studied. Some studies have also argued the positive effects of political connections on firm's performance via financial advantages. The politics of Pakistan have been closely linked to rent seeking and corruption. In a 70-year history, only two elected governments could complete their five years' tenure in the office. Except for these two governments, all elected prime ministers and their respective assemblies have been dissolved because of the charges of corruption and political patronage. This shows the hold of rent-seeking activities in the country, which could also influence the firms' behaviour. To the best of our knowledge, this is the first study to analyse the effects of political connections on firms' financial constraints. Moreover, it is the first study to see the effects of political connections on firms' performances across financial status of the firms. The result of this research would help the policy makers to understand how the political connections could help the firms to achieve financial advantages, and subsequently help them to improve operational efficiencies by reducing the problem of agency cost.

3. Structure of the Thesis and Summary of Each Empirical Chapter

Whether the level of financial constraints affects a firm's activities is a subject of econometric testing in this study. By using multifarious measures of financial constraints, we check the existence of financial constraints in Pakistani listed firms in chapter 2. First, we use q investment model and error correction model (ECM) to see investment-cash flow sensitivity in our sample firms. A significant and positive coefficient of cash flow shows the presence of financial constraints, as firms rely more on internal funds due to unavailability of external funds. The reason to use two different models of investment is to get robust results because of rising controversy around the measurement of Tobin's q. Our results, derived from both models, demonstrate that Pakistani listed firms are subject to financial constraints. It shows the presence of pecking order in financing patterns among listed firms. It further indicates the insufficient effort of the financial liberalization process to overcome the difficulties to raise external funds. It might also suggest the strict requirements, regulations, and transparency conditions for the listed firms in Pakistan that stop them from raising external funds. Next, we sort firms with an apriori classification scheme depending on an endogenous variable with respect to constraints. In our study, we categorize firms into size, dividend pay out ratio, and group affiliation, and then check the relationship between cash flow and investment. This exercise shows that size and dividend payments are significant factors to be associated with a firm's financial status. We find large firms and dividend-paying firms are less financially constrained when compared to small and dividend non-paying firms. Second, we assess the application of indices (measures of financial constraints) and assets tangibility for the case of the Pakistani economy. We sort firms' characteristics associated with difficult access to external finance into quartiles by KZ index, WW index, HP index, and assets tangibility to check whether these features of the firms move in the same direction as predicted by these indices. The movements of the variables of these indices will

show the functioning of these indices for the case of Pakistan. After sorting firms into quartiles based upon each index, we find that using KZ index demands extreme caution, as the mean value of q for all sample firms moves in the opposite direction. This prevents a very important condition being met in order for KZ index to function in the Pakistan setting. We further find an accurate functioning of WW index for Pakistani firms, as all financial variables' movements are consistent in having difficulty accessing external finance. We also find that mean values of the variables sorted by HP index and assets tangibility move according to their predictions. Our next step includes further evaluation of these indices by regressing financial variables on financial status of the firms. First, we divide firms into financial status on the basis of liquidity, a pattern used by Kaplan and Zingales (1997) and Hadlock and Pierce (2010). We then use ordered logit model to regress financial status on accounting variables, used by these indices, and on asset tangibility. Our results further support that WW index perform somehow better than other indices for the setup of a developing country. The results to regress financial status on HP index and assets tangibility are mixed.

In chapter 3, we investigate the significance of financial constraints on the export decision of Pakistani manufacturing listed firms. Export to international market manifests a case in which the level of financial constraint (the difference between cost of internal finance and external finance) is likely to be more significant. Indeed, prospective exporters are aware of the expenditures related to transportation cost and competing for a higher standard of products to export to international market. There is also the possibility that export starters might not get easy access to external funding because of risk involvement to the project. With the higher need of external funding in order to fulfil additional expenditures, it is more likely that financial constraints affect a firm's export decision. We concentrate only on manufacturing

listed Pakistani firms for this empirical chapter. In order to investigate the role of financial constraint on Pakistani manufacturing firms' export decisions, we examine the relationship between financial constraints and export decision of the firms over the period 2006–2014 for the sample firms. The rationale for this exercise is the observation that if the prospective exporters are less financially constrained, they are more likely to make a decision to export. Particularly, the financial condition of export starters behaves differently from non-exporters; therefore, we also check the ex-ante financial condition of starters. Given the significance of finance for exporters, it is also important to see how export to international market brings financial changes in exporters' balance sheets. This chapter will also check the effects of export on the financial condition of starters when compared to non-exporters. We find that exporters are categorically different from non-exporters in terms of finance. We further argue, on the basis of our results, that measures of financial constraints are different from measures of financial health, where previous literature has extensively relied on measures of financial health. Our results show that being financially less constrained is a significant determinant of a firm's export decision, when compared to being financially healthy. Firms may run out of funds to get access to international market, and possibly run out of liquid assets and accumulate loans on their balance sheet (indicators of financially weak firms). In turn, our study shows that firms should have easy access to external finance to meet international market criteria, but low liquidity and high leverage, or vice versa, could fluctuate due to many other factors. We raise our arguments on the basis of criticism for liquidity and leverage ratios as measures of financial constraints. We further find mixed evidence of becoming less financially constrained before starting to export for entrants, when compared to non-exporters. Our results are also consistent with previous studies that export does not bring financial advantages to starters in the short term.

In chapter 4, we examine the relationship between Pakistani listed non-financial firms' political connections, financial constraints, and performance. A firm's political connection is an important factor, where the difference in internal and external finance is clearly visible. A number of studies approve that firms' political connections assist firms in a number of ways, such as easy requirements to borrow loans. This easy access to loans by politically connected firms may make them less dependent on internal funds, or the cost of internal and external funds may become equal for them. In addition, political connections do not only affect financial aspects of the firms but they may also influence a firm's performance. The efficient use of easily available loans may enhance the performance level of the firms. Alternatively, the politicians' interference in decision-making and desire to use resources for personal motives could negatively affect performance. Given the assumption that a politically connected firm is less financially constrained, there is the possibility of variation of the effect of political connections on performance level across variant levels of constraint. In order to visualise the influences of political connections on a firm's financial status and performance, we use firm-level data for Pakistani listed non-financial firms for the period 2006–2015. The logic behind this exercise is the observation that politically connected firms are less financially constrained. By using two different measures of political connections, formal and informal, our results show that formal political connections (via board of director participation in general elections) make firms different from non-politically connected firms in terms of financial status and productivity. We also find that formal political connections bring financial advantages to firms and make them less financially constrained. It becomes easier for politically connected firms to access external funds. Our results further show that political connections influence firms' performances badly. These results are consistent with previous findings. Our study finds a few evidence that firms' level of financial constraints put positive impacts on the performance of politically connected firms.

In chapter 5, we conclude the thesis with the review of our main findings. We then provide some discussions and policy implications. Finally, we give some suggestions to extend our research in future.

Chapter 2: Financial Constraints of Pakistani listed firms : models, measures and evaluation

1. Introduction

Financial constraints have long been cited as the major hindrance for business. Therefore, a number of empirical studies have been conducted to see the presence of financial constraints at firm-level but most of the time for the case of developed countries. However, this is particular important for the case of developing country, as developed countries have well-established financial markets making them less likely to suffer from severe financial constraints. The case of developing countries is different; the presence of underdeveloped financial markets on one hand, and higher chances of information asymmetries and agency cost on the other hand, make the level and effects of financial constraints extremely severe. This chapter of the thesis fill this gap by using a sample of firm-level data for Pakistani listed firms to check the presence of financial constraints. Pakistan, being an emerging economy and one of the highest performers in South Asia is a suitable candidate for this study. The process of financial liberalization was initiated in Pakistan in 1990s to reduce the level of financial limitations to corporate sector. However, recent studies indicate listed firms in Pakistan are financially constrained (Khwaja and Mian, 2005). This study provides evidence to policy makers to review the process of financial liberalization from the perspective of financial hurdles to the corporate sector.

Besides this, previous studies (such as Fazzari, et al., 1988; Hubbard, et al., 1995; Kaplan and Zingales, 1997; Carpenter and Guariglia, 2008; Chen, 2008; Guariglia and Knight, 2013) have mainly relied on investment models to see the effects of finance on investment to check financial constraints in firms. However, the limitations of all these investment models (q model, Euler equation, and ECM) leave a gap for new researchers to use advanced and more

accurate measures of financial constraints. Our study is trying to fill this gap. To test the presence of financial constraints and to investigate the sensitivity of the empirical findings to the choice of alternative specifications, in this chapter we use two different models of investment. Departing from these traditional investment models, we further sort firms into financial status by KZ index, WW index, HP index and Assets tangibility to check the performance of these latest measures for a developing country like Pakistan. We further argue that it is very important to see the suitability of existing popular measures and indices for the case of a developing country. Even though a few studies (such as Riaz, et al., 2016) have used indices to calculate the level of financial constraint in Pakistan, none of the studies has tested the suitability of these indices for the setting of developing countries. We argue that most of the proxies of financial constraints (including indices) have been developed in the setup of developed countries. Using those indices for the case of developing countries is an open question[2]. Our study contributes to the literature by evaluating these popular latest measures of financial constraints for the case of a developing country.

In this chapter, we will discuss two fundamental research questions. First, whether Pakistani firms are financially constrained or not. Further, whether the level of financial constraints vary across different status of firms (such as across firms' size, dividend policy and group affiliation). Second, whether popular measures of financial constraints including sorting variables (such as age, size and Assets tangibility) and indices (such as WW Index, KZ Index and HP Index) are suitable to use for the environment of developing country. In order to investigate the first question, we will initially use investment – cash flow sensitivity as a measure of financial constraints by using q investment model. Due to the possibility of error in calculation of q as highlighted by previous studies (such as Erickson and Whited, 2000 ;

[2] However, there are a number of empirical studies that are using these popular measures for the case of developing countries (such as Guariglia and Yang 2016; Riaz, et al., 2016).

Summers 1981), we will also use Error Correction Model (ECM) to check investment-cash flow sensitivity at firm level. To check the level of investment cash flow sensitivity across different type of firms, we priori sort firms according to size, group affiliation and dividend policy and then check the level of investment cash –flow sensitivity[3]. In order to investigate the second empirical question, we will sort firms according to the latest measures of financial constraints, such as indices (KZ, WW and HP) and Assets tangibility. In doing so, we will see whether characteristics of the firms which indicate the level of financial constraint are associated with external financial constraints. We will then follow the methodology used by Hadlock and Pierce(2010) and use Ordered Logit model to check whether these sorting financial variables are truly linked to the status of financial constraints for the case of developing country. We will regress firms' quantitatively determined financial constraint status (based on liquidity level of firms) on the financial variables of these indices and assets tangibility. This practice will give a confidence to future researchers to use latest measures of financial constraints for the setup of developing country.

Our empirical results find that Pakistani listed financial firms are financially constrained. We further find that large and dividend-paying firms are less financially constrained. When we sort firms in to quartiles on the basis of indices and assets tangibility, we find that firms' characteristics, categorized by WW and HP indices, are more appropriate to associate with difficult access to external finance. One of the most important variables (q) of KZ index moves differently for Pakistani firms, which goes against the structural prediction and functioning of the index. This cast doubt on the sorting factors given by KZ index for the case of Pakistani firms; whereas, we find all the financial variables of WW and HP indices move according to the expectations of the indices. It means the functioning of these two indices for

[3] As size and group affiliation are found to cause lending bias in Pakistan's financial system. The detailed explanation is provided in the section 3.

the case of developing countries like Pakistan is more appropriate. Evaluating these indices and assets tangibility on the basis of estimation results, we find most of the variables of WW index are significant and in agreement with the index when compared to the KZ and HP indices. Asset tangibility also appears significant but with the opposite sign. It means WW index is better to associate to the difficult access of external finance to the Pakistani firms.

The rest of the chapter proceeds as follows: section 2 presents a brief theoretical and empirical review of measures of financial constraints. Section 3 provides background and stylized facts about the Pakistani financial system and corporate sector. Section 4 develops the empirical methodology. Section 5 presents the results. The chapter will be concluded in section 6.

2. Literature Review

The objective of this section is to lay the foundation of this chapter by introducing financial constraints and the theoretical background of imperfect capital markets, and to critically evaluate different measures of financial constraints. More specifically, this section is organised as follows: it starts with the definition of financial constraints following the antecedent of financial constraints, then gives the review of investment-cash flow sensitivity as a measure of financial constraints, and the application of different investment models in this regard. To conclude, we give an overview on different sample splitting criteria and indices as measures of financial constraints.

In short, section 2.1 gives a theoretical background of capital market imperfections and an overview of investment-cash flow sensitivity as a measure of financial constraints. Section

2.2 presents a review of three extensively applied empirical models to test the effects of financial constraints on investment: the q model, the Euler equation, and the error correction model. It further discusses the shortcomings of each of the empirical models. Section 2.3 provides contradictory analysis against investment-cash flow sensitivity as a measure of financial constraints, and reviews other measures of financial constraints in detail: sample splitting criteria, assets tangibility, KZ index, WW index, and HP index.

Kaplan and Zingales (1997, p6) define financial constraints as

> 'A firm as being financially constrained if the cost or availablity of external funds precludes the company from making an investment it would have chosen to make had internal funds been available. In other words, there is a wedge between the internal and external costs of fund'.

The literature of financial constraints on investment associate them with external financial constraints, as firms find it hard to generate funds for particular investment projects because of expensive external funds (such as Whited, 1992; Bond and Meghir, 1994; Love, 2003). The theories of imperfect capital markets define more financially constrained firms in terms of greater investment-cash flow sensitivity (Fazzari, et al., 1988). Tirole (2006) explains the same idea in different terms as frictions in the supply of capital, mainly because information asymmetry between investors and firms causes financial constraints. These resistences of capital market decrease the elasticity of the supply curve of external capital curve. Almeida and Campello (2001, p11) also confirm that "constrained firms are at the point where the supply of capital becomes inelastic". Farre-Mensa and Ljungqvist (2016) further explain the characteristics of financially constrained and unconstrained firms in terms of a firm's capital

supply curve. The more the firm is financially constrained, the steeper (more inelastic) the supply curve is. The above-mentioned definitions given by different authors associate financial constraints with difficult access of external finance due to numerous reasons e.g. information asymmetries in capital market. We will use the same definitions for our empirical studies in this thesis.

2.1 Antecedent of financial constraints

The literature of financial constraints dates back to Modigliani and Miller's (1958) theorem on the irrelevance of capital structure. This theorem states that in the absence of transaction cost, information asymmetry, and agency cost, a firm's investment decision relies upon expected performance of the company[4]. It is so a firm's internal and external sources of funds are perfectly substituted in the neoclassical world; therefore, a firm's investment decision is not stimulated by the method of financing. This theorem exists only in the perfectly competitive capital markets. However, capital markets are imperfect in the real world due to factors such as transaction cost, bankruptcy cost, and taxation.

Capital market imperfection

Most of the theoretical work of the 1970s' era highlighted that the assumptions of Modigliani and Miller's (1958) theorem do not exist in the real world. In the real world, markets are imperfect due to the problems of asymmetric information and agency cost. Under these circumstances, a firm's investment spending may be influenced by the condition of a firm's balance sheet. If potential investors are less informed than managers of the firms about the

[4] This theorem assumes that both the decision maker of the firm and the external fund supplier have equal information about the investment opportunities, riskiness of the project, and profit.

prospective investment opportunity, the cost of issuing equity may increase. This difference of shadow price between internal finance and external finance may cause cost disadvantage of external finance. This problem of asymmetric information was first highlighted by Akerlof (1970) with the 'lemons problem'[5]. Relating the problem of asymmetry information to the issue of equity finance is applied by Myers and Majluf (1984), who introduced a situation where a firm's manager has some additional information about the prospect project but the investor is unaware of this information. As a result, a less informed investor may demand premium on equity for balancing the losses encountered from financing a 'lemon' firm (bad project). This premium makes an imperfect substitution between internal finance and external finance. Stiglitz and Weiss (1981) relate the same idea of information asymmetry to the problem of credit rationing in the debt market[6]. As a result of asymmetric information and undervaluation of the equity issue, there is a possibility that new investors may take more of the net present value (NPV) of the project, causing a net loss to existing shareholders. In this scenario, rejection of the project seems likely even if the NPV is positive.

The agency cost theory argues that the conflict of interest between the ownership and management leads manager indulging in self-interest. This ultimately results in the decline of the firm's value. Jensen and Meckling (1976) give two types of conflicts in agency relationship. First, the conflict exists between shareholder (principal) and manager (agent). Second, the conflict occurs between debt holder and equity holder. There are possibilities that managers may use delegated rights and resources for their personal motives rather than

[5] Akerlof (1970) highlights the situation where sellers of cars have some additional information regarding the quality of cars. This information asymmetry can cause malfunctioning of the market and a complete breakdown of the market in the extreme case.

[6] As lenders may not be aware of the good borrower and bad borrower, they fix a high interest rate, which forces the good borrower to leave the market. It increases the chance of loan default and eventually cuts the lender's expected profit.

maximizing the value of firms. This reduction in welfare incurred by the principal as a result of divergence of interest of the manager will be called ‘residual loss. Jensen (1986) also highlights that a changed objective of management and interest of shareholder initiates suboptimal or substandard investment.

Hierarchy of finance

Due to the occurrence of an imperfect capital market, it becomes challenging for firms to get external finance easily at the time of need. In turn, firms may indulge in the problem of financial constraint. Projects for which equity is issued are undervalued because of information asymmetry; this causes net loss to shareholders. In this situation, projects are rejected even though they have positive NPV. This underinvestment can only be avoided by the idea given by Myers (1984), that cheap internal finance should be preferred over expensive external finance. The reason for avoiding external financing is the higher issuing cost of equity, which includes administrative and underwriting costs. Myers and Majluf (1984) also argue that firms seem to choose internal financing over external financing, and if firms need to do external financing, they should prefer bonds to stock. If firms can only issue risky debt, firms may refuse even a positive NPV investment opportunity, because average opportunity loss is lower with debt finance when compared to equity finance; therefore, firms always prefer debt over equity. Under these circumstances, firm investment decisions are much influenced by a financing pattern.

Investment cash flow sensitivity and financial constraints

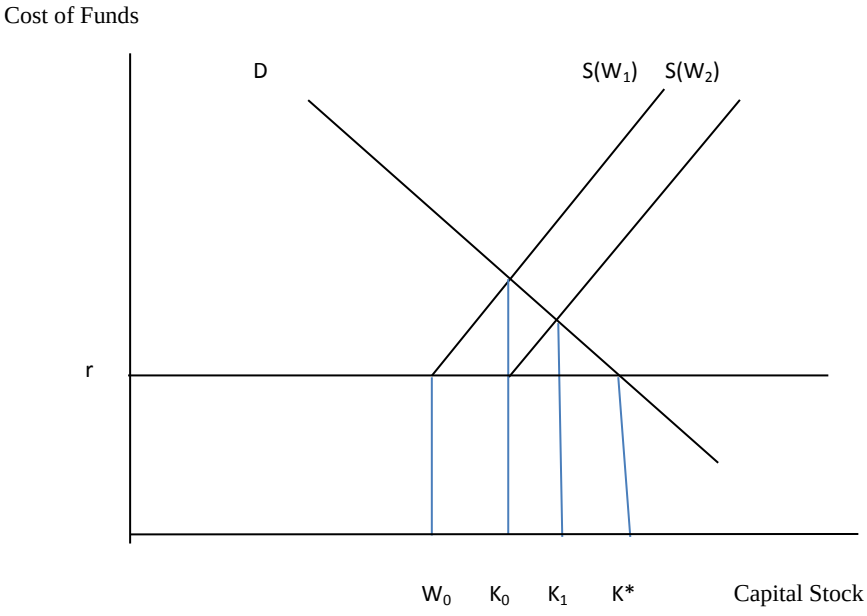
Empirically, financial constraint has been gauged by the investment-cash flow sensitivity[7]. This concept of a link between internal funds and capital investment, in the case of informational imperfections, is explained by figure 2.1. The supply curve, S, represents the supply of funds to the firm, while the demand curve, D, represents the demand for capital by the firm with net worth. The cost of capital is on the vertical axis, while the quantity of capital stock is on the horizontal axis. The supply curve, S, in neoclassical investment model, is the horizontal segment at the market real rate of interest (r). In this case, at K*, the expected marginal profitability would be equal to the investment. As the movement of D relies on the firm's investment opportunities (expected future profitability of capital), the position of S is determined by the cost of capital (the market interest rate). In the simple world of perfect capital market, there will be no link between a firm's internal funds and investment decision. The market interest rate would act as an opportunity cost of internal funds. Firms will easily borrow at that interest rate to obtain the optimal investment; subsequently, underinvestment will not occur.

As the features of imperfect capital market lead outsiders to demand premium on external funds, an upward sloping supply curve emerges, which shows the funds above the level of internal funds. Let us consider a firm with net worth of W_1 and investment demand curve D. The firm will be able to invest up to the point K_0 only because of an imperfect capital market.

[7] For instance, see Fazzari etal.,1988 ; Kaplan ,1997. Cash flow is normally measured by the level of internal funds in the empirical literature.

This shows the significance of financial constraints on investment, as lack of finance on expensive external finance leads a firm to fail to obtain its optimal investment level. The increase in net worth from W_1 to W_2, holding the investment opportunities unchanged, leads to an increase in investment from K_0 to K_1. The slope of S(W) curve relies on the level of information problems faced by firms. The firms with a higher level of information problems indicate the much steeper S(W) curve. This means the cost of external funds is higher than the internal funds. This logical reasoning builds the relationship between investment-cash flow to see the existence of financing constraints in the studies.

Figure 2.1: Relationship between internal funds and capital investment



Source: Hubbard (1998, p 4)

2.2 Models for financial constraints and investment

Myer and Kuh (1957) first introduced the concept of the role of finance in business investment. Even though, most of the research of the 1960s separates the role of finance from investment decision (Modigliani and Miller, 1958). Jorgenson (1971) introduced the idea of

user cost of capital in 1963 and developed the first neoclassical model. Despite its simplicity and popularity, this model could not establish its validity in empirical tests. This challenge to empirical researchers was first answered by Fazzari et al. (1988), who used Q model to check the impact of net worth on investment[8]. Fazzari et al. (1988) criticized the existing models, which only depicted the pattern of mature companies. For these companies, internal finance and external finance can be perfect substitutes, but for other firms, external capital is not a perfect substitute for internal capital. In their influential paper, Fazzari et al. (1988) test the relationship between investment and cash flow (internal finance) by using q model of investment for the case of US manufacturing firms. They find that even after controlling for investment opportunities via Tobin's q, a firm's cash flow is a significant determinant of a firm's investment decision. Fazzari et al. (1988) reveal that high dividend firms have less investment-cash flow sensitivity and low dividend firms have high investment-cash flow sensitivity. They interpret high investment-cash flow sensitivity as evidence of financial constraints. A large number of papers in the literature following the Fazzari et al. (1988) terminology find similar results. Hoshi et al. (1991) used the same methodology to scrutinize the behaviour of 24 manufacturing companies that were affiliated with KEIRETSU (industrial group) and 121 independent firms that were not members of KEIRETSU in Japan. The study concludes that stand-alone firms are more financially constrained, as they have severe investment cash flow sensitivity. Oliner and Rudebusch (1992) explored 99 NYSE-listed firms and 21 over-the-counter firms. This study also used Q investment model to check the effect of cash flow on investment. The results are that a group of young firms that sell and buy stocks over the counter; show a higher sensitivity between investment and cash flow than the mature firms.

[8] Q theory was first introduced by Keynes (1936) and revitalized by Brainard & Tobin (1968) and Tobin (1969).

Derivation of the Q model

By following Blundell et al. (1992) and Whited (1992), we derive q model as follows:

In the q theory of investment a forward looking firm which faces costs in adjusting its capital stock behaves to maximise the present value of future net receipts R, given by:

$$V_{it} = E\left[\sum_{s=0}^{\infty} \Upsilon_{t+s} R_{i,t+s} / \Omega_{it}\right] \qquad (1)$$

Where $R_{it} = p_t [F(K_{it}, L_{it}) - C(I_{it}, K_{it})] - w_t L_{it} - P_t^I I_{it}$

and $\Upsilon_{t+s} = \prod_{j=1}^{s} \frac{1}{1+r_{t+j}}$, for s= 1,2,…..,∞ and $\Upsilon_t = 1$

subject to capital accumulation constraint:

$$K_{it} = (1-\delta)K_{i,t-1} + I_t \qquad (2)$$

where i and t denote the firm and time period, $E[./\Omega_{it}]$ shows the expectation conditional on information available to firm i and at time t; r_{t+j} is the nominal discount rate between period t+j-1 and t+j ; Υ_{t+s} is the discount factor between period t and t+s; p_{it} is the price of output; K_{it} is the capital stock; L_{it} is a vector of variable factor inputs; w_t is a vector of prices of these variable factors ; $p_t F(K_{it}, L_{it})$ is the revenue function, that is, the production function $F(K_{it}, L_{it})$ multiplied by the product price; I_{it} is investment ; p_t^I is the price of capital goods; $p_t^I I_{it}$ is the purchase cost of investment goods; $C(I_{it}, K_{it})$ is the cost of adjustment function, increasing and strictly convex in I_{it} and decreasing in K_{it}; and δ is the constant rate of depreciation. It is assumed that the firm is price taker in both output and input markets. It is further assumed that there are no taxes or debt finance.

We set up Lagrangian, where λ denotes multiplier of Lagrangian

$$L = E\ [\Upsilon_{t+1}\Omega_{it}\ ]\ P_t\ \{F(K_{it}\ L_{it}) - C(I_{it}\ K_{it})\} - W_t L_{it} - \mathrm{P}_t^{\mathrm{I}} I_{it} + \lambda_{it}\ \Big((1-\delta)K_{i,t-1} + I_{it}K_{it}\Big) \quad (3)$$

The first order condition for maximizing (3) with respect to L_{it} gives

$$\frac{\partial(V_t)}{\partial(L_t)}: \quad \left(\frac{\partial R}{\partial L}\right)_{it} - W_{it} = 0 \quad (4)$$

The first order condition for maximizing (3) with respect to I_{it} gives

$$\frac{\partial(V_t)}{\partial(I_t)}: \quad \left(\frac{\partial R}{\partial I}\right)_{it} + \lambda_{it} = 0 \quad (5)$$

From equation (5), we get $\lambda_{it} = -\left(\frac{\partial R}{\partial I}\right)_t$

The first order condition for maximizing (3) with respect to K_{it} gives

$$\frac{\partial(V_{it})}{\partial(K_{it})} = \lambda_{it} = \left(\frac{\partial R}{\partial k}\right)_{it} + (1-\delta)E\ [\ \Upsilon_{t+s}\ \lambda_{it+s}\ /\Omega_{it}\ ] = \frac{\left(\frac{\partial V_{it}}{\partial K_{i,t-1}}\right)}{1-\delta} \quad (6)$$

Substituting for $R_{it,}$ equations (4), (5) and (6) become

$$w_{it} = P_t\ F_L\ (K_{it}\ L_{it}) \quad (4b)$$

$$\lambda_{it} = P^I{}_t + P_t C_I\ (I_{it}\ K_{it}) \quad (5b)$$

$$\lambda_{it} = P_t\ F_K\ (K_{it}\ L_{it}) - P_t C_k\ (I_{it}\ K_{it}) + (1-\delta)E[\ \Upsilon_{t+1}\ \lambda_{it+1}\ /\Omega_{it}\ ] \quad (6b)$$

Rearranging equation (6b) gives

$$F_K(K_{it}\ L_{it}) - C_k\ (I_{it}\ K_{it}) = \left\{1 - \frac{[\ (1-\delta)E\ [\ \Upsilon_{t+1}\ \lambda_{it+1}\ /\Omega_{it}\ ]}{\lambda_{it}}\right\}\frac{\lambda_{it}}{P_t} \qquad (7)$$

Equation (7) depicts the result of standard neoclassical theory. The firm will use the capital to the point at which marginal return on capital becomes equal to the shadow user cost of capital[9].

Equation (5b) can also be written as

$$C_I\ (I_{it}K_{it}) = \frac{\lambda_{it} - P^I{}_t}{P_t} = \frac{\left[\left(\frac{\lambda_{it}}{P^I{}_t}\right) - 1\right]P^I{}_t}{P_t} = \frac{(q_{it}-1)P^I{}_t}{P_t} \qquad (8)$$

Where $q_{it} = \lambda_{it}/P^I{}_t = \dfrac{\left(\frac{\partial V_{it}}{\partial K_{i,t-1}}\right)}{(1-\delta\ )P^I_t}$ (9)

equation (9) is known as marginal q, shows the ratio of the market value of an additional unit of capital to its replacement cost.

From equation (8) we get that, in the absence of adjustment costs (i.e. $C_I\ (I_{it,}\ K_{it}\ ) = 0$), the firm invests up to the point where marginal q obtains the value of unity. With strictly convex adjustment costs, the level of investment is an increasing function of the deviation of marginal q from unity.

To get an investment specification from the first order in equation (8), a functional form of for the cost of adjustment function is required. A widely used parameterization in literature assumes that

[9] See Jorgenson (1963).

$$C_I(I_t K_t) = \frac{b}{2}\left[\left(\frac{1}{K}\right)_t - c_t - \varepsilon_t\right]^2 K_{it} \quad (10)$$

This has the properties that adjustment costs are strictly convex in I_{it} and homogeneous degree one in (I_{it} , K_{it}). Total adjustment costs are quadratic about some 'normal' rate of gross investment c_i (at which adjustment costs average zero), and marginal adjustment costs are linear in the observed rate of investment. The coefficient b can be as parameterizing the speed of adjustment. ε_{it} represents unobservable factors in adjustment costs.

Substituting the adjustment cost function into equation (8), and solving for investment gives an expression for investment as a function of marginal q:

$$\left(\frac{I}{K}\right)_{it} = c_i + \frac{\frac{1}{b(q_t-1)}P^I}{P^t} + \varepsilon_t \quad (11)$$

Since the shadow value λ_{it} can not be observed and marginal q_{it} is also not directly observable. We can only observe average q, namely the ratio of the market value of existing capital to its replacement cost. However, Hayashi(1982) shows if the firm is price taker in all markets and both the production function and adjustment cost functions are linearly homogeneous in their arguments, then average q and marginal q are equal. Using the properties of linear homogeneous functions (e.g. $F(K,L) = KF_K + LF_L$) and equations 4(b), equation 6(b) can be re-written as:

$$\lambda_{it}(1-\delta)K_{i,t-1} = R_{it} + (1-\delta)E\left[\frac{\Upsilon_{t+1}\lambda_{i,t+1}}{\Omega_i}\right]K_{it} \quad (12)$$

Solving equation (12) forward by repeated substitution then gives

$$\frac{\lambda_{it}}{P_t^I} = \frac{\left(\frac{\partial V_{it}}{\partial K_{i,t-1}}\right)}{(1-\delta)\mathrm{P}_t^{\mathrm{I}}} = q_{it} \quad (13)$$

where V_{it} a value of the firm and $(1-\delta)p_t^I K_{i,t-1}$ is the replacement value of the capital stock. Using average q constructed from financial market data as a measure of marginal q, the relation between investment and q can be expressed as

$$\left(\frac{I}{K}\right)_{it} = c_i + \frac{1}{b}Q_{it} + \varepsilon_t \qquad (14)$$

ε is the summation of three means zero elements

$\varepsilon_{it} = v_i + u_i + w_{it}$

Where v_i is a proxy for unobserved firm-specific heterogeneity. u_i is account for the cyclical factors. w_{it} is stochastic disturbance to the firm.

Equation (14) represents an investment model derived under frictionless capital markets. To test the impact of financial constraints, recent studies have used Q model included with a cash flow term, proxying for the change in net worth. Q controls for the market evaluation of the firm's investment opportunities. The traditional procedure is to include a variable depicting the condition of internal funds – usually cash flow. Under this q model, none of the variables, including cash flow, should be significant. If cash flow appears significant, this means failure of the frictionless q model. It supports the existence of financial constraints.

The other explanations for the significant cash flow are doubts regarding the failure of q model to capture firms' investment opportunities. In the real world, there is distortion of the assumptions of q model, so the equality between average q and marginal q is not possible. Cummins et al. (2006) highlight the measurement error problem with calculation of average q. This can occur if present value of expected future net distribution diverges from the stock market valuation.

Another challenge to the performance of q theory is given by Carpenter and Guariglia (2008), who argued that q model only forecasts outsiders' assessments of investment opportunities. It does not assess insiders' estimation of opportunities. For this purpose, this paper tests whether financial constraint is due to information asymmetry of capital market or is due to the deficiency of q theory, which does not estimate insiders' evaluation of opportunities. Results for all three estimation methods give positive and statistically significant coefficients of cash flow (CF). This paper includes a new variable called contractual obligation for future investment in the regression model. Results of econometric techniques of this new regression give the same positive relationship between cash flow and investment, which supports the already prevailing literature that financial constraint is due to information asymmetries of capital market.

The big challenge to this model arises in the situation where average q is not equal to marginal q. In order to overcome the shortcomings of q model, another approach, Euler equation, is used in investment. To separate the specific role of financial constraint in the investment process, Euler equation has been applied in a similar manner as it is used in Consumption[10] literature. Euler equation can control expectational influences on investment decisions. These expectational influences are shown in error terms. This equation is a relation between investment rates in succeeding periods, which can be applied under the presence of symmetric and quadratic cost of adjustment. By using Euler equation, the problem of measuring average q is also avoided. In what follows, those firms that are not listed on the stock market can also be investigated.

[10] Euler equation was first used by Stephen P Zeldes in Consumption.

Derivation of the Euler equation

Euler equation is derived from the value maximization problem of the firm. By following Whited (1992) and Bond and Meghir (1994), we combine equations (5) and (6) to derive Euler equation. After eliminating λ_{it} and λ_{it+1} , the basic Euler equation model is expressed as:

$$-\left(\frac{\partial R}{\partial I}\right)_{it} = \left(\frac{\partial R}{\partial k}\right)_{it} - (1-\delta)E[\Upsilon_{t+1}\left(\frac{\partial R}{\partial I}\right)_{i,t+1} / \Omega_{it}] \qquad (13)$$

Indicating the error was made when forecasting Υ_{t+1} $(\partial R / \partial I)_{I,\ t+1}$ based on information available in period t by:

$$\varepsilon_{i,t+1} = \Upsilon_{t+1}\left(\frac{\partial R}{\partial I}\right)_{i,t+1} - E[\Upsilon_{t+1}\left(\frac{\partial R}{\partial I}\right)_{i,t+1} / \Omega_{it}] \qquad (14)$$

And substituting the realised value for the one-period ahead expectation in equation (13) gives:

$$-\left(\frac{\partial R}{\partial I}\right)_{it} = \left(\frac{\partial R}{\partial k}\right)_{it} - (1-\delta)\Upsilon_{t+1}\left(\frac{\partial R}{\partial I}\right)_{i,t+1} + (1-\delta)\varepsilon_{i,t+1} \qquad (15)$$

To obtain an empirical investment model, it then requires only that the marginal revenue product of capital and the marginal adjustment costs are specified in terms of observables.

Substituting for the net receipts R gives:

$$p^I{}_t + p_t C_I\,(I_{it}\ K_{it}) = p_t\,F_K\,(K_{it}\ L_{it}) - p_t C_k\,(I_{it}\ K_{it}) + (1-\delta)\Upsilon_{t+1}[p^I_{t+1} + p_{t+1}C_I(I_{i,t+1}, K_{i,t+1})] + (1-\delta)\varepsilon_{i,t+1} \qquad (16)$$

If F_K (K_{it} , L_{it}) is constant returns to scale and C(I_{it} , K_{it})is linearly homogeneous in I_{it} and K_{it} using equation (4b) gives:

$$F_K(K_{it}\ L_{it}) - C_k\ (I_{it}\ K_{it}) = [\frac{\Pi}{K}]_{it}\ + C_I(I_{it}, K_{it})\left(\frac{I}{K}\right)_{it} \quad (17)$$

Where Π is gross operating profits, that is sales $p_t[F(K_{it}, L_{it}) - C(I_{it}, K_{it})]$ minus variable costs w_tL_{it}. Substituting (17) in (16) gives the expression:

$$p^I{}_t\ + p_t C_I\ (I_{it}\ K_{it}) =$$

$$\left[\frac{\Pi}{K}\right]_{it} + C_I(I_{it}, K_{it})\left(\frac{I}{K}\right)_{it} + (1-\delta)\Upsilon_{t+1}\left[p^I{}_{t+1} + p_{t+1}C_I\ (I_{it+1}\ K_{it+1})\right] + (1-\delta)\mathcal{E}_{i,t+1} \quad (18)$$

We assume competitive markets and quadratic cost of function forms as :

$$C(I_{it}K_{it})\ =\ \frac{b}{2}\left[\left(\frac{I}{K}\right)_{it} - C\right]^2 K_{it} \qquad (19)$$

Where the rate of gross investment c is assumed constant across firms and non-stochastic, the

The optimal rate of investment will be

$$\left(\frac{I}{K}\right)_{i,t+1} = c(1-\Phi_{t+1}) + (1+c)\Phi_{t+1}\left(\frac{I}{K}\right)_{it} - \Phi_{t+1}\left(\frac{I}{K}\right)_{it}{}^2 - \frac{\Phi_{t+1}}{a}\left[\left(\frac{\Pi}{PK}\right)_{it} - j_t\right] + \mathcal{E}_{t+1} \quad (20)$$

Where $J_t = [1-(1-\delta)\Upsilon_{t+1}\ p^I{}_{t+1}/p^I{}_t]\ \frac{p_t^I}{p_t}$ (21)

Is the real user cost of capital in the sense of Jorgenson, $\Phi_{t+1} = p_t\ /[p_{t+1}(1-\delta)\Upsilon_{t+1}]$ is a real discount factor, and $\mathcal{E}_{i,t+1} = -\mathcal{E}_{i,t+1}/(bp_{t+1}\Upsilon_{t+1})$. The coefficient on the lagged investment rate is

positive and greater than one. The coefficient on the lagged square investment rate is negative and greater than one in absolute value. Under the assumptions of perfect capital markets, the common coefficient on the lagged gross operating profits and the user cost terms is negative and depends on the magnitude of the adjustment costs. If this assumption is correct, investment may be positively related to profits through the effect of liquidity constraints, and the basic Euler equation in (21) would be misspecified.

Whited (1992) uses Euler equation to check the effect of liquidity and debt constraint on a firm's discount rate. Bond and Meghir (1994) apply Euler equation to test the hierarchy of the finance model for UK manufacturing firms[11]. Bond et al. (2003) also apply Euler equation model to examine the influence of finance on investment for firms in Belgium, France, Germany, and UK.

Derivation of the Error Correction Model

Recently, error correction model has been used as an alternative model to test the hypothesis of financial constraint (Bond et al. (2003) and Guariglia (2008). The model was initially introduced by Bean(1981) into the literature of investment. The model specifies a long- run level of capital stock and allows a flexible specification of the adjustment dynamics to be estimated from the data. Assuming that in the absence of adjustment costs, the firm's desired capital stock will take the form:

$$K_{it} = S_{it} - \text{¢}j_{it} + V_i \qquad (16)$$

[11] This model assumes that internal funds are available at lower cost than external funds.

K_{it} is log of capital stock. S_{it} is log of firm sale, j_{it} is user cost of real capital and V_{it} is a firm-specific effect.

However, in the presence of adjustment costs, it is not easy for the firm to achieve its desired capital stock immediately; therefore, to control the slow adjustment of capital stock, we use a dynamic adjustment mechanism between capital and sales called Autoregressive Distributed Model, with two lags, in which equation (16) is nested as a long run equilibrium. It is also assumed that variation in capital stock is controlled by the time-specific component of the error term; we can obtain an expression for the logarithm of the firm's capital stock:

$$K_{it} = \alpha_1 K_{i,t-1} + \alpha_2 K_{i,t-2} + \beta_0 S_{it} + \beta_1 S_{i,t-1} + \beta_2 S_{i,t-2} + d_t + \eta_i + \eta_{jt} + v_{it} \quad (17)$$

$K_{i,t-1}$ and $K_{i,t-2}$ are autoregressive components in equation (17). S_{it}, $S_{i,t-1}$, $S_{i,t-2}$ are distributed lag components. d_t is a time-specific component. η_i is a firm-specific effect. η_{jt} a time-specific effect that varies across industries. vit is an idiosyncratic error term. Equation (17) is autoregressive distributed lag model ADL(2,2). We subtract $K_{i,t-1}$ from both sides of the equation (17) then add and subtract $(\alpha_1-1)K_{i,t-2}$, $\beta_0 Y_{i,t-1}$, $(\beta_0+\beta_1)S_{i,t-2}$ and $(\alpha_1+\alpha_2-1)\ S_{i,t-2}$ on the right hand side of the equation. We apply unit elasticity that $(\beta_0+\beta_1+\beta_2)/(1-\alpha_1-\alpha_2)$ is equal to 1 in long run.

$$K_{it} - K_{i,t-1} = \Delta K_{it} = (\alpha - 1)\Delta K_{i,t-1} + \beta_0 \Delta S_{it} + (\beta_0 + \beta_1)\Delta S_{i,t-1} - (1 - \alpha_1 - \alpha_2)\left(K_{i,t-2} - S_{i,t-2}\right) + d_t + \eta_i + \eta_{jt} + v_{it} \quad (18)$$

We use $\Delta K_{it} \approx I_{it}/K_{i,t-1} - Ş$ approximation and include a cash flow term ($CF/K_{i,t-1}$), then our empirical model will look like

$$\frac{I_{it}}{K_{i,t-1}} = \Delta K_{i,t-1} = Z_1\left(\frac{I_{i,t-1}}{K_{i,t-2}}\right) + Z_2\Delta S_{it} + Z_3\Delta S_{i.t-1} + Z_4\left(K_{i,t-2} - S_{i,t-2}\right) + Z_5 S_{i,t-2} + Z_6\left(\frac{CF_{it}}{K_{i,t-1}}\right) + d_t + \eta_i + \eta_{jt} + v_{it} \qquad (19)$$

Where $Z_1 = (\alpha\text{-}1)$, $Z_2 = \beta_0$, $Z_3 = \beta_0+\beta_1$, $Z_4 = (\alpha_1+\alpha_2\text{-}1)$ and $Z_5 = Z_4(1\text{-}Ɛ)$ here $Ɛ = -(\beta_0+\beta_1+\beta_2)/ Z_4$ shows long run elasticity.

It is important to note that in order to be consistent with the error correction behaviour, the coefficient associated with ($K_{i,t-2} - S_{i,t-2}$) should be negative , i.e. if the level of capital stock is lower (higher) than its desired level, the future investment should be higher to catch up with the desired level of capital stock and vice versa.

A number of studies have used ECM to check the changes in financial conditions on the level of investment. Bond et al. (2003) used ECM to check the effects of financial constraint on investment under different financial systems. Chen (2008) intended to see the role of cash flow to determine firms' levels of investment in the transition economy of China. Using ECM, significant cash flow coefficient showed sensitivity between cash flow and investment.

2.3 Contradictory analysis and other measures of financial constraints

In general, the evidence of empirical studies following Fazzari et al. (1988) associates financial constraints with the investment-cash flow sensitivity. However, the work of Kaplan

and Zingales (1997) casts doubts about the use of investment-cash flow sensitivity as a gauge of the existence of financial constraints. Kaplan and Zingales (1997) reassessed 49 low-dividend-paying firms from the sample of Fazzari et al. (1988).. The findings contrast the results of Fazzari et al. (1988), as high sensitivity of investment to cash flow was not found among the most financially constrained firms. Cleary (1999) also supported the results of Kaplan and Zingales (1997). Cleary (1999) highlighted that less creditworthy firms, which are associated with severe financial constraints, show lesser investment-cash flow sensitivity. Allayannis and Mozumdar (2004) also supported the results of contradictory studies. They used negative cash flow as a proxy of financially weak firms. They found that financially weak firms have less investment-cash flow sensitivity. Cleary et al. (2007) also found a u-shaped function between firms' investments and internal funds. Guariglia (2008) uncovered the same results for the panel of UK firms.

However, the argument of Kaplan and Zingales (1997) and his supporters were well answered by Fazzari et al. (2000) in following years. Fazzari et al. (2000) pinpoint that more financially constrained firms, categorized by Kaplan and Zingales (1997), are actually financially distressed firms. These firms are possibly restricted by creditors to use internal funds for investment purposes, and consequently show low responsiveness of investment and cash flow. In general, the results of Kaplan and Zingales (1997) also suffer some other problems. Such as the criteria they use to divide the firms into the degree of financing constraints for such a small sample is inappropriate. Moreover, the reliance on managers' statements is not a reliable source to classify the firms.

The study by Moyen (2004) links the contradictory results with using different sample splitting criteria by both studies. He finds that when firms are categorized according to Fazzari et al.'s (1988) methodology , as firms with low dividend are most constrained and firms with high dividend are least constrained, results of the regression are consistent with their findings. If firms are categorized by Kaplan and Zingales' (1997) criterion, as firms without access to required funds are likely constrained and firms with access to ample funds are never constrained, results are found to be consistent with their findings.

In a nutshell, these contradictory results conflict the conventional wisdom, but are driven by the fact that when the firm is in severe cash shortfall, its investment does not respond, even to internal funds.

Sample splitting criteria as a measure of financial constraint

From the previous discussion, it is clearly found that empirical evidence of investment-cash flow sensitivity seems to be quite sensitive to the sample splitting criteria, which means it is an essential element in the test of financial constraints hypothesis. The logic behind splitting the sample firms into different groups is to categorize them according to those characteristics that seem closer to the capital market imperfections (such as information asymmetry and agency problems). As financial constraints are the result of these capital market imperfections, these sample splitting criteria are being used extensively to gauge financial constraints on firms.

Different types of constraints can have a distinct impact on investment. Some studies have used internal financial constraints, such as cash flow and coverage ratio, for categorizing firms to scrutinize the implication of financial constraint on investment. Other studies have applied external financial constraint, such as dividend ratio, size, and age as control variables to see their impact on the financial constraint of firms. Table 2.1 below summarizes different controlled variables that have been extensively used in literature.

Table 2. 1 : Review of empirical literature: Sample splitting criteria

Sample splitting criteria	**Authors**	**Country**	**Finding**
Dividend payout	Fazzari et al. (1988) Hubbard et al. (1995)	USA Global	High investment-cash flow sensitivities for low-div firms. Euler equation model is rejected for low-div firms.
Affiliation to the industrial group or bank	Hoshi et al. (1991) Cho (1998) Elston and Albach (1995)	Japan Korea Germany	Affiliated firms have lesser investment-cash flow sensitivity.
Size (of firm)	Carpenter and Guariglia (2008) Jaramillo et al. (1996)	UK Eucador	Larger firms have lesser investment-cash flow sensitivity. Smaller firms have lesser investment-cash flow sensitivity.

	Guariglia (2008)	UK	The investment of smaller firms is more sensitive to cash flow.
Age (of firm)	Guariglia (2008)	UK	The investment of younger firms is more sensitive to cash flow.
Cash flow	Cleary et al. (2007) Guariglia (2008)	Global UK	Relationship between investment and cash flow is u-shaped.
Financial health (Bond rating)	Whited (1992)	US	The firms without access to bonds market have higher investment-cash flow sensitivity.
Regional division	Sun and Yamori (2009) Chen (2008)	China China	Variation in investment-cash flow sensitivity is sensitive to regional development.
Leverage ratio	Agung (2000)	Indonesia	High leverage firms show higher investment-cash flow sensitivity.

These sample splitting criteria have been used to gauge the level of information asymmetry that the firm faces. However, some of these sample splitting criteria have been criticized in the literature so far. Evidence for size, which has been widely used to partition the sample, is mixed. In general, large firms tend to show less investment-cash flow sensitivity (such as Fazzari, et al., 1988; Hu and Schiantarelli, 1998; Jaramillio, et al., 1996). In contrast, Devereux and Schiantarelli (1990) and Chow and Fung (1998) found that large firms are

more financially constrained on the basis of higher investment-cash flow sensitivity. Nonetheless, these splitting criteria provide us with an insight into studying a firm's heterogeneity.

Moreover, these criteria have been criticised in the literature on the following bases. First, previous studies kept financially constrained and unconstrained groups fixed in all sample periods, whereas, financial constraint cannot necessarily prevail in all sample periods; therefore, firms may transit across different financial times (Schiantarelli, 1996). However, recent studies are assigning firm years into different groups, which allows them to transit between different financial times, and this resolves the problem somehow. Moreover, literature also shows less satisfaction towards using a single criteria to divide the firms. It is believed that this is not enough of a statistic, but nonetheless, a number of empirical studies have been using these criteria, as they believe that these provide some insights to study the relationship between firms' characteristics and their behaviour.

Assets tangibility as a measure of financial constraint

There is another popular measure of financial constraint in the literature given by Almeida and Campello (2006), who extend a theoretical argument that tangibility of a firm's assets is such a factor that encourages/sustains external financing because of having the ability to reduce the contractibility problems. This, in turn, increases a firm's ability to access external finance. According to their theoretical expectation, firms with more tangible assets are less likely to be financially constrained. By using data from COMPUSTAT over the period 1985–2000, their paper shows that, at a low level of assets tangibility, investment-cash flow sensitivity increases. This paper uses a detailed firm-level measure to gauge the expected

liquidation value of firms' main categories of operating assets. At the firm level, asset tangibility is measured by the following formula[12]:

$$Assets\ Tangibility = (Cash + 0.715 * \text{Receivables} + 0.547 * \text{Inventory} + 0.535 * \text{Capital})/\text{total assets} \quad (20)$$

Where Cash is a firm's cash holdings; Receivables consist of a firm's accounts receivable; Inventory is the value of a firm's inventory; Capital is the value of a firm's fixed assets; and total assets is a firm's book value of total assets. Higher tangibility means firms are less financially constrained. However, asset tangibility may have strong industry-related effects and fewer firms-related variations. In addition to standard industry fixed effect, asset tangibility as a measure of financial condition of the firm may also rely on a firm's position within industry. To get rid of industry-related effects, we will use the ratio of the firm tangibility over industry level median. We will use an industry-adjusted level of asset tangibility for our empirical studies.

Indices as a measure of financial constraint

In addition to investment-cash flow sensitivity and other splitting criteria of firms, three indices are very popular in the literature to overcome the shortcomings of the already existing measures of financial constraints. These indices are a summation of multiple financial ratios of the firms. The detail of these indices are provided below.

[12] Almeida and Campello (2006) borrow this measure from Berger et al(1996) to construct a firm-level measure of expected asset liquidation values. Berger et al(1996) find a dollar of book value produces , on average, 72 cents for total receivables, 55 cents for inventory, and 54 cents for fixed assets for the sample of COMPUSTAT firms.

KZ index

The actual KZ index is given by Lamont et al. (2001). They developed an index on the regression coefficients generated by Kaplan and Zingales, who classified firms into five categories of financial constraints and then used an ordered logit regression to estimate the accounting variables. Lamont et al. (2001) give an index consisting of a linear combination of five accounting ratios: cash flow, market value, debt, dividends, and cash holdings, and each is scaled by total capital. Following is the KZ index:

$$KZ\ Index = -1.001909 * CF_{it} + 0.2826389 * Q_{it} + 3.139193 * TD_{it} - 39.3678 * Div_{it} - 1.314759 * CASH_{it} \quad (21)$$

Where CF is the ratio of cash flow to capital; Q is Tobin's q; TD is ratio of long term debt to capital; Div is ratio of dividend to capital; and CASH is ratio of cash to capital.

A higher index value suggests a firm that is more financially cosntrained. Subsequently, financially constrained firms have low cash flow, high q, high debt ratio, low dividend payments, and low cash.

KZ index is found to be the most popular measure of financial constraints if judged by Google Scholar citations. This index is also generated by the influential debate between Fazzari et al. (1988) and Kaplan and Zinagales (1997), as explained previously. However, there is considerable criticism about the error in q value calculation, which is used to calculate the index. Moreover, suitability of the index for a large sample is also an open question because this index is actually built on a small sample given by Kaplan and Zingales (1997). Kim and Park (2015) check the correlation between firm's measure of financial distress and three popular measures of financial constraints (KZ index, WW index, and HP

index) in order to distinguish financial constraint from financial distress. Their empirical study finds KZ index is linked more to financial distress than financial constraints.

WW index

This structural approach overcomes the problem of traditional approach where measurement of Tobin's q involves serious difficulties (Erickson and Whited, 2000; Bond and Cummins, 2001; Cooper and Ejarque, 2003). There were also some concerns about KZ index related to the size of the sample, as Kaplan and Zingales (1997) use only 49 firms from Fazzari et al. (1988), known as 'constrained firms', while Lamont et al. (2001) apply the exact coefficients on data from a broad sample of firms to construct a 'synthetic KZ index'. Therefore, using the same coefficients for a much larger sample of firms in a different period leaves an open question as to whether this index is truly capturing the financial constraints.

Whited and Wu (2006) used a distinct approach. Based on a standard intertemporal investment model, this study constructs an index drawn from a structural model. The model predicts that external finance constraints affect the intertemporal substitution of investment today for investment tomorrow, via the shadow value of scarce external funds. This index is based on the coefficients acquired from the structural model. It is measured as an estimation of cost of external funds on the following variables: cash flow to assets, a dummy capturing whether the firm pays a dividend, long-term debt to total assets, size, firm sales growth, and industry sales growth.

This index is calculated as follows:

$$wwindex = -0.091\mathrm{CF}_{\mathrm{it}} - 0.062\mathrm{DIVPOS}_{\mathrm{it}} + 0.021\mathrm{TLTD}_{\mathrm{it}} - 0.044\mathrm{LNTA}_{\mathrm{it}} + 0.102\mathrm{ISG}_{\mathrm{it}} - 0.035\mathrm{SG}_{\mathrm{it}} \quad (22)$$

Where CF is ratio of cash flow to total assets; DIVPOS is a dummy variable that takes one if firm pays cash dividends; TLTD is ratio of long-term debt to total assets; LNTA is natural log of total assets; ISG is the firms' 2-digit industry sales growth; and SG is firms' sales growth. By construction, firms with a high WW index are considered more financially constrained, containing low cash flow, low dividend, high leverage, low total assets, high industry sales growth, and low firm growth rate.

HP index

Hadlock and Pierce (2010) revise Kaplan and Zingales' (1997) approach by collecting the information from annual reports and 10-K filings of 356 randomly selected firms over the period 1995–2004[13]. Alongside the qualitative information, they also include quantitative data on dividend payment, repurchases, and cash balances to partition the firms into financial status. Their methodology includes to first evaluating the existing measures of financial constraints, i.e. KZ index, WW index, and firm-specific characteristics. In doing so, Hadlock and Pierce (2010) divided the sample into five categories and three different schemes. The first scheme divides the firms only on quantitative information. Scheme 2 is similar to Scheme 1, except to ignore the liquidity problem signals. Scheme 3 includes both qualitative and quantitative information to categorize firms into financial status. They estimate an Ordered logit model in which financially constrained status is modelled as a function of the five components of KZ index. Similar regression is run for the components of WW index and

[13] 10-K is a broad summary report of a company's performance, which is submitted annually to the Securities and Exchange Commission. Generally, 10-K consists of much more detail than the annual report.

four sorting variables of Almeida et al. (2004). A firm's cash flow, leverage, age, and size are found significant components of a firm's financial status in all estimations. This study chooses age and size as more appropriate characteristics to sort the firms into financial status, as these are more exogenous and highly related to constraints in the sample. The coefficients of age and size are found to be always significant and of the expected negative signs in all estimations. On the basis of all preceding tests, this study constructs its own index by using size and age. This paper further estimates an ordered logit in which a firm's financial constraints status is modelled as a function of size, size squared, and age. The estimates are used to create an index. This index is calculated as follows:

$$HPIndex = -0.737 * Size + 0.043 * Size^2 - 0.040 * Age \quad (23)$$

Where Size is log of book assets and Age is the number of years the firm has been on the database with a non-missing stock price. In calculating this index, values of size have been replaced with log ($4.5 billion) if the actual value is exceeded by log ($4.5 billion). Age has also been capped at 37 years.

Regardless of containing some shortcomings, a number of the latest empirical studies in the growing literature of finance and investment are using indices to categorise the firms into being financially constrained and unconstrained (such as Almeida, et al., 2013; Guariglia and Yang, 2016).

3. Overview of the Pakistani Economy

This section will first review the role of the financial system in the corporate sector of Pakistan, particularly in the aftermath of the financial liberalization process, and then we will review the macroeconomic performance of the country during the same period. We will also briefly discuss the financial disclosure practices in Pakistan. At the end, this section will discuss the role of size and group affiliation of the firms as a cause of market imperfections.

3.1 Pakistani financial system and corporate sector

The process of financial liberalization was undertaken in the 1990s, and is considered a landmark in the history of the Pakistani financial system. Through these reforms, the influence of politicians over credit allocation and loan recovery schemes was controlled by the participation of the private sector. The vibrant set of reforms included interest rate deregulation, privatisation of state-owned banks, changes in the institutional framework, and entry deregulation for foreign banks. These modifications started a steady process of improvement in the capital market SBP (1990–2002).

The share of listed companies comprised of only 1.8 per cent of total registered companies by 2000. Even inside the capital market, only four companies (PTCL, Hubco, PSO, and ICI) were dominating, with an 80 to 85 per cent share in total trading volume. Table 2 gives an overview of the Pakistani equity market. Column 1 of table 2.2 shows an increase and fall in the number of listed companies over the period 1991–2016. One can see a very positive influence of financial reforms over capital markets in Pakistan. The number of listed firms increased from 497 to 762 in a decade. However, a decline in the number of listed firms began after 2003, mainly related to the increasing number of terrorist activities and poor law

and order conditions in the country. The second column of table 2.2 shows an increase in market capitalization. This shows that the size of the firms has been increasing over the period. Column 3 of table 2.2 gives statistics on market capitalization as a percentage of GDP. Market capitalization as a percentage of GDP evaluates the size of the stock market relative to the size of the economy. Statistics of this column show that it remains under 50 per cent of GDP over the whole history of the equity market. The performance of the stock market was remarkable in 2007, when the share of market capitalization as a percentage of GDP rose to 46.1 per cent. It started to decline after that. It kept declining until reaching 19.4 per cent in 2012. To understand the factors behind this decline, unsatisfactory progress of financial sector reforms, issues of political turmoil, a poor law and order situation, and an energy crisis are prominent.

Table 2. 2: Equity market condition 1991–2014

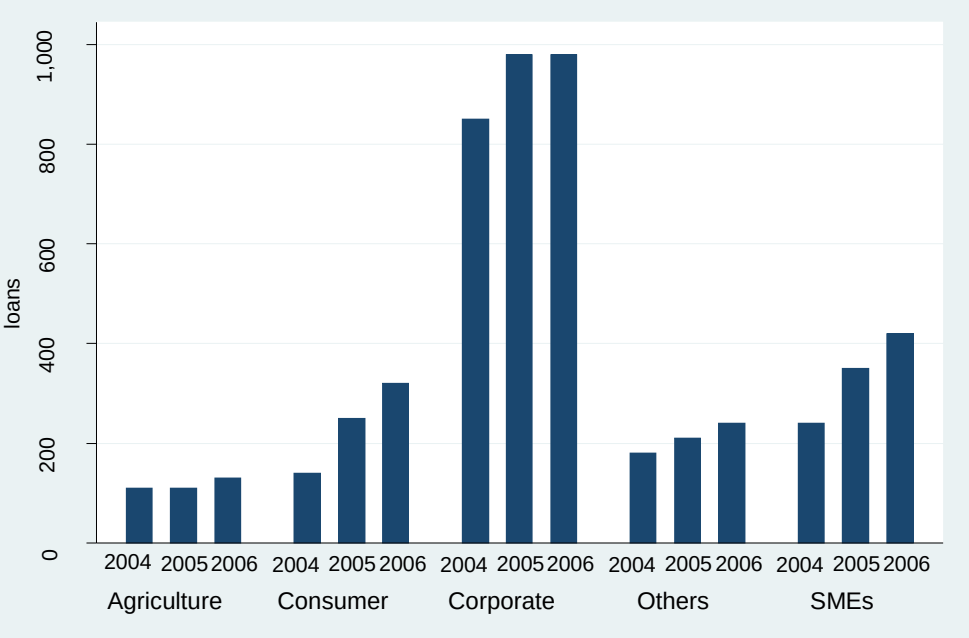
Period	Number of listed companies at KSE (1)	Market capitalization (billion Rs) (2)	Market capitalization as per cent of GDP (3)
1991	497	90.0	16.1
1992	596	218.4	16.5
1993	652	214.4	22.5
1994	683	404.6	23.7
1995	746	293.3	15.3
1996	783	365.2	16.8
1997	782	496.1	17.6
1998	779	262.4	8.7
1999	769	287.9	11.1
2000	762	394.4	8.9
2001	759	341.8	6.8
2002	725	411.6	14.1
2003	705	755.81	19.9
2004	666	1428.1	29.6
2005	659	2068	42.0
2006	658	3065.8	33.2
2007	652	3777.7	46.1
2008	652	2143.2	13.8
2009	652	2732.4	19.8
2010	639	3315.8	21.5
2011	591	3548.9	15.3
2012	569	5502.2	19.4
2013	559	5050	20.5
2014	559	7116	22.5
2015	554	6928.497	26.2
2016	558	9628.514	27.6

Source: Financial Sector Assessment (1990-2005) & [14]Pakistan Economic Survey (2006-2014)
Web link: http://www.sbp.org.pk/publications/fsa.htm http://www.sbp.org.pk/FSR/2016/pdf/Chap-2.pdf
Web link: http://www.finance.gov.pk/

[14]Pakistan Economic Surveys available on Ministry of Finance website.

The banking sector has always remained a predominant source of corporate financing in Pakistan. Financial Stability Review (2006) reports the dominant role of the local private sector over public sector and foreign banks. The local private sector was dominant, with the lion's share of 72.9 per cent in assets until 2000. As far as loan distribution of these banks is concerned, figure 2.2 gives sector wise loan movements. It shows the corporate sector as a leading borrower in the loan portfolio in 2006.

Figure 2.2: Sector wise loans distribution



Source: Banking System Review 2006

Web link: http://www.sbp.org.pk/publications/bsr/index.htm

Banks are still playing a leading role in corporate finance. Even in 2016, the borrowing of the corporate sector was 68 per cent, standing at PKR 3.8 trillion, of overall domestic loans[15]. On the other side, corporate financing via capital market stands at PKR 600 billion. Equity financing had been playing an active role in asset financing but it has been diminishing in recent years (Financial Stability Review, 2016).

[15]PKR is Pakistani Rupee

A number of empirical studies for Pakistan also show that the corporate sector is mainly relying on banks' loans in their need for external funding. The lesser dependence on the equity market lies in the still underdeveloped equity markets. A study conducted by Raza et al. (2013) explores 323 manufacturing listed firms to see the financing pattern of the firms. The results show that Pakistani firms are mainly relying on debts, in which short-term debts account for 77 per cent of the total debt of sample firms. Sheikh and Wang (2010) also confirm that Pakistani firms rely on bank debt because of an undeveloped bond market. These studies further confirm the implication of the pecking order theory in Pakistan.

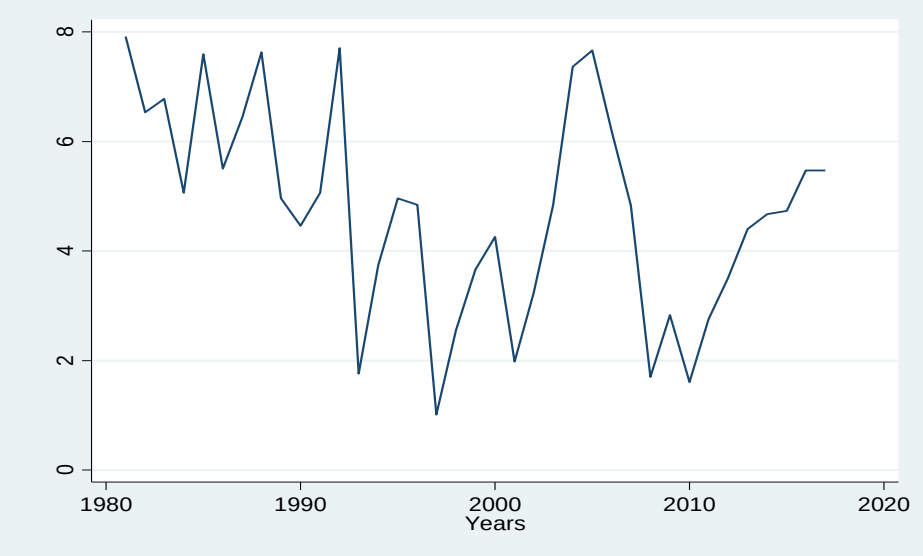
The synopsis of the Pakistani financial system shows the predominant position of banks lending to the corporate sector in external funding. The equity financing is growing but still lags behind.

3.2 Macroeconomic performance

The overall macroeconomic performance of the country and corporate sector performance are interdependent on each other. Figures 2.3 and 2.4 give annual GDP growth rate in per cent, and gross fixed capital formation growth in per cent respectively, as GDP growth rate shows how well and poorly an economy is performing. Figure 2.3 shows that, overall, the growth rate is unstable; however, it reaches its highest, at 7.7, between 1992 and 2005. After 2005, its performance is dismal, but it has an upward trend again in 2011. If we look at figure 2.4, gross fixed capital formation (GFCF) annual percentage growth rate is also giving a gloomy picture. It was at its peak in 2006 and at the bottom between 2008 and 2010. The downfall of these macroeconomic indicators of the economy from 2008 to 2010 can be associated with

the impacts of the global financial crisis on the Pakistani economy. However, macroeconomic indicators of both figures show an improvement in the economy after 2014.

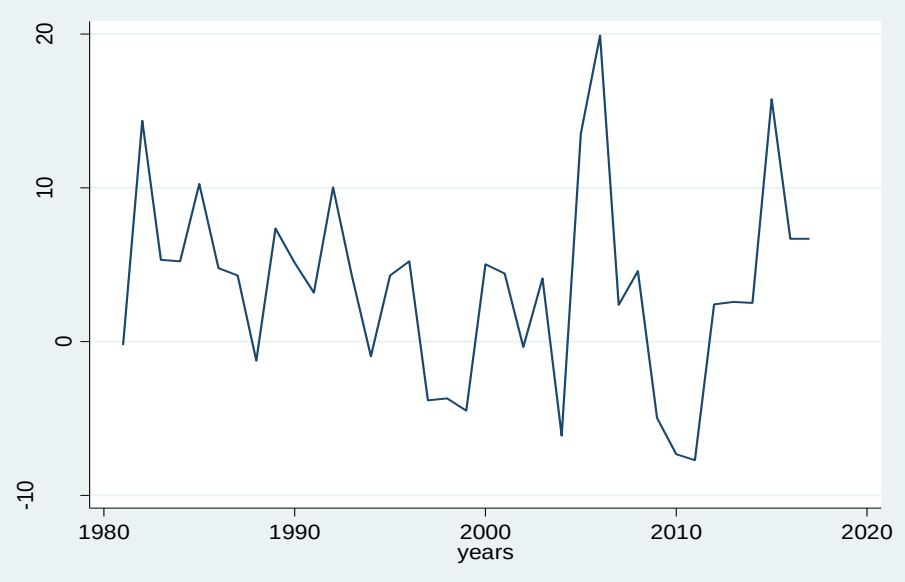
Figure 2.3: GDP growth (annual %)



Source: World Bank: Data Bank for Pakistan

Web link: http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG

Figure2.4: Gross fixed capital formation (annual % growth)



Source: World Bank: Data Bank for Pakistan
Web link: http://data.worldbank.org/indicator/NE.GDI.FTOT.KD.ZG

Investment rate and investment to GDP ratio

Investment plays a pivotal role in the economic growth of Pakistan. In the 1990s (era of financial liberalization), both public and private sectors started to participate in investment. Table 2.3 illustrates that investment rate has been increasing over the years, but not evenly. Investment was at its peak in 2007 and started to decline after that. We cannot associate this decline with financial markets' failure only, as the emergence of energy crises in the country at the same period bears the responsibility as well. However, participation of the private sector has been increasing when compared to public sector investment. We can see the improvement in the statistics of investment data from 2014, showing an increase in investment rate in the country.

Table 2. 3: Investment to GDP ratio

Years	Gross fixed investment (1)	Public investment (2)	Private investment (3)
1995	16.8	8.2	8.6
1996	17.4	8.3	9.1
1997	16.5	6.9	9.6
1998	15.2	5.3	9.9
1999	13.4	5.3	8.0
2000	13.5	5.4	8.1
2001	15.8	5.7	10.2
2002	15.5	4.2	11.3
2003	15.3	4.0	11.3
2004	15.0	4.0	10.9
2005	17.5	4.3	13.1
2006	17.19	4.6	12.6
2007	17.6	4.8	12.8
2008	15.9	4.3	11.7
2009	14.20	3.7	10.5
2010	12.51	3.2	9.3
2011	13.32	3.7	9.6
2012	15.08	3.9	8.7
2013	14.96	3.52	9.84
2014	14.64	3.17	9.87
2015	15.71	3.75	10.36
2016	15.55	3.79	10.16

Source: Annual Reports of SBP(1999-2012)
Pakistan Economic Survey(2016-2017)
Weblink:http://www.sbp.org.pk/reports/annual/index.htm
http://www.finance.gov.pk/survey/chapters_17/01-Growth.pdf

3.3 Financial disclosure practices in Pakistan

Three accounting bodies, namely Institute of Chartered Accountants Pakistan (ICAP), Institute of Cost and Management Accountants of Pakistan (ICMA), and Pakistan Institute of Public Finance Accountants (PIPFA), are operating in Pakistan. Companies Act of 1913 was kept as such until 1971, after the country gained independence in 1947. Government established the Security and Exchange Authority (SEA) in the 1970s to improve the accounting disclosure practices in the country. Companies Ordinance Act was enacted in 1984, according to which it is made mandatory for listed firms to comply with International Accounting Standards (IAS).

Another significant improvement was undertaken in 2002, as the Code of Corporate Governance was introduced. The aim of the code is to raise the confidence of investors via mitigating moral hazard problems. This effort made the firms obliged to disclose information related to their credit worthiness, e.g. loan default and tax evasions.

However, all these efforts are still not up to the mark, as Ashraf and Ghani (2005) revealed that Company Law is considered as the least administrative law in Pakistan. Regardless of these efforts, financial markets in Pakistan are characterised by weak corporate governance and inadequate disclosure, which can enhance the problem of information asymmetries and agency problems.

3.4 Financial constraints in Pakistan

Firms' size and financial constraints

In the literature, a firm's size has been extensively correlated to the probability of being financially constrained (such as Fazzari, et al., 1988; Jaramillo, et al., 1996; Chow and Fung, 1998). As small firms are more likely to have little or no track record, as they grow and have longer operating periods, the chances to overcome the problems of information asymmetries and agency cost expand. Therefore, the issue of financial constraints is more relevant to small firms for the following two reasons: first, small firms are likely to be more information ally unclear than large firms are. Second, small firms have fewer options to raise external finance via equity, consequently relying more on short-term debts.

While looking at the industrial sector of Pakistan, one important feature is the large number of small and medium-sized enterprises (SMEs). SMEs are playing a crucial role in social and economic uplift in Pakistan. Like other developing countries, SMEs are a reflection of the Pakistani economy (Khalique, et al., 2011). The government of Pakistan (GOP) took a number of steps, such as the establishment of Small and Medium Enterprise Development Authority (SMEDA) in 1998, the formation of SMEs and micro finance banks, and the creation of specialized departments for the SME sector in most commercial banks, to overcome the problems related to their financial needs. Regardless of all these steps, SMEs have been suffering from a number of hindrances that are affecting their performance level. These obstacles include a low level of financial literacy, lending strategies by the banks, and absence of reliable business information structure (Khwaja and Mian, 2005; Dar, et al., 2017). These problems related to small firms refer to the existence of financial constraints among these firms on the basis of size in the country.

The sample in our study includes only listed firms; generally, the listed firms are large firms in the country. Still, we will see the role of size in causing financial constraint among listed firms. Due to the absence of identical definition of SMEs in Pakistan, we divide the sample firms on the basis of total assets[16].

Group affiliation and financial constraints

Affiliation to the industrial group is also an important factor, which increases the probability of firms to get external finance easily. Usually, firms can have access to the internal capital market that is created by the group. Evidence given by Hoshi et al. (1991) and Chirinko and Schaller (1995) for the case of Japan and Canada respectively, supports the idea that affiliation to an economic group reduces the problems related to information asymmetries and lowers the hazards related to external funds access.

It is popularly known that Pakistani industrial structure is owned by 22 super-rich families from Pakistan. In 1995, the top 43 groups, which were created by these 22 families, accounted for 43 per cent of total manufacturing firms listed on Karachi Stock Exchange. These groups do not only own manufacturing industries but also private banks, insurance companies, leasing companies, modarabas (financial contracts), and power plants. In addition to listed companies, the number of unlisted public firms and private limited companies is also innumerable. These groups also have companies that are incorporated abroad. They have ties to each other via formal and informal relations (Rehman, 2006). A book by Rehman (2006) reports the list of the top 38 business groups (based on their size) and their associated firms in

[16]Small and Medium Enterprise Development Authority (SMEDA), Pakistan Bureau of Statistics (PBS) and State Bank of Pakistan (SBP) have defined SMEs on different bases. SMEDA defines SMEs on number of employees and number of assets. PBS defines it on number of employees only. SBP defines it on number of employees, nature of business, and net sales value per annum.

Pakistan. This thesis relies on this book in an attempt to isolate the group affiliation of sample firms. A number of other studies (such as Ashraf and Ghani 2005; Masulis, et al., 2011) have used the same source. In addition, the official websites of these groups provide the list of affiliated firms, which have also been crosschecked.

Given the popularity of well-known economic groups in Pakistan, the presence of financial constraints in the context of group affiliation becomes significant in Pakistan for the following two reasons: first, group-affiliated firms tend to be less financially constrained, as firms could easily access banks sponsored by the group. Second, the group-affiliated firms could also access the international capital market, for easy access to external finance, because of having a superior position.

This section of the chapter gives us a background of the Pakistani financial and corporate sector to understand the presence of information asymmetries and agency cost leading to market imperfections. The process of financial liberalization is equipping financial markets to assist the financial needs of the corporate sector, but still there are loopholes generating the factors to cause capital market imperfections.

4. Estimation Framework and Data

This section of the chapter proceeds as follows: first, we explain the methodology to test for investment-cash flow sensitivity (a traditional and popular measure of financial constraint) for Pakistani listed firms. In this regard, we use q model and ECM for empirical specifications. Given the significance of a firm's size and group affiliation to generate

information asymmetry in the Pakistani corporate sector, we then describe the procedure to sort firms into size and group affiliation to check the variation in investment-cash flow sensitivity. Literature has also substantially relied on sorting firms into financial status according to dividend policy. We will also sort firms into dividend-paying and non-dividend-paying firms to check investment-cash flow sensitivity. Second, we explain the methodology to categorise the firms into levels of financial constraints on the basis of KZ index, WW index, HP index, and assets tangibility. Third, to evaluate the applicability of existing indices and assets tangibility, we explain our methodology.

4.1 Investment cash flow sensitivity

Q model

Our empirical study will begin with the q theory framework to investigate the role of financing constraints for the investment level of the firm. We try to estimate a more general dynamic model including the lagged value of dependent variable. By following Carpenter&Guariglia(2008) and after including the lagged value of dependent variable, q model specification will take the following form:

$$\frac{I_{it}}{K_{i,t-1}} = a_0 + b\frac{I_{i,t-1}}{K_{i,t-2}} + cQ_{t-1} + \frac{dCF_{it}}{K_{i,t-1}} + v_i + v_t + \mathrm{v_r} + e_{it} \qquad (24)$$

where I/K is investment to fixed assets ratio. This ratio is used to see the intensity of investment for the firms. We define investment as change in real tangible fixed assets plus depreciation. In order to control possible heteroscedasticity due to size scale effect and for comparison purposes, we will scale the key variables with lagged fixed assets. K is capital, which is measured by fixed assets. Q is Tobin's q. CF is cash flow, as given by the ORBIS

database. ORBIS defines it as profit for period plus depreciation. A significant and positive coefficient of cash flow after controlling the investment opportunities via Tobin's q, will highlight the existence of financial constraints. v_t shows time-specific effect, v_i gives firm-specific effect, v_r controls for region effects, and e_{it} gives idiosyncratic shock.

Error correction model (ECM)

By following Bond et al. (2003), Bond and Lombardi (2006), and Guariglia (2008), the version of ECM that we derived in section 2 will take the following form:

$$\frac{I_{it}}{K_{i,t-1}} = \alpha + Z_1\left(\frac{I_{i,t-1}}{K_{i,t-2}}\right) + Z_2\Delta S_{it} + Z_3\Delta S_{i.t-1} + Z_4\left(K_{i,t-2} - S_{i,t-2}\right) + Z_6\left(\frac{CF_{it}}{K_{i,t-1}}\right) + v_i + v_t + v_r + e_{it} \quad (25)$$

Where I_{it} denotes investment for firm i in period t, K_{it} is the value of capital stock. α is a constant term. S_{it} logarithm of real sales showing output, CF_{it} is cash flow, v_t shows time-specific effect, v_i gives firm-specific effect, v_r controls for region effects, and e_{it} gives idiosyncratic shock. To investigate the role of financial factors in investment, we include current cash flow term in the estimation equation. A significant coefficient of cash flow refers to the presence of financial constraints on investment. We would expect a positive and significant coefficient on cash flow, if firms' investments were influenced by the availability of internal funds.

Role of size, group membership, and dividend ratio

To test the impact of firm size on investment-cash flow sensitivity, we divide the sample on the basis of total assets. We sort the data by size. The firms with total assets above the sample median are in the group of large firms. The firms with total assets less than the sample median comprise the group of small firms. We generate a dummy variable, size dummy_{it}, which is equal to 1 if firm i has total assets larger than median in year t, and 0 otherwise. We estimate our investment equation where cash flow variables are interacted to size dummy. We will use error correction model for estimation. The equation (25) will become:

$$\frac{I_{it}}{K_{i,t-1}} = \alpha + Z_1\left(\frac{I_{i,t-1}}{K_{i,t-2}}\right) + Z_2\Delta S_{it} + Z_3\Delta S_{i.t-1} + Z_4\left(K_{i,t-2} - S_{i,t-2}\right) + Z_5\ \frac{CF_{it}}{K_{i,t-1}} +$$

$$Z_5\ Size\ dummy_{it} + Z_6\left(\frac{CF_{it}}{K_{i,t-1}}\right) * Size\ dummy_{it} + v_j + v_r + e_{it} \qquad (26)$$

To test the impact of group membership, we will introduce the dummy of group affiliation in to the main empirical specification. The group affiliation dummy is equal to 1 if firms belong to the top 30 industrial groups in Pakistan.

$$\frac{I_{it}}{K_{i,t-1}} = \alpha + Z_1\left(\frac{I_{i,t-1}}{K_{i,t-2}}\right) + Z_2\Delta S_{it} + Z_3\Delta S_{i.t-1} + Z_4\left(K_{i,t-2} - S_{i,t-2}\right) + Z_5\ \frac{CF_{it}}{K_{i,t-1}} +$$

$$Z_5\ Group\ dummy_i + Z_6\left(\frac{CF_{it}}{K_{i,t-1}}\right) * Group\ dummy_i + v_j + v_r + e_{it} \qquad (27)$$

To test the impact of dividend ratio, we will generate the dummy variable. If the firms pay a dividend to their shareholders, it will be equal to 1; otherwise, it is 0.

$$\frac{I_{it}}{K_{i,t-1}} = \alpha + Z_1\left(\frac{I_{i,t-1}}{K_{i,t-2}}\right) + Z_2\Delta S_{it} + Z_3\Delta S_{i.t-1} + Z_4\left(K_{i,t-2} - S_{i,t-2}\right) + Z_5\ \frac{CF_{it}}{K_{i,t-1}} +$$

$$Z_5\ dividend\ dummy_{it} + Z_6\left(\frac{CF_{it}}{K_{i,t-1}}\right) * dividend\ dummy_{it} + v_j + v_r + e_{it} \qquad (28)$$

Estimators

It is expected that some estimators may lead to bias because some regressors may be endogenously determined in our specifications[17]. In the presence of endogeneity, ordinary least square (OLS) estimator is likely to upward bias the estimation of lagged dependent variable. Fixed effect estimator may lead to a downward bias of lagged dependent variable. The useful estimator, which can control for unobserved heterogeneity and endogeneity problems at the same time, is generalized method of moments[18] (GMM). We will estimate the empirical specification with system GMM given by Arellano and Bover (1995) and Blundell and Bond (1998). By accumulating an additional assumption of uncorrelation between the first differences of instrument variables and fixed effects, Arellano and Bover (1995) and Blundell and Bond (1998) improve the efficiency of original difference GMM (Roodman, 2009). To assess the validity of the model and instruments, we will rely on the AR (2) test for second-order serial correlation of the residuals, and the Sargan test for over- identifying restrictions in the differenced equations.

We will estimate the above given empirical specifications by OLS, fixed effect, and System GMM. The reason to use these three estimators is to test the robustness of these results to a wide variety of changes in estimation techniques and specifications.

[17] Cash flow and sales are taken as endogeneous variables in the investment equations, as it is understandable that higher investment leads to higher sales and cash flow.

[18] GMM hereafter.

4.2 Using latest measures to calculate financial constraints

We will then sort all firms in our sample into portfolios according to the KZ index, WW index, HP index, and assets tangibility. We will use the regression coefficients of each index to sort firms into quartiles. For instance, we construct KZ index by including a linear combination of five accounting ratios of KZ index for sorting firms into constrained and unconstrained groups. After calculating the indices for each firm, we make portfolios by ranking all firms each year by all the indices. The lowest 25 per cent of firm years by each index will be considered as least constrained firms. The highest 25 per cent of each firm year by each index will be considered as most constrained firms and vice versa. We provide the definitions for all the variables used to form these indices in the appendix. For the assets tangibility, the highest 25 per cent of each firm year will be considered as least constrained, and vice versa.

4.3 Evaluation of existing measures for the case of Pakistan

We follow Kaplan and Zingales (1997), Lamont et al. (2001), and Hadlock and Pierce (2010) to estimate a firm's quantitatively determined financial constraint status on numerous explanatory variables. Kaplan and Zingales (1995) and Hadlock and Pierce (2010) divided firms into five categories on the basis of qualitative and quantitative information. Their classification scheme mainly relies on the liquidity information of the firms. These studies have used data from COMPUSTAT database for US firms, alongside letters to shareholders, discussions of liquidity, and 10-K for each firm year. For the case of developing countries, it

is hard to get such detailed qualitative data on liquidity status of the firms. However, we have data to calculate liquidity quantitatively for Pakistani firms.

For categorising firms into four financial constraints, statuses 0, 1, 2, and 3, we use liquidity ratio to divide firms into quartiles. Liquidity has been calculated as a ratio of a firm's current assets minus its short-term debt over total assets. We form portfolios by dividing the sample firms in to four quartiles according to the liquidity condition of the firms. The highest 25 per cent of firm years by liquidity ratio will be considered as least constrained firms. The lowest 25 per cent of each firm year by liquidity ratio will be considered as most constrained firms.

Table 2.4 gives mean values of liquidity ratio when sorted in quartiles.

Table 2. 4: Categories of financial constraint on basis of liquidity

	(0) **Most constrained**	**(1)** **Likely constrained**	**(2)** **Likely less constrained**	**(3)** **Least constrained**
Liquidity	-.400 (.715)	-.018 (.029)	.095 (.044)	.352 (.142)

Notes: Standard errors are reported in parentheses. Liquidity is calculated as a ratio of a firm's current assets minus its short-term debt over total assets. We form portfolios by dividing the sample firms in to quartiles on the basis of the liquidity of the firms.

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Following Hadlock and Pierce (2010), we regress financial constraint status of the firms as a function of five explanatory variables of KZ index first. The following empirical model will be estimated by ordered logit model.

$$Financial\ status = \alpha + \beta_0 CF_{it} + \beta_1 Q_{it} + \beta_2 TD_{it} - \beta_3\ Div_{it} - \beta_4 * CASH_{it} \qquad (29)$$

where financial status is ordered into quartiles according to the liquidity condition of the firms. CF is ratio of cash flow to capital; Q is Tobin's q; TD is ratio of total debt to capital; Div is ratio of dividends to capital; and CASH is ratio of cash to capital.

To evaluate WW index, we model financial constraint status of the firms as a function of six sorting variables of WW index.

$$Financial\ Status = \alpha + \beta_0 \mathrm{CF_{it}} - \beta_1 \mathrm{DIVPOS_{it}} + \beta_2 \mathrm{TLTD_{it}} - \beta_3\ \mathrm{LNTA_{it}} + \beta_4 \mathrm{ISG_{it}} - \beta_5 \mathrm{SG_{it}} \quad (30)$$

Where CF is ratio of cash flow to total assets, DIVPOS is a dummy variable that takes one if the firm pays cash dividends; TLTD is ratio of long-term debt to total assets; LNTA is natural log of total assets; ISG is the firm's 2-digit industry sales growth; and SG is firm's sales growth.

To evaluate HP index, we regress financial status of the firms on the size and age of the firms.

$$Financial\ Status = \alpha + \beta_0 Size + * \beta_1 Size^2 - \beta_2 Age \quad (31)$$

Where Size is log of book assets and Age is the number of years of firms' incorporation.

We will also regress financial constraint status of the firms as a function of assets tangibility due to the popularity of this measure in the literature. We will also control for the size and age.

$$Financial\ Status = \alpha + \beta_0 Assetstangibility + \beta_1 Size - \beta_2 Age \quad (32)$$

Estimator:

By following Kaplan and Zingales (1997) and Hadlock and Pierce (2010), we will use ordered logit model to estimate empirical specifications from (29) to (32). As our dependent variable is ordinal dependent variable, categorised by least constrained, likely less constrained, likely more constrained, and most constrained, the best choice is to use ordered logit model (Wooldridge, 2002).

4.4 Sample selection and summary statistics

Data

The firm-level financial data used in this study is extracted from the ORBIS database, which consists of profit and loss and balance sheet data**.** ORBIS database is Bureau Van Dijk's publication which contains information on over 200 million private companies worldwide. From this database, we select Pakistani listed non-financial firms by using the US two-digit standard industry classification (SIC)[19]. Given the popularity of SIC in the statistics of economics (Mannetje and Kromhout, 2003), we classify Pakistani firms on two-digit SIC in our study. Two-digit SIC classifies non-financial firms into 12 categories that are too detailed for our study. By following Aharony et al,(2010) and Saeed et al,(2014),this study re-distribute the two-digit SIC into eight-industry categories. The detailed industry classification is given in Appendix 2A.

[19] The three industry classifications which are renowned in the world are Global Industry Classification Standard(GICS), Global Classification System (GCS) and Standard Industrial Classification(SIC) system. GICS is published by Morgan Stanley Capital International (MSCI) and Standard and Poor's(S&P). GCS is issued by Financial Times and London Stock Exchange (FTSE). SIC is issued by the United States.

Even though, we also have the access to financial report of Central Bank (State Bank of Pakistan) and DataStream; however, the number of firms and years covered by these sources are lesser than ORBIS database. Moreover, these sources also do not provide information on ownership structure of the firms.

The total sample available on ORBIS contains 349 non-financial listed firms. The reason to select only non-financial firms for the sample is a different accounting treatment of profit and revenue by these firms from financial firms (banks, insurance companies and investment firms). We clean data by removing outliers, as we only concentrate on positive values of sales, capital and total assets. Moreover, all those firms with missing values for the important variables are also removed. We include only those firms that have observations for a minimum of two consecutive years. After meeting these conditions, the final sample consists of an unbalanced panel of 2197 firm year observations of 337 firms for the period 2006 - 2015. As the firms in the sample do not consist of same number of time-series observations, therefore, it is an unbalanced panel data.

We use GDP Price Deflator and Wholesale Price Index to obtain real values of the variables used in this study. Data on the deflators have been collected from the World Bank database for Pakistan. Capital stock and investment are deflated by using Wholesale Price Index while other variables are deflated by using GDP Price Deflator. Data on group affiliated firms is provided by Rehman(2006). Rehman(2006) gives list of top 38 business groups (based on their size) and names of their affiliated firms. However, 8 out of 38 groups consist of non-listed and financial firms only. We find 101 firms are affiliated to groups, whilst 236 firms

are stand-alone by matching the affiliated firms to those 30 business groups in our total sample of 337 firms. A number of other studies (such as Masulis et al. 2011 and Ashraf and Ghani, 2005) have used the same source to identify the business groups in Pakistan.

4.5 Summary statistics

Table 2.5 gives summary statistics for the key regression variables for the total sample of the firms. The second row in table 2.5 reports the investment to tangible fixed assets ratio. This ratio is used to see the intensity of investment for the firm. Based on this ratio, the investing intensity of overall listed firms in Pakistan is 6 per cent. Tobin's q is a ratio of total market value of firm to total asset value. It is 0.5 for full sample of firms in our case which is low, means stocks are under-valued. The cash flow to capital ratio shows how much capital expenditure requirements are fulfilled by cash flow of the firms. It is 17 per cent for the full sample of listed firms in our sample. Sales to capital ratio measures the operational efficiency of the firm, it is 3.14 for the case of our sample firms.

Table 2.6 gives summary statistics for the key regression variables for the firms sorted by size, group affiliation, and dividend, as explained in section 3. The large and small firms are investing 10 and 2 per cent of their tangible assets each year respectively. The difference is also highly significant at 1% level. The group-affiliated and stand-alone firms are investing 5 and 6 per cent of their total tangible fixed assets respectively. However, the difference is statistically not significant. The firms that pay dividends are investing 8 per cent as compared to the 3 per cent of investment of those firms that do not pay dividends. The difference is also statistically highly significant. If we compare the investment opportunities of these firms, we

find that non-affiliated and dividend-paying firms have higher value of Tobin's q, as compared to affiliated and dividend paying firms. These differences are also highly significant. In contrast, the difference between large and small firms in term of investment opportunities is not statistically significant. The differences in cash flow and sales ratios are also statistically insignificant between large and small firms. Cash flow ratio is higher for non-affiliated and dividend paying firms as compared to affiliated and non-dividend paying firms. This difference is highly significant. The sales to capital ratio is higher for non-affiliated and dividend paying firms as compared to affiliated and non-dividend paying firms. This difference is statistically significant too. The overall differences among accounting ratios are statistically more significant when the firms are sorted on the basis of dividend payment and affiliation. It highlights that market imperfections are more prominent when firms are divided on the basis of dividend policy and affiliation to economic groups as compared to size of the firms.

Table 2. 5: Descriptive statistics for key variables

	Mean	**Median**	**Standard Deviation**	**Min**	**Max**	**Obs**
$\mathbf{I_{it}/K_{i,t-1}}$	.062	.005	.270	-.973	1.97	2197
Q	.558	.242	1.04	.004	12.6	2197
$\mathbf{CF_{it}/K_{i,t-1}}$	.174	.116	.292	-.973	1.98	2197
$\mathbf{Sales_{it}/K_{i,t-1}}$	3.14	1.87	5.90	.0015	114.6	2197

Notes: I represents real investment. Investment is measured as the change in real tangible fixed assets plus depreciation. K represents real fixed assets. Capital is measured by real tangible fixed assets. Q represents Tobin's q, is a ratio of market value of the firm over total assets.. CF represents cash flow. Cash flow is defined as net income for the year plus depreciation. Sales represent net sales.

Table 2. 6: Descriptive statistics for key regression variables across different firms' status

	$Sizedum_{it}$ =0	**$Sizedum_{it}$ =1**	**Mean diff (t-stat)**	**Group aff_{it} =0**	**Group aff_{it}=1**	**Mean diff (t-stat)**	**$Divdum_{it}$ =0**	**$Divdum_{it}$ =1**	**Mean diff (t-stat)**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
$I_{it}/K_{i,t-1}$	.027	.106	-.08***	.067	.054	.012	.030	.086	-.056***
	(.215)	(.319)		(.268)	(.274)		(.277)	(.263)	
Q	.538	.632	-.05	.668	.377	.26***	.236	.816	-.544***
	(.926)	(1.52)		(1.39)	(.726)		(.389)	(1.52)	
$CF_{it}/K_{i,t-1}$	.172	.182	-.007	.188	.149	.04***	.050	.263	-.209***
	(.279)	(.315)		(.317)	(.238)		(.189)	(.323)	
$Sales_{it}/K_{i,t-1}$	3.20	3.16	.131	3.48	2.49	0.91***	2.14	3.89	-1.70***
	(5.66)	(6.54)		(7.04)	(2.62)		(5.79)	(6.16)	
No of obs	1202	995		1536	661		892	1305	

Notes: The table reports sample mean, and corresponding standard deviations are reported in parentheses. $Sizedum_{it}$=0 represents small firms. $Sizedum_{it}$= 1 represents large firms. Group aff_{it} =0 represents stand-alone firms. Group aff_{it} =1 represents group-affiliated firms. $Divdum_{it}$=0 represents firms that do not pay dividends. $Divdum_{it}$=1 represents firms that pay dividends. I represents real investment. Investment is measured as the change in real tangible fixed assets plus depreciation. K represents real fixed assets. Capital is measured by real tangible fixed assets. Q represents Tobin's q, is a ratio of market value of the firm over total assets.. CF represents cash flow. Cash flow is defined as net income for the year plus depreciation. Sales represent net sales.

In table 2.7, we report the mean, median, standard deviation, minimum and maximum value of KZ index, WW index, HP index and Assets Tangibility. In table2.8, WW Index and HP index give low value for large and dividend paying firms as compared to small and non-dividend paying firms. The differences are also statistically significant. While KZ index is

small for non-affiliated firms and non-dividend paying firms which is also statistically significant. Only dividend paying firms give higher statistically significant tangible assets as compared to non-dividend paying firms. However, the differences in tangible assets are statistically insignificant by KZ index and WW Index. Overall when the firms are divided on the basis of dividend ratio, dividend paying firms have lower values of indices and higher value of tangible assets as compared to non-dividend paying firms. These results are also consistently statistically significant. Most of the times differences are insignificant when firms are sorted on the basis of size and group affiliation. It means that sorting of firms into financial status on the basis of dividend ratio is more appropriate (as backed by the predictions of indices and assets tangibility) than on the basis of size and group affiliation.

Table 2. 7: Descriptive Statistics for Financial Constraints measures

	Mean (1)	Median (2)	Standard Deviation (3)	Min (4)	Max (5)	Obs (6)
KZ index	-1.10	.135	4.158	-20.57	6.61	1529
WW index	-.049	-.049	.2827	-10.57	.294	1529
HP index	-10.84	-10.8	.956	-13.98	-7.23	1529
Assets Tangibilty	.9818	.999	.1288	.3070	1.45	1529

Note: KZ index is summation of five variables; cash flow, total debt, cash, q and dividend ratio. WW index is summation of six variables: cash flow, dummy of dividend, total debt, firms' sales growth, industry sales growth and total assets. HP index is summation of age and size. Assets tangibility is summation of inventory, receivables and capital of firms.

Table 2. 8 : Descriptive statistics of latest measures of financial constraints

	Size dum_{it}=0	Size dum_{it}=1	Mean diff (t-stat)	Group aff_{it} =0	Group aff_{it}=1	Mean diff (t-stat)	Div dum_{it}=0	Div dum_{it}=1	Mean diff (t-stat)
KZ index	-1.38	-1.41	-.242	-1.75	-.636	-1.6***	.967	-3.19	4.3***
	(5.69)	(7.43)		(7.01)	(5.07)		(1.72)	(8.00)	
WW index	-.049	-.051	.02***	-.053	-.043	-.005	-.0003	-.087	.11***
	(.364)	(.083)		(.337)	(.087)		(.419)	(.067)	
HP index	-10.7	-10.9	.21***	-10.8	-10.9	.013	-10.5	-11.1	.682***
	(.967)	(.933)		(.969)	(.918)		(.974)	(.854)	
Assets tangibilty	.977	.995	.009	.989	.986	.009	.965	1.02	.055***
	(.134)	(.257)		(.247)	(.117)		(.137)	(.283)`	
No of obs	889	643		1042	490		661	871	

Notes: The table reports sample mean, and corresponding standard deviations are reported in parentheses. $Sizedum_{it}$=0 represents small firms. $Sizedum_{it}$= 1 represents large firms. Group aff_{it} =0 represents stand-alone firms. Group aff_{it} =1 represents group-affiliated firms. $Divdum_{it}$=0 represents firms that do not pay dividends. $Divdum_{it}$=1 represents firms that pay dividends.

In table 2.9, we present summary statistics for subsamples grouped by the level of constraints using liquidity ratio. A number of interesting differences appear between most constrained and least constrained firms. The least constrained firms have high cash flow, low debt, high dividend payments, low investment opportunities, high cash holdings, low industry, and firm sales growth, are older in age and have low tangible assets as compared to the most financially constrained firms. The proportion of total assets remains the same between least financially constrained and most financially constrained firms.

Table 2. 9: Descriptive statistics for firm characteristics by yearly financial constraints status (Liquidity Ratio)

	(1) Least constrained	(2) Likely least constrained	(3) Likely most constrained	(4) Most constrained
$\mathbf{I_t/K_{t-1}}$	.097	.096	.081	-.008
	(.259)	(.256)	(.081)	(.223)
$\mathbf{CF_t/ K_{t-1}}$	.412	.172	.113	-.013
	(.357)	(.167)	(.127)	(.198)
$\mathbf{Debt_t/K_{t-1}}$	.164	.250	.265	.284
	(.730)	(.243)	(.198)	(.373)
$\mathbf{Dividend_t/ K_{t-1}}$	.143	.029	.023	.008
	(.260)	(.72)	(.080)	(.041)
q	.979	.442	.404	.246
	(1.28)	(.805)	(.919)	(.743)
$\mathbf{Cash_t/K_{t-1}}$	.319	.073	.032	.022
	(.672)	(.231)	(.058)	(.049)
Industry sales growth	.039	.049	.068	.049
	(.158)	(.161)	(.185)	(.171)
Firm sales growth	.046	.088	.069	.806
	(.385)	(.886)	(.518)	(15.3)
Age	29.2	28.4	27.1	26.1
	(8.01)	(8.30)	(8.26)	(9.23)
Ln (Total assets)	14.8	15.0	15.1	14.8
	(1.27)	(1.33)	(1.26)	(1.63)
Assets tangibility	.910	.995	1.01	1.01
	(.179)	(.102)	(.078)	(.106)
	383	383	383	383

Notes: The figures in columns 1 to 4 are mean values of the indicated variables. Standard errors are reported in parentheses. A firm's financial constraint status for each year are least constrained, likely least constrained, likely most constrained, and most constrained, based on quantitative data of liquidity ratio. Liquidity has been calculated as a ratio of a firm's current assets minus its short-term debt over total assets. The highest 25% of firm years by liquidity ratio makes a group of least constrained firms; the lowest 25% of firm years by liquidity ratio makes a group of most constrained firms.

Table 2. 10: Correlation between Measures of Financial Constraints

	KZ Index	WW Index	HP Index	Assets Tangibility	Liquidity Ratio
KZ Index	------				
WW Index	0.0801	----------			
	(0.001)				
HP Index	0.099	0.2725	---------		
	(0.000)	(0.000)			
Assets Tangibility	0.2012	0.0883	0.1028	----------	
	(0.000)	(0.000)	(0.000)		
Liquidity Ratio	-0.2735	-0.0186	-0.1822	-0.175	----------
	(0.000)	(0.000)	(0.000)	(0.000)	

Note: Table reports Pearson's r correlation coefficients. P values are reported in parenthesis.

The correlation between the measures of financial constraints is reported in table 2.10. KZ index, WW index and HP index are strongly positively correlated, meaning that these three measures of financial constraints go hand in hand. The correlation between indices and Assets tangibility is also positively correlated. It means higher the value of indices, higher the assets tangibility of the firm is. Even though, the predictions of these indices and assets tangibility as measures of financial constraints do not support this positive correlation. As higher indices mean high level of financial constraints, while higher assets tangibility refer to lower level of financial constraints. Moreover, firms' liquidity shows a negative relationship with firms' assets tangibility and indices.

5. Results and Discussion

5.1 Investment cash flow sensitivity as a measure of financial constraints

Q model

Table 2.11 gives the estimates of empirical specification (equation 24) for a full sample. Equation (24) is estimated by OLS, fixed effects, and System GMM estimators. The focus of the estimation is the coefficient of cash flow. We find positive and significant coefficients of cash flow by all three estimators. This is the first evidence showing that listed firms in Pakistan are financially constrained, as investment is positively and significantly influenced by cash flow of the firms.

Table 2. 11: Baseline specification of q model estimation

Dependent variable $I_{it}/ K_{i\,t-1}$	**(1) OLS**	**(2) Fixed effect**	**(3) System-GMM**
$I_{it-1}/ K_{i\,t-2}$	0.0485**	-0.0401	.0234***
	(0.0227)	(0.0255)	(.0029)
Q_{t-1}	0.0184*	0.0358**	.0359***
	(0.0108)	(0.0157)	(.0035)
CF_{it}/K_{it-1}	0.170***	0.175***	.2130***
	(0.0301)	(0.0555)	(.0131)
Sargan (p)			0.066
AR (2) (p)			0.155
Region dummies	YES	NO	NO
Year dummies	YES	YES	YES
Industry dummies	YES	NO	NO
Observations	1,906	1,906	1,906
R-squared	0.159	0.126	

Notes: Standard errors are reported in parentheses. The Sargan test is a test of the over-identifying restrictions asymptotically distributed as chi-square under the null of instrument validity. AR(2) is a test for second-order serial correlation in the first-difference residuals, under the null of no second-order serial correlation. If the instruments are acceptable, the p-value of Sargan test and AR(2) should be greater than 0.05. The System GMM estimator uses lagged values of all right side variables dated t-3 as instruments. *** p<0.01, ** p<0.05, * p<0.1. I represents real investment. Investment is measured as the change in real tangible fixed assets plus depreciation. K represents real fixed assets. Capital is measured by real tangible fixed assets. Q represents Tobin's q, is a ratio of market value of the firm over total assets.. CF represents cash flow. Cash flow is defined as net income for the year plus depreciation.

Error correction model (ECM)

To overcome the shortcomings of q investment model and the robustness check, we also use ECM to check investment cash flow sensitivity. Table 2.12 reports the estimates of equation (25) for the full sample of the firms. The error correction term is correctly specified by OLS, fixed effect, and System GMM. Lagged dependent variable affects the investment by fixed effect. Current sales growth affects investment by all three estimators. Lagged sales growth affects the investment, when estimated by OLS, fixed effect, and GMM. The coefficient of cash flow is positive and significant by all three estimators. Column 3 of table 2.12 also reports Sargan test and AR(2) test for GMM. The regression estimates pass both tests showing no second-order serial correlation of the residuals. This further proves the validity of instruments.

Table 2. 12: Baseline specification of ECM estimation

Dependent variable	(1)	(2)	(3)
$I_{it}/ K_{i\ t-1}$	OLS	Fixed effect	System GMM
$I_{i,t-1} / K_{i,t-2}$	0.0111	-0.108***	.0100
	(0.0229)	(0.0297)	(0.034)
ΔS_{it}	0.0119***	0.0125**	.0067**
	(0.00376)	(0.00592)	(.0034)
$\Delta S_{i,t-1}$	0.0196**	0.0273***	.0095**
	(0.00782)	(0.0103)	(.005)
$K_{i,\ t-2} - S_{i,\ t-2}$	-0.00908*	-0.0203**	-.0059
	(0.00546)	(0.0101)	(.0061)
$CF_{it}/ K_{i,\ t-1}$	0.195***	0.231***	.269***
	(0.0324)	(0.0644)	(.0852)
Sargan(p)			0.303
AR(2) (P)			0.340
Region dummies	YES	NO	NO
Year dummies	YES	YES	YES
Industry dummies	YES	NO	NO
Observations	1,515	1,515	1,515
R-squared	0.171	0.137	

Notes: Standard errors are reported in parentheses. The Sargan test is a test of the over-identifying restrictions asymptotically distributed as chi-square under the null of instrument validity. AR(2) is a test for second-order serial correlation in the first-difference residuals, under the null of no second-order serial correlation. If the instruments are acceptable, the p-value of Sargan test and AR(2) should be greater than 0.05. The System GMM uses lagged values of cash flow, sales and $I_{i,t-1} / K_{i,\ t-2}$ dated t-3 as instruments. *** p<0.01, ** p<0.05, * p<0. I represents real investment. Investment is measured as the change in real tangible fixed assets plus depreciation. K represents real fixed assets. Capital is measured by real tangible fixed assets. Q represents Tobin's q, is a ratio of market value of the firm over total assets.. CF represents cash flow. Cash flow is defined as net income for the year plus depreciation. Sales represent net sales.

Regression results for different types of firms

We now estimate empirical specification given in equation (26) by first-difference GMM. Column 1 of table 2.13 gives the result of the firms with size dummy. Our coefficient of the interaction term of cash flow and dummy of firm size is negative and significant (-0.116). It means large firms are less financially constrained, as they have 11 per cent less investment-cash flow sensitivity as compared to Small firms. Our results support the findings of previous studies (such as Guariglia, 2003; 2008).

Column 2 of table 2.13 presents the results of empirical specification given in equation (27) by System GMM, with dummy of affiliation with industrial groups. The coefficient of interaction term (CF*Group-aff) is insignificant. It shows that group affiliation does not cause any difference in a firm's financial status.

Column 3 of table 2.13 gives the result of equation (28), when firms are sorted on the basis of dividend payments estimated by System GMM. The coefficient of the interaction term of cash flow and dummy of dividend is significant and negative (-0.220). It implies a firm's dividend policy affects investment-cash flow sensitivity for Pakistani listed non-financial firms. In other words, dividend ratio is associated with Pakistani firms' financial status. The results are in line with the findings of previous studies (such as Fazzari, et al., 1988; Hubbard, et al., 1995), which find low investment-cash flow sensitivity among dividend-paying firms.

Table 2. 13: Sorting of firms according to size, dividend, and group affiliation

Dep variable = $I_{it} / K_{i,t-1}$	**(1) SYSTEM GMM**	**(2) SYSTEM GMM**	**(3) SYSTEM GMM**
$I_{i,t-1} / K_{i,t-2}$	-0.00115	0.170*	-0.513***
	(0.0292)	(0.101)	(0.0860)
ΔS_{it}	-0.0179*	0.0361*	-0.132***
	(0.0262)	(0.0241)	(0.104)
$\Delta S_{i,t-1}$	0.0173*	0.0180	0.0687
	(0. 313)	(0.0145)	(0.0921)
$K_{i, t-2} - S_{i, t-2}$	-0.00820	-0.00264	-0.105*
	(0.0112)	(0.0141)	(0.0604)
$CF_{it} / K_{i, t-1}$	0.252*	0.467 **	2.259**
	(0.13)	(0.161	(0.907)
Size dummy$_{it}$	0.0909**		
	(0.0409)		
$CF_{it} / K_{i, t-1}$* Size dum$_{it}$	-0.116*		
	(0.198)		
Group dummy$_{it}$		0.107	
		(0.0919)	
$CF_{it} / K_{i, T-1}$* Group dum$_{i}$		-0.451	
		(0.369)	
Dividend dummy$_{it}$			-0.190
			(0.187)
$CF_{it} / K_{i, t-1}$* Dividend dum$_{it}$			-0.220*
			(0.924)
Sargan(p)	0.603	0.998	0.136
AR(2) (P)	0.478	0.441	0.159
Region dummies	NO	NO	NO
Year dummies	YES	YES	YES
Industry dummies	NO	NO	NO
Observations	1,515	1,515	1,515

Notes: Standard errors are reported in parentheses. The Sargan test is a test of the over-identifying restrictions asymptotically distributed as chi-square under the null of instrument validity. AR(2) is a test for second-order serial correlation in the first-difference residuals, under the null of no second-order serial correlation. If the instruments are acceptable, the p-value of Sargan test and AR(2) should be greater than 0.05. The System GMM estimator use lagged values of all right side variables dated t-2 as instruments. I represents real investment. Investment is measured as the change in real tangible fixed assets plus depreciation. K represents real fixed assets. Capital is measured by real tangible fixed assets. Q represents Tobin's q, is a ratio of market value of the firm over total assets.. CF represents cash flow. Cash flow is defined as net income for the year plus depreciation. Sales represent net sales.*** p<0.01, ** p<0.05, * p<0.1.

So far, our results show that Pakistani firms are financially constrained, as tested by both q model and ECM.

5.2 Firms sorted by indices

Table 2.14 provides mean values of financial variables for a group of firms when firms are sorted into quartiles by KZ index. A firm is characterized as constrained by KZ index by having high leverage, low dividend, low cash earnings, high q, and low cash flow. Low cash flow and low dividend payments could be associated with external finance. However, the high level of q is related to q's partial correlation with cash flow (Kaplan and Zingales, 1997), as a firm is classified as being likely financially constrained and conditional on having a low cash flow, only if it has more investment opportunities (q). The high leverage is associated with poor financial health of the firm whose balance sheet is full of debt. When we sort firms according to the KZ index in table 2.14, we find that most constrained firms have less cash flow (.009), higher leverage ratio (.569), lower dividend ratio (.001), lower q value (.206), and lower cash (.042), as compared to least constrained firms. Except for the value of q, all other financial variables of financially constrained firms move according to the indication of KZ index. The level of q is decreasing with the level of financial constraints, while the level of investment drops with the level of financial constraints. As more investment opportunities are conditional on low cash flow, which is a very important characteristic of KZ index, we cannot ignore this. This causes doubts to arise about the application of KZ index for Pakistani firms.

Liquidity ratio of the firms decreases substantially in the level of constraint (from .244 to -.113). This is associated with the difficult access of external finance and running out of internal funds. Asset tangibility increases slightly in the position of most financially constrained (from .920 to 1.03). This is against the prediction of Almeida and Campello (2006), who argue that tangible assets increase the access to external finance by meeting the

conditions of contracts; therefore, financially least constrained firms have more tangible assets. However, we could associate this with an inverse relationship between liquidity ratio and assets tangibility of firms somehow. We also see in row 2 that least constrained firms by KZ index have high investment – capital ratio.

Table 2. 14: Firms sorted by KZ index

	Least constrained	Likely least constrained	Likely most constrained	Most constrained
KZ index	-7.44	-.320	.446	1.74
I_t / K_t	.037	.025	.015	-.032
Cash flow/Real capital	.437	.169	.064	.009
Debt/Real capital	.099	.109	.188	.569
Dividend/Real capital	.185	.013	.003	.001
q	1.29	.338	.219	.206
Cash/Real capital	.312	.063	.026	.042
Liquidity	.244	.018	-.124	-.113
Assets tangibility	.920	.985	1.01	1.03

Notes: Total debt is a ratio of real long-term debt over capital. Dividend is a cash dividend paid by the firm. I represents real investment. Investment is measured as the change in real tangible fixed assets plus depreciation. K represents real fixed assets. Capital is measured by real tangible fixed assets. Q represents Tobin's q, is a ratio of market value of the firm over total assets.. CF represents cash flow. Cash flow is defined as net income for the year plus depreciation. Sales represent net sales. Liquidity is calculated as a ratio of a firm's current assets minus its short-term debt over total assets. Assets tangibility is summation of inventory, receivables and capital of firms.

Table 2.15 provides mean values of financial variables when firms are sorted into quartiles by WW index. According to the WW index, constrained firms should have high leverage, low dividend, low cash flow, high industry, low sales growth rate, and low total assets. We find that most constrained firms have high leverage ratio, low dividend payments, low cash flow, low firm growth, high industry growth, and low total assets. All six variables of financially constrained firms move according to the indication of WW index. Most constrained firms have belonged to low sales growth but have high industries sales growth. Investment level

also goes down with high level of financial constraints. It gives evidence that even though the coefficients of WW index are calculated for firms available on COMPUSTAT database, they are still applicable for Pakistan[20]. Moreover, the liquidity level of firms goes down with the increase in financial constraints. However, asset tangibility of the firms go up with the higher level of financial constraints, similar to the case of KZ index. A possible explanation could be that more tangible assets enable firms to borrow more.

Table 2. 15: Firms sorted by WW index

	Least constrained	Likely least constrained	Likely most constrained	Most constrained
WW index	-.176	-.073	-.016	.066
I_t / K_t	.061	.051	.010	-.042
Cash flow/Total assets	.116	.082	.067	.019
Debt/Total assets	.122	.109	.127	.224
Dividend dummy	.919	.770	.504	.081
Firm growth rate	1.03	.046	.023	-.079
Industry growth rate	.001	.037	.078	.089
Ln (Total assets)	16.5	15.3	14.5	13.5
Liquidity	.087	.068	.023	-.152
Assets tangibility	.947	.991	.999	1.01

Notes: Total debt is a ratio of real long-term debt over capital. Dividend dummy is equal to 1 if firms pay cash dividend and 0 otherwise. I represents real investment. Investment is measured as the change in real tangible fixed assets plus depreciation. K represents real fixed assets. Capital is measured by real tangible fixed assets. Q represents Tobin's q, is a ratio of market value of the firm over total assets.. CF represents cash flow. Cash flow is defined as net income for the year plus depreciation. Sales represent net sales. Liquidity is calculated as a ratio of a firm's current assets minus its short-term debt over total assets. Assets tangibility is summation of inventory, receivables and capital of firms.

When we sort firms according to HP index quartiles in table 2.16, we see that most constrained firms are smaller in size and younger in age. This is consistent with the prediction

[20] COMPUSTAT covers over 56,000 companies globally, over 45,500 non-North American securities, companies from 112 countries, and 98% of the world's total market capitalization.

of HP index. Leverage ratio goes up and liquidity ratio goes down in the most constrained firms, which is consistent with the general poor financial health of the firms. However, assets tangibility goes up from .98 to 1.00 in a higher level of financial constraints, against the theory of Almeida and Campello (2006).

Table 2. 16: Firms sorted by HP index

	Least constrained	Likely least constrained	Likely most constrained	Most constrained
HP index	-12.0	-11.1	-10.5	-9.62
I_t / K_t	.046	.026	.011	-.057
age	29.5	39.3	34.3	26.4
Ln(Total assets)	16.7	15.3	14.4	13.4
Leverage	.371	.406	.431	.504
Liquidity	.033	.048	.029	-.084
Assets tangibility	.967	.983	.996	1.00

Notes: Leverage is calculated as ratio of a firm's short-term debt over total assets. Liquidity is calculated as a ratio of a firm's current assets minus its short-term debt over total assets. Assets tangibility is summation of inventory, receivables and capital of firms.

We sort firms according to assets tangibility in table 2.17. Most constrained firms have less tangible assets as compared to least constrained firms (Almeida and Campello, 2006). We see that least constrained firms that have high assets tangibility, have higher KZ, WW, and HP indices as compared to most constrained firms. Overall, the results so far show that all three indices are moving in the same direction consistently, but assets tangibility is moving in the opposite direction. We further find that least constrained firms have high leverage and low liquidity ratio when firms are sorted according to assets tangibility. Some studies in the literature (such as Harc, 2015) show a positive relation between tangible assets and leverage ratio, as higher tangible assets increase the borrowing of loans due to the lesser problem of collateral. However, we do not find any study that shows a fixed trend between assets

tangibility and liquidity of the firms. Our results imply a negative relationship between tangible assets and liquidity ratio. Supporting these results can be the idea that firms with higher tangible assets may get loans easily at the time of need and do not need to hold liquid assets all the time. The indices such as HP index and WW index are comprehensive measures taking into account several aspects of firm finance, whereas assets tangibility measures one aspect. Therefore, we do not regard our results as conflicting evidence for the measures, rather the measures proxy for different aspects of firm finance.

Table 2. 17: Firms sorted by assets tangibility

	Least constrained	Likely least constrained	Likely most constrained	Most constrained
Assets tangibility	1.14	1.02	.976	.817
I_t / K_{t-1}	.017	.006	.011	-.001
KZ index	-.570	-.094	-.469	-4.45
WW index	-.035	-.039	-.038	-.088
HP index	-10.8	-10.9	-10.7	-10.9
Leverage	.496	.413	.382	.421
Liquidity	-.033	-.026	-.014	.099

Notes: Assets tangibility is summation of inventory, receivables and capital of firms.Leverage is calculated as ratio of a firm's short-term debt over total assets. Liquidity is calculated as a ratio of a firm's current assets minus its short-term debt over total assets.

Hence, we find that characteristics of the firms sorted by WW index and HP index are consistent with the prediction of these indices for the case of Pakistani firms. However, one of the important features of KZ index, the movement of q, is moving opposite and creates doubts for the full functioning of this index for the case of Pakistan. Assets tangibility builds a sensible relation with leverage ratio but is not consistent with the indices. In sum, the firms categorised as most financially constrained by WW index and HP index have the features that are associated with difficult access to external finance. Moreover firms categorised as most

financially constrained by the indices and assets tangibility have low investment level, which is clearly associated with the presence of financial constraints.

5.3 Evaluation of existing measures of financial constraints

Here we report the results drawn from ordered logit model by regressing financial constraint status on the explanatory variables. Our choice of explanatory variables comes from the previous approaches to measuring financial constraints. For categorising firms into four financial constraints status 0, 1, 2, and 3, we sort firms into quartiles by liquidity ratio as explained in section 4.

Column 1 of table 2.18 reports the results when a firm's financial constraint status, based on liquidity ratio of the firms, is regressed on five financial variables of KZ index. Our results in column 1 illustrate that least financially constrained firms have more cash flow, more cash holdings, and a low value of q, as compared to most financially constrained firms. The coefficients of debt and dividend are insignificant. The original KZ index predicts that least financially constrained firms have high cash flow, low q, low debt, high dividend payments, and more cash. Tobin's q, which is a significant component for the proper functioning of KZ index, is significant and appears with an appropriate sign for Pakistani firms.

Column 2 of table 2.18 reports the results when a firm's financial constraint status, based on liquidity ratio, is regressed on six accounting variables of WW index. Our results indicate that least financially constrained firms have high cash flow, less leverage, fewer total assets, higher dividend payments, and less industry growth as compared to the most financially constrained firms, which have low cash flow, high leverage, high total assets, low dividend

payments, and high industry growth. The coefficient of a firm's growth is insignificant. Whited &Wu (2006) used industry and firms' sales growth rates to control investment opportunities instead of Tobin's q in the empirical specification. The sign of industry growth is significantly inconsistent with the prediction of WW index. Our sign of coefficient of total assets is inconsistent with the index but is significant.

Column 3 of table 2.18 reports the results when a firm's financial constraint status is regressed on financial variables of HP index (age and size). Our results show the coefficient of age is significant and the sign is consistent with the index, as the least financially constrained firms are older in age in Pakistan.

Column 4 reports the results when a firm's financial constraint status is regressed on assets tangibility, size, and age. The results report that least financially constrained firms have fewer tangible assets as compared to most constrained firms. This is, however, against the prediction of Almeida and Campello's (2006) theoretical base, which argues that a firm's tangible assets reduce the problem of contractibility and increases a firm's access to external funds. Supporting this result, we argue that our criterion is to categorize firms into financial status based upon liquidity ratio, and we have previously found a negative relationship between liquidity and assets tangibility. The negative coefficient of tangibility can be a possible result of this relationship. However, assets tangibility is significant, which means it is an important element to partition firms by their financial status.

In column 5, we report the results when a firm's financial constraint status is regressed on all ten financial variables alongside time and industry dummies. We still find significant coefficient on cash flow, total debt, total assets, cash, age, dividend, and assets tangibility, even though the signs of total assets and assets tangibility are not in line with the prediction for Pakistani firms. The coefficients of q and industry growth become insignificant.

We also report marginal effects in table 2.19. Table provides marginal effects of each variable with respect to each index and Assets tangibility. Marginal effects are provided for each four categories of financial status from 0 to 3 (most financially constrained to least financially constrained). For instance, column (1) reports the marginal effect of cash flow under KZ index for '0' category in the first row. It tells if cash flow increases by 1 unit firms are about 86 per cent less likely to be financially most constrained.

In sum, we find three out of five variables of KZ index (cash flow, cash and q) are generally in agreement with the index. We find five out of six variables of WW index(cash flow, total debt, dividend, industry growth and size) in agreement with the index. We find one out of two variables of HP index (age) in agreement with the HP index, even though, when we run the regression with all variables together on financial status of the firms, we find cash flow, total debt, dividend, cash holdings, asset tangibility, age, and total assets as significant factors to categorize firms by financial status. On the basis of our results, we argue that, due to the formation of these indices for developed countries' data, the functioning of these indices varies with the financial and economic conditions of developing country. Overall, we find WW Index perform better for the case of developing country as compared to other indices. However, Total assets (size) and Assets tangibility appear significant but with wrong signs.

Size of the firm has been considered an important indicator of constraint status in the literature; we have also found that large firms are financially less constrained as having low investment –cash flow sensitivity in our sample firms previously. Besides, when we sort firms by the indices we also see that least financially constrained firms have higher total assets. When regress six components of WW index and two components of HP index on firm's level of liquidity constraints, we find that least financially constrained firms have low total assets. We can associate these contradictory results to the variances and covariances between the factors of WW index (and HP index) in a given sample. Moreover, this negative sign can be the result of relationship between total assets and liquidity ratio[21]. The wrong sign of assets tangibility can be associated to negative correlation between liquidity ratio and assets tangibility[22].

On the basis of our estimation results, we can conclude that performance of WW index is better than KZ index and HP index for the case of developing country like Pakistan.

[21] The mean value of total assets in four financial statuses of the firms (based on liquidity) is slightly higher in least constrained firms as compared to most financially constrained group. While, the mean total assets is higher in likely least constrained category and likely most constrained group as compared to most constrained firms and least constrained firms.

[22] We check the mean value of assets tangibility in four financial statuses of the firms (based on liquidity), we find less assets tangibility in those firms which have higher level of liquidity. It confirms a negative relation between liquidity and assets tangibility. On the basis of this, we will not argue that Assets tangibility is not an important sorting factor to partition firms into financial status.

Table 2. 18: Ordered logit model: using different explanatory variables to predict financial constraint status

	KZ index	WW index	HP index	Assets tangibility	Year + time dummies
	1	2	3	4	5
Cash flow	6.742***	10.85***			11.00***
	(0.414)	(0.715)			(0.823)
Total debt	-0.194	-1.837***			-0.917**
	(0.197)	(0.349)			(0.371)
Ln(total assets)		-0.198***	0.0215	-0.0176	-0.224***
		(0.0389)	(0.0343)	(0.0351)	(0.0433)
Dividend	0.521	1.021***			1.036***
	(0.910)	(0.114)			(0.122)
Cash	3.590***				3.770***
	(0.554)				(0.605)
q	-0.137*				-0.0867
	(0.0714)				(0.0696)
Industry growth rate		-0.972***			-0.232
		(0.293)			(0.381)
Firm growth rate		-0.0111			-0.0189
		(0.0143)			(0.0135)
Age			0.0132***	0.0144***	0.0106***
			(0.00247)	(0.00252)	(0.00279)
Assets tangibility				-4.889***	-2.338***
				(0.415)	(0.574)
Constant cut1	-0.366***	-3.370***	-0.341	-5.782***	-6.548***
	(0.0930)	(0.572)	(0.523)	(0.704)	(0.967)
Constant cut2	1.105***	-1.879***	0.779	-4.610***	-4.891***
	(0.0964)	(0.569)	(0.524)	(0.701)	(0.964)
Constant cut3	2.748***	-0.421	1.896***	-3.392***	-3.128***
	(0.120)	(0.565)	(0.525)	(0.696)	(0.957)
Observations	1,520	1,520	1,520	1,520	1,520

Note: All estimates are derived from an ordered logit model, where a dependent variable is based on liquidity level of the firms as an integer varying from 0 – most financially constraint up to 3 – least financial constraint for firms. The outcome measure in this analysis is financial status – least constrained, likely least constrained, likely most constrained, and most constrained. Our response variable, financial constraint status has a natural ordering from least constrained to most constrained – 0 to 3. Cut1, cut2 and cut3 are cut points on the latent variable. Cut1 is used to differentiate least financial constraint 0 from 1, 2 and 3. Cut2 is used to differentiate 0 and 1 from 2 and 3. Cut3 is used to differentiate 0, 1, and 2 from 3. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 2. 19: Marginal Effects

	KZ Index				WW Index				HP Index				Assets tangibility			
Financial Status	**0**	1	2	3	**0**	1	2	3	**0**	1	2	3	**0**	1	2	3
Cash flow	-.859	-.796	.536	1.12	-1.73	-1.03	1.16	1.605								
Total debt	.0118	.011	-.007	-.015	.305	.182	-.205	-.283								
Ln(total assets)					.033	.019	-.022	-.031	.0008	.0003	-.0003	-.0007	.008	.003	-.003	-.008
Dividend	-.0432	-.0400	.027	.056	-.165	-.082	.106	.1411								
Cash	-.4434	-.4106	.277	.577												
Q	.0177	.0164	-.011	-.023												
Industry growth rate					.0001	.0001	-.0001	-.0001								
Firm growth rate					.0277	.0165	-.0186	-.0257								
Age									-.0024	-.0008	.0009	.0023	-.003	-.001	.001	.003
Assets tangibility													.903	.352	-.364	-.891

Note: All marginal effects are derived from an ordered logit model, where a dependent variable is based on liquidity level of the firms as an integer varying from 0 – most financially constraint up to 3 – least financial constraint for firms. The outcome measure in this analysis is financial status – least constrained, likely least constrained, likely most constrained, and most constrained. Our response variable, financial constraint status has a natural ordering from least constrained to most constrained – 0 to 3.

6. Conclusion

Based on the Pakistani listed firm-level dataset over the period 2006–2015, using multiple measures of financial constraints and different methods of estimation, we investigate whether Pakistani firms are financially constrained.

By using q model of investment and ECM, we find strong evidence that Pakistani firms are financially constrained. By dividing firms into size, dividend ratio, and affiliation to group, we find the presence of lending bias among large and dividend paying firms. We find large and dividend-paying firms are financially less constrained as they show low investment-cash flow sensitivity. We do not find the evidence to claim that group-affiliated firms are financially less constrained.

We also use indices and assets tangibility to categorise firms into financial status. We then investigate whether the movement of the indices is consistent with their predictions for the case of Pakistan; more specifically, whether the firms categorised as constrained by these indices show the characteristics that would be associated with difficult access of external finance to firms. Our results indicate the malfunctioning of KZ index for the case of Pakistani firms. One of the most important conditions to function the KZ index does not fulfil, as low cash flow for constrained firms is conditional on high investment opportunities. For the case of Pakistani listed firms, we find that investment opportunities are decreasing in the case of more financially constrained firms. We find WW index and HP index are performing better for Pakistani firms, as the movements of all the variables are in consistent with the indices.

In order to further evaluate these indices and assets tangibility as a suitable measure of financial constraint for Pakistani firms, we regress a firm's financial constraints status on the accounting variables of these indices and assets tangibility. We sort firms into financial constraints status according to the liquidity situation of the firms. After categorising firms into quartiles (least constrained, likely least constrained, likely most constrained, most constrained) on the basis of liquidity ratio, we first regress financial status on five variables of KZ index. We find significant coefficients of cash flow, q, and cash holdings. Moreover, the signs of these coefficients also agree with the index. We then regress financial status on six variables of WW index. For the case of WW index, cash flow, total assets, dividend ratio, debt ratio, and industry growth are significant. However, total assets and industry growth appear with the opposite signs, against the prediction of WW index. For HP index, only age is significant and the sign is consistent with the index. For assets tangibility, the coefficient is significant but appears with a negative sign. We associate the negative sign of the coefficient of assets tangibility with the negative relationship between liquidity holdings and tangible assets of the firms. On the basis of our results, we argue that the results show concisely that accounting variables of WW index are those which associate to financial status of the firms better, even for the case of developing countries like Pakistan.

Data Appendix 2A:

A.1. Table: Industry classification

Industry	Two-digit SIC code	Number of firms	Percentage of entire sample
Food &Tobacco	1,2, 9, 20,21,54	38	11
Basic industries including petroleum	10, 12, 13, 14, 24, 26, 28, 29, 33	54	17
Construction	15, 16, 17, 32, 52	35	10
Textile & Trade	22, 23, 31, 51, 53, 56, 59	135	40
Consumer durable	25, 30, 36, 37, 39, 50, 55, 57, 34, 35, 38	33	10
Transportation	40, 41, 42, 44, 45, 47	11	3
Services	72,73,75,76,80,82,87,89	4	1
Others	No specific SIC code	27	8
Total Sample		337	100

Data Appendix 2B:

B.1. Definition of variables:

I_{it}: Investment is measured as the change in real tangible fixed assets plus depreciation.

CF_{it}: Cash flow is defined by ORBIS as net income for the year plus depreciation.

K_{it}: Capital is measured by real tangible fixed assets.

Q: Q is defined by ORBIS as ratio of market value of the firm over total assets.

$S_{it.}$ Sales is the real net sales defined by ORBIS.

Total assets: Book value of total assets.

Dividend: Dividend is proxied by cash dividend paid by the firm.

B.2. Definition of components of KZ index:

Cash flow: Ratio of cash flow to capital.

Q: Ratio of firm's market value over total assets.

Total Debt: Ratio of real long-term debt over capital.

Dividend: Ratio of cash dividend payment to capital.

Cash: Calculated by cash in hand of the company.

A.2 Summary statistics of components of KZ index

	Obs	**Mean**	**Std. dev**	**Min**	**Max**
Debt/K	1532	.2412593	.4389543	0	13.37691
Cash flow/K	1532	.1700263	.2755706	-1.360872	2.194326
Dividend/K	1532	.0503124	.1504398	0	2.344669
Cash/K	1532	.1108145	.3742479	3.71e-06	5.474133
Tobin's q	1532	.5147676	.9924327	.004	12.58

B.3. Definition of components of WW index:

CF_{it}: Ratio of cash flow to total assets.

$DIVPOS_{it}$: Dummy variable equal to 1 if firm pays dividend, and 0 otherwise.

$TLTD_{it}$: Ratio of long-term debt to total assets.

$LNTA_{it}$: Natural log of total assets.

$ISG_{it:}$ Firm's two-digit industry sales growth.

$SG_{it:}$ Firm's sales growth.

A.3: Summary statistics of components of WW index

	Obs	Mean	Std. dev	Min	Max
Debt/assets	1532	.1457129	.2129914	0	5.189272
Cash flow/assets	1532	.0708944	.1132141	-1.113075	1.423806
Div dummy	1532	.5685379	.495442	0	1
Firms sales growth	1532	.2556751	7.760929	-1	302.1199
Industry sales growth	1532	.0512842	.1687316	-.7831785	.718526
Ln (Total assets)	1532	14.94245	1.391673	9.327146	19.33008

B.4. Definition of components of HP index:
Age: Calculated by firm's year of incorporation.

Size: Calculated by log of book value of total assets.

A.4: Summary statistics of components of HP index

	Obs	Mean	Std. dev	Min	Max
Age	1532	27.69909	8.550854	1	35
Ln (Total assets)	1532	14.94245	1.391673	9.327146	19.33008

Chapter 3: Financial Constraints and the Export Participation Decision for the Case of Pakistani Listed Firms

1. Introduction

Exporting has been considered a significant driving force of economic growth. Export exerts positive externalities for the domestic economy in the form of economies of scale, technological spillovers, reallocation of existing resources, and participation in the world economy. The impressive examples of China, Hong Kong, Singapore, and the Republic of Korea further support export-led growth hypothesis. Policy makers across the globe are making an effort to accelerate the implementation of trade promotion policies. In this regard, understanding the significance of determinants of export decision of the firms is second to none.

Contemporary development in trade has considered sunk start-up costs and productivity differentials as prominent factors behind a firm's decision to export (Roberts and Tybout, 1997; Bernard and Wagner, 2001; Bernard and Jensen, 2004). According to these studies, firms counter the challenge of sunk cost alongside the contest of size, age, and productivity for entering the foreign market. Exporters are paying an entry cost, which consists of accumulating information on foreign market, establishing new market channels, cost of packaging, and innovations in product quality. Consequently, only profitable firms that can bear the sunk cost enter the foreign market to compete for foreign products. Emerging literature has recently provided the foundation of the relationship between financial health and export behaviour of the firm (see for example Chaney, 2005).

Das et al. (2007) estimate the size of sunk costs for Columbian firms at around 400,000 US dollars. This study further explains that existing exporters, who have paid sunk costs, have a 70 per cent higher probability to export to foreign markets. In addition to sunk entry costs,

exporters also need to pay trade costs, which include transportation costs, policy barriers, information costs, contracts, and currency costs. In order to fulfil all these expenditures, financially constrained[23] firms would not be able to bear the sunk costs to fulfil the requirements of the foreign market.

A number of attempts have been made to explore this relationship, but there is still a dearth of empirical studies in this context for developing economies. This chapter endeavours to fill this gap by using a sample of firm-level data for Pakistani listed firms for the period of 2006 to 2014. Pakistan may be taken as a suitable region to conduct this study for the following reasons: first, the unsatisfactory export share to its GDP, with 12.3 per cent to GDP in 2014, which makes it important to examine the role of finance for boosting export level of the firms. Second, Pakistani financial markets are still underdeveloped. The study conducted by Saeed and Sameer (2015) highlights that even large listed firms are financially constrained in Pakistan; therefore, the study exploring the need for finance for the decision to export will have significant policy implications.

We examine the significance of being financially less constrained to the extensive margin of export for Pakistani firms by using measures of financial constraints. We introduce financial constraints as a factor of firm's heterogeneity in the literature of determinants of export participation decision. A number of studies have empirically tested the relationship between financial condition and export decision of the firm (such as Greenaway, et al., 2007; Bellone, et al., 2010; Nagaraj, 2014; Kiendrebeogo and Minea, 2017). In doing so, these studies have mainly relied on liquidity ratio and leverage ratio to see the role of finance in export decision. We argue that previous studies mainly rely on measures of financial health but not on the

[23] A firm is called financially constrained if the cost of external funds stops the company from undertaking the investment project. In other words, the cost of internal and external finances is not perfectly substituted (Kaplan and Zingales, 1997).

measures of financial constraints. These two measures have been criticised in the literature on the following bases: first, a firm's high level of liquidity does not refer a good financial situation of the firm. Almeida et al. (2004) report that financially constrained firms are inclined to hoard more cash. This study proves theoretically and empirically that financially constrained firms increase their propensity of cash in the case of macroeconomic shocks. Increase in liquidity cannot necessarily be associated with being less financially constrained. Second, there is no clear theoretical foundation of a relationship between liquidity ratio and financial constraints, or a relationship between leverage ratio and financial constraints (Bellone, et al., 2009). Third, these two measures have been better known as measures of financial health rather than measures of financial constraints (Almeida, et al., 2004)[24]. Fourth, access to external finance (debt) means firms are financially less constrained as they have easy access to external finance, but, according to the literature, firms are considered financially constrained if they have higher leverage ratio, which creates doubts against the applicability of this measure. Critics argue that leverage and liquidity ratios are not representing the condition of financial constraints (where firms are just running out of enough funds to finance investment). Therefore, we introduce the latest measures of financial constraints to investigate the relationship between financial constraint and export decision of the firms. These measures are WW index and asset tangibility[25].

Moreover, Bellone et al. (2009) have used an index, given by Musso and Schiavo(2008), to calculate firm level of financial constraints[26]. Our study uses WW index and assets tangibility

[24] We can differentiate financially weak firms from financially constrained firms as follows: financially weak firms are those that are on the verge of collapse or bankruptcy. On the other hand, financially constrained firms are those firms that are running out of funds but can still be financially healthy.

[25] WW index is a measure to calculate financial constraints given by Whited and Wu (2006) – a combination of six significant financial variables of the firm. Assets tangibility is a measure of financial constraint given by Almeida et al. (2004), which measures a firm's financial condition with its level of tangible assets.

[26] This index is not popular in the literature of the study. It is built on seven different variables, which have been selected on the basis of their performance and the level of comfort to access the external funding.

to measure financial constraints. These measures are more comprehensive than the index given by Musso and Schiavo(2008). Judging by the Google Scholar citations, the WW index is the most popular among our measures, followed by assets tangibility, HP Index (Hadlock and Pierce, 2010) and then Musso and Schiavo(2008) index.

We argue that it is important to see whether firms should be financially healthy or financially less constrained to export to foreign export market. We believe that leverage ratio and liquidity ratio are better to visualise firms' financial policies. We also use leverage ratio and liquidity ratio alongside WW index and assets tangibility for comparison.

The previous literature has mainly used random-effect probit, fixed effect, and first-differenced GMM to estimate the determinants of export market participation decision. The reasons to choose these estimators in the literature are the binary nature of dependent variable and omitted variable bias in terms of firm-level unobservables (e.g. Nagaraj, 2004; Greenaway, et al., 2007; Bellone, et al., 2009). However, we argue that these three estimators have limitations to estimate such a type of empirical model. First, one of the assumptions upon which Random Effect depends, demand plant-related effect should be uncorrelated from the regressor. Therefore, Random Effect will become an unsuitable estimator in this case (Wooldridge, 2002). Second, fixed effect may give biased parameter estimates, especially for the coefficients on the lagged dependent variable (Wooldridge, 2002). We have lagged dependent variable in our model as current export decision may depend on previous year firms' export status. Third, first-difference GMM may fail to properly capture the curvature of the regression function in the proximity of 0 and 1 due to the binary nature of dependent variable (Greenaway, et al., 2007). The dependent variable in our empirical model is of binary nature. Given the shortcomings of each estimator which has been used in the

literature, we will use Random logit model to estimate our empirical specification. However, to get robust results when neither of the estimator is free from limitations in our case, we will prefer to estimate the effects of financial constraints on export decision with four different estimators; Random logit model, Random Probit model, System GMM and Fixed effects.

This chapter addresses four fundamental questions related to international trade and finance. First, are exporters different from non-exporters in the context of finance? Second, is the financial condition of a firm a significant determinant of export decision? Third, does the financial condition of the firm improve before entering the international export market? Fourth, does international trade improve the financial condition of the firm after entering the export market? The above questions are tested by using a sample of firm-level data for Pakistani non-financial listed manufacturing firms for the period 2006–2014. We find that exporters are categorically different from non-exporters in terms of finance, and a firm's financial status is an important determinant of its export market entry decision. Our study also highlights that being financially less constrained is more important for the firm's decision to enter the export market than being financially healthy. For the case of developing countries, the measures of financial constraints are more appropriate to highlight the position of finance for export decision. Consistent with previous studies, we find some evidence that export starters' financial statuses differ from non-exporters before entering the export market because of sunk cost requirement. Likewise, our results do support the findings of previous studies that exporting does not bring financial benefits to firms in the short run.

The remainder of the chapter is organised as follows: in the next section we give a concise overview of Pakistan's international trade trends. In section 3, we review theoretical and

empirical literature. Section 4 builds hypothesis, informs about dataset, and gives summary statistics. Section 5 presents empirical results of our study. In section 6, we conclude.

2. Exports in Pakistan

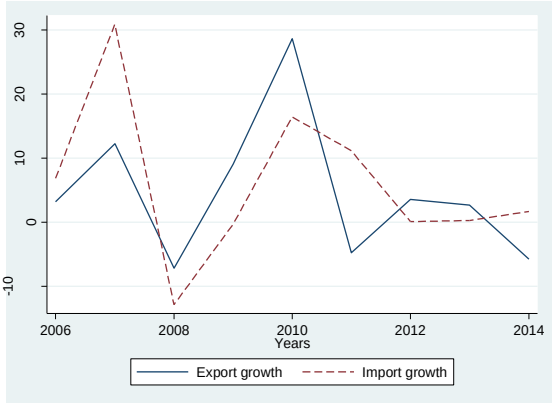
The exporting sector of Pakistan has not shown a good performance since its independence in 1947. Except for the first nine years of favourable balance of trade, the performance of international trade remains disappointing. This section gives a brief review of the trends and patterns of the trade of Pakistan as a background of our empirical study.

Figure 3.1 shows annual growth rate of export and import for the period 2006–2014. The average annual growth rates for exports and imports are 5 per cent and 6 per cent between 2006 and 2014 respectively. The trends in export and import growth rate remain very unstable during this period. Between 2006 and 2008 the import growth rate is higher than export growth rate but between 2008 and 2010, export growth rate remains higher than import growth rate. The export growth rate starts to fall down sharply in 2011, even though it starts to increase in coming years but still could not get the height it got in year 2010. We relate this instability in export growth rate with political turmoil and energy crisis of the country. Figure 3.2 and figure 3.3 show contributions of trade to the GDP of the country. The trade share of GDP grows between 2006 and 2007, but it starts to decline afterwards. If we look particularly at the per cent share of exports to GDP during this period, in figure 3.3, it remains unstable, with a dramatic decline between 2006 and 2009.

Figure 3.4 reports the trade balance of Pakistan between 2006 and 2014. Pakistan continues to run a trade deficit. We may relate this poor condition of trade of balance, which mainly emerges after 2000, to a number of geopolitical circumstances of the country. A poor security situation, continuous terrorist attacks, meagre law and order conditions, and an energy crisis, on the one hand, while participation with the world in the war against terrorism, on the other hand, reduced foreign direct investment inflow to the country and slowed down the domestic industrial sector performance manifold. This all turned in to the worst ever balance of trade situation in the country in 2000s.

Figure 3.5 highlights the structure of the export sector of the country. It tells the share of different sectors in total export in per cent. P stands for primary products. SM stands for semi-manufactured products. M stands for manufacturing items, and O stands for the rest of the items. Pakistan's export mainly depends upon manufactured goods, while the share of raw and semi-manufactured goods to overall export is very low. The contribution of the manufacturing sector to overall export of the country is the highest when compared to the contribution of other sectors, and was around 55.4 per cent in 2014. This poor and unstable export sector performance requires effective policy measures to promote development in Pakistan.

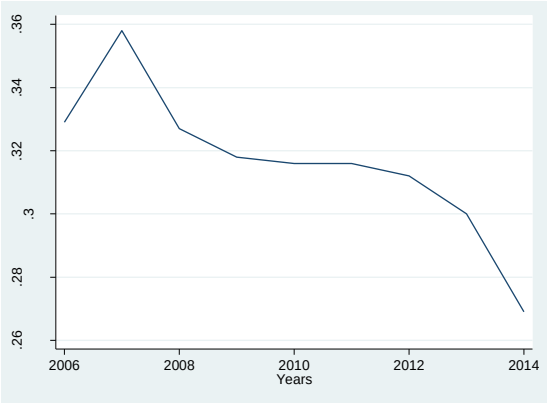
Figure 3.1: Export and import growth rate(million U.S.$)



Source: Pakistan Bureau of Statistics and author's calculation

Web link: www.pbs.gov.pk/trade-tables

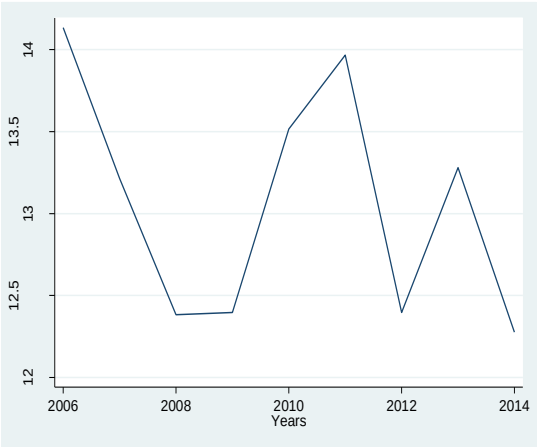
Figure 3.2: Trade to GDP ratio



Source: World Bank database

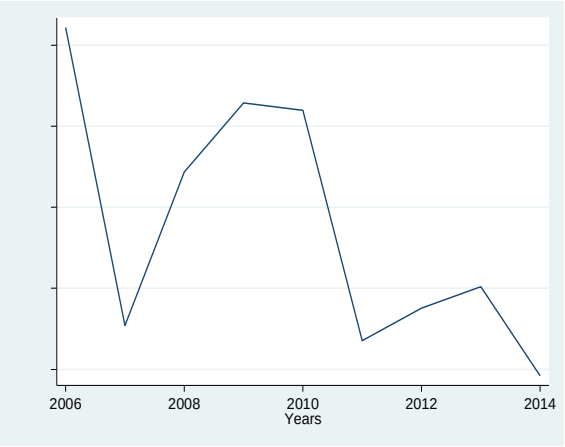
Web link: http://databank.worldbank.org/data/home.aspx

Figure 3. 3: Exports of goods and services(% of GDP)



Source: World Bank database

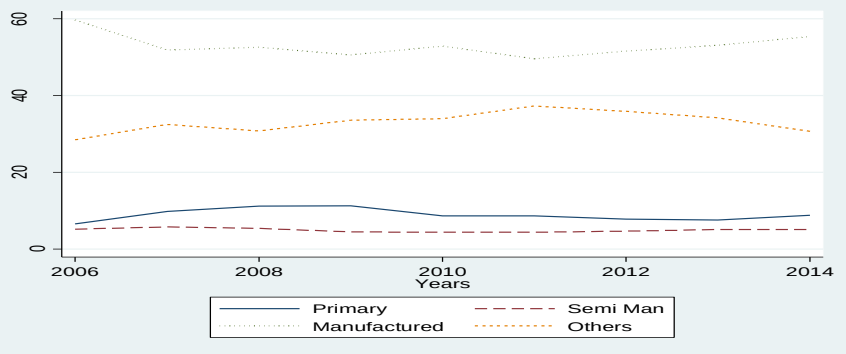
Figure 3.4: Trade balance (million U.S.$)



Source: Pakistan Bureau of Statistics and author's calculation

Web link: www.pbs.gov.pk/trade-tables

Figure 3.5: Composition of export



Source: Ministry of Finance Pakistan Economic Survey (06-14)
Weblink:http://data.worldbank.org/indicator/BX.KLT.DINV.WD.GD.ZS

3. Financial Constraints and Export: Literature Review

The significant role of finance for the investment of the firm provides insights to explore the role of finance as a determinant of export. Researchers have widely discussed firm heterogeneity and the role of fixed costs with other determinants of the export decision. However, there are only a few studies examining the interaction between financial constraints and foreign export decision at a firm's level. This section of the chapter will briefly review existing literature on the determinants of foreign export decision of the firms in general, and finance as a determinant of export decision in particular.

3.1 Firm heterogeneity and the role of fixed cost in export decision

Firm heterogeneity in terms of size, quality of work force, productivity, and financial health has been considered the determinant of the export decision in the literature. Previous evidence shows that exporters are different from non-exporters as the former are more productive, larger, and are capital intensive and technology intensive. Bernard and Jensen (1999) find in their sample of US firms that labour productivity is 12 to 24 per cent higher and capital intensity is 7 to 22 per cent higher in exporters as compared to their counterpart firms. This study also highlights that exporters start to perform excellently before entering the foreign market.

Besides these superior characteristics, exporters are also considered financially healthier (Greenaway, et al., 2007; Bellone, et al., 2009), as firms overcome the challenge of sunk cost alongside the contest of size and age for entering the foreign market (Roberts and Tybout,

1997). This empirical study develops a dynamic model of the export decision of a profit-maximizing firm. It further proves that prior export market experience positively affects the current decision to export. However, this effect lessens quickly over time. The probability of plant to export is increased by 60 per cent in the current year among previous exporters. If the plant remains outside the foreign market for two years, its probability of exporting in the current year differs from the non-exporters. This difference in probability of exporting is mainly due to paying sunk cost.

Bernard and Wagner (2001) also verify that successful firms export. This success is not only in the level of productivity, in terms of quality of labour and size, but also in terms of financial condition, as firms have to pay sunk cost to enter the foreign export market. By using dynamic binary choice model of the decision to enter the foreign export market, Bernard and Wagner (2001) unveil the substantial entry cost for entrance to the market. Moreover, previous exporting experience increases the probability of current exporters by 50 per cent in this study.

3.2 Theoretical base of nexus between financial constraint and export

So far, we have seen different determinants of export decision – how exporters perform differently to non-exporters. The second part of the literature sheds light on the interaction between firm level of liquidity and international trade. Two theoretical models of heterogeneity of firms have been developed by Eaton and Kortum (2002) and Melitz (2003). Both models show a differentiation in firms because of productivity differences.

Only productive firms, which may bear the fixed costs associated to foreign export, will proceed (Melitz, 2003). Melitz uses a monopolistic competition framework and fixed costs related to export to develop a dynamic industry model with heterogeneous firms. His model shows how only more productive firms can export to foreign market as compared with less productive firms. This phenomenon induces a reallocation of market shares towards the more productive firms because of gaining additional export sales. Likewise, profits are also reallocated to more productive firms. This model of trade, integrating a firm's diverse productivity level, under the assumption of monopolistic competition and highlights the significance of firm heterogeneity and sunk cost as determinants of a firm's export participation decision.

Chaney (2005) extended the model of Melitz (2003) to include the effect of liquidity constraint. In addition to the already existing concept of trade hysteresis in literature, Chaney (2005) connected liquidity constraint to firm heterogeneity. The most productive firm earns more profit from extended sales to conquer any liquidity constraint. On the other hand, the less productive firm would be inhibited to enter the market because of the liquidity constraint. A firm faces two kinds of costs to gain access to foreign markets: fixed cost and variable cost. The firm that intends to export need to pay an entry cost. Subsequently, the prospect exporter has to bear both domestic and foreign expenses. This fixed entry cost includes the expenses to get foreign market information, setting up a distribution network, and so on. The model sets up two productive thresholds for exporters and non-exporters. Non-exporters must have non-negative profits from domestic sales to survive, while exporters must also have non-negative profits in the foreign market to continue export. Both heterogeneity and monopolistic competition create this division between exporters and non-exporters. As the firms are in

monopolistic competition, the elasticity of substitution between varieties determines the export decision. While incorporating the concept of liquidity constraint, the model assumes that a firm faces liquidity constraints only for exporting activities, as domestic investors do not trust firms for exporting to foreign market. On the other hand, foreign investors are also not willing to finance domestic exporters. Firms may become financially constrained to cover fixed entry cost to foreign market from their domestic sales.

3.3 Empirical evidence

Indirect test of financial constraint and export

Financial development, specifically access to external finance, predominantly influences trade balance and export shares in manufacturing firms. Beck (2002) tests the hypothesis that countries with more sophisticated and developed financial institutions have a higher volume of export share and trade balances for the sample of the manufacturing sector. This study works on the sample of 65 countries over the period of 30 years from 1966 to 1995. The theoretical basis of Beck's (2002) uses savings to the private sector as a proxy of efficiency of the financial sector. The results of this study show that efficiency of financial sector reduces liquidity constraints of manufacturing firms. This may enhance the specialization of the economy and emergence of economies of scale. This process gives manufacturing firms a comparative advantage over financially constrained firms. The empirical test of this study assumes that manufacturing firms experience higher scale of economies in comparison to their counterparts, with credit to the private sector as a share of GDP is taken as a proxy of financial development. Manufactured exports, imports, their differences relative to GDP, and the share of manufactured exports (imports) in total merchandise exports (imports), are taken as a proxy of trade in manufactured goods. To estimate the empirical model, this study uses

GMM and dynamic panel techniques. The results highlight that countries with developed financial institutions are having higher export shares.

Another study investigating the relationship between a firm's status of trade and a firm's financial status is given by Campa and Shaver (2002). This study highlights that there is not only a one-way relationship between a firm's specific characteristics[27] and the decision to start export. Exporting may also positively affect a firm's capital investment. By using the data of Spanish manufacturing firms, the study compares the level of liquidity constraints between the set of exporters and set of non-exporters over the entire sample period. The results indicate more stable cash flow and capital investment among exporters in comparison to the group of non-exporters. The more stable cash flow of exporters is associated with the diversification benefit of selling in different nations. In return, the financial condition of exporting firms becomes more stable after exporting to international market.

Guariglia and Mateut (2010) check the effect of being an exporter and foreign-owned on the financial health of the firms. This study uses inventory investment rather than fixed investment. The reasons to choose inventory investment include high liquid and low adjustment cost in applying inventory items, and higher chances of fixed investment equation to suffer from misspecification due to measurement error in q. The study investigates the role of global engagement status of firms on their financial health over a large panel of UK manufacturing firms between 1993 and 2003. They find that financial factors affect the inventory investment, but only for those firm years when these firms export, which means

[27] i.e age, productivity and size.

that exporting helps exporters to alleviate the level of financial tensions of their balance sheet.

Global engagement and financial variables play a pivotal role in firm survival probability. By using a sample of 9420 UK firms for the period 1997–2002, Bridges and Guariglia (2008) explore the link between global engagement and firm survival probabilities. They highlight two sources of global engagement: one is foreign-owned and the other is export. They find that financial health matters for the firm's survival regardless of their relation to global entities, but when the sample is divided according to ownership, they find that financial factors are not affecting firm survival if they are globally engaged, which means globally-engaged firms are not letting firms be financially constrained, and increase their chances of survival.

Global exchange of goods and services mainly depends upon the efficient financial markets. Manova (2013) applies the heterogeneous-firm model with cross-country differences in financial development and cross-industry variation in financial vulnerability over a panel of bilateral trade for 27 industries. She finds the export rate of financially developed countries is higher in intangible assets and external capital. Moreover, economies with weak financial institutions are exporting to fewer destinations and have fewer product varieties, which, in turn, reduce the overall volume of trade.

Although the above studies are not directly scrutinizing the relationship between financial constraint and export, these studies shed light on the relationship between financial development and international trade as a foundation of our empirical study.

Direct test of financial constraint and export

Greenaway et al. (2007) investigate the relationship between firms' financial health and their decision to export to foreign markets, for the sample of UK manufacturing firms between 1993 and 2003. This study uses leverage ratio[28], liquidity ratio,[29] and firm's riskiness[30] as measures of a firm's financial health. The results show that exporters are more liquid and less levered, meaning exporters are less financially constrained. This study further explores the difference between continuous exporters and entrants in terms of financial situation, where the entrants are found to be financially weak. The weaker financial situation of starters is associated with payment of sunk cost in comparison with continuous exporters. Furthermore, ex-ante financial advantage of future exporters was not found, but ex-post financial advantages over exporters are clearly found. This study concludes that continuous exporters undoubtedly possess lower leverage and higher liquidity, proving that exporters are less financially constrained.

Bellone et al. (2010) further attempt to answer whether less financially constrained firms determine the decision of firms to start exporting, making firms less financially constrained. Based upon Chaney's (2005) model, Bellone et al. (2010) conducted an empirical study for French manufacturing firms between 1993 and 2005. By using a different measure of financial constraint based upon Musso and Schiavo (2007) (alongside leverage and liquidity ratios), this study finds that financially stable firms are more inclined to export. Moreover,

[28] Leverage ratio = firm's short term debt/firm's current assets.
[29] Liquidity ratio = (firm's current assets – current liabilities) /firm's current assets.
[30] Firm's riskiness is measured by labelled Quiscore. This measure is based upon the information related to firm's credit rating and probability of company's failure in last 12 months.

the study rejects the argument that exporting impedes financial restraints of the firms in future.

Muûls (2015) checks the effect of credit constraint on the dynamics and growth of 9000 Belgian manufacturing firms between 1999 and 2005. He examines the impacts of credit constraints on destinations of export, volume of export, and number of exporting products of the exporters. Coface is used as a measure of credit constraints[31]. This study finds that less financially constrained firms explore new destinations of export, and therefore have access to multiple foreign markets. This study further proves the validity of pecking order theory of trade that less constrained firms will export to the less developed and furthest economies.

More recently, Nagaraj (2014) has examined the impact of financial constraint on extensive (new exporters) and intensive margin (volume exported by exporters) for the Indian economy. This study also uses liquidity ratio and leverage ratio as measures of financial constraints. The results support the importance of financial smoothness for decision to export. This study does not find evidence for the role of financial health on the volume of export of already exporting firms.

Impact of export promotion activities and ownership on firm export

Export promotion activities help firms to enter the foreign market. Zia (2008) uses loan-level dataset for the textile sector of Pakistan to check the role of subsidized credit in alleviating

[31] Coface is a direct measure of credit worthiness used by financial institutions while lending loans.

financial constraints at firm level; moreover, how competently this credit is distributed to targeted firms. Firms are considered financially constrained if their export level is sensitive to subsidized credit. The study examines the effects of subsidies, which are ceased for a particular commodity of textile firms. The results show a decline in export of that particular cotton product as a result of the removal of subsidized credit. However, this effect was heterogeneous across different kinds of firms. Large listed firms remained unaffected as their export level remained the same, while the export level of private firms was substantially influenced. Even in the subsample of private firms, the small private firms are found to be more financially constrained as these firms' export levels declined considerably. In addition, this study underlines the misallocation of export subsidies in Pakistan. These export subsidies have been provided to the firms that are not actually financially constrained.

Multinational companies are considered a natural channel of foreign market information, such as foreign consumers and foreign technology. Aitken et al. (1997) support the presence of multinational companies in the industry, as these promote the probability of export for other firms in the same industry.

Greenaway et al. (2004) explore the premise given by Aitken et al. (1997) for the case of the UK firms. This study supports the existing argument that multinational companies (MNCs) help the firms to start exporting in host countries via demonstration effect, exporting strategies and techniques. They also regard export spillover as the secondary determinant of export decision, as these spillovers are an indirect conduit through which MNCs increase a host country firm's productivity.

Li and Yu (2009) explain the positive role of a foreign-owned firm to increase the export level of the firm. They highlight the fact that foreign-owned firms depend less on domestic financial intermediaries for funding, but easily get funding from a foreign parent firm in the time of need. The empirical results of this study show that foreign-affiliated firms are less dependent on domestic external funding and export more.

Manova et al. (2015) find that foreign affiliated exporters export 62 per cent more and joint ventures export 50 per cent more than domestic firms. In addition, this study examines the effect of financial frictions on different trade margins. They find that financial frictions reduce exporters' global sales, product variety, number of destinations, and sales within each destination.

4. Empirical Methodology and Data

4.1 Estimation methods

As the literature has already shown that exporters are different from non-exporters in terms of size, age, and productivity based upon the theoretical arguments given by Chaney (2005), we will examine if there is a difference in terms of level of financial constraints too. We compare the difference between exporters and non-exporters by following Bernard and Jensen (1999). We estimate the following model by pooled (OLS) estimator:

$$\ln X_{it} = \beta_0 + \beta_1 \text{Expdum}_{it} + \beta_2 \text{age}_{it} + \beta_4 \text{Size}_{it} + \text{dummies} + e_{it} \qquad (1)$$

Where i and t denote firm and year; X_{it} is one of the four proxies of financial measure: WW index, assets tangibility, leverage ratio, and liquidity ratio; Expdum is a dummy variable equal to 1 when firm exports and 0 otherwise. We include age and size to control the size and age. We also include industry, time, and regional dummies to control for industry, time, and regional specific effects.

We then estimate the empirical model for the determinants of the export decision of the firms. Following Bellone et al. (2010) and Nagaraj (2014), we model the firm's export decision as:

$$\text{Expdum}_{it} = \alpha + \beta_1 \text{Expdum}_{i,t-1} + \beta_2 \text{Size}_{I,t-1} + \beta_3 \text{Wage}_{i,t-1} + \beta_4 \text{TFP}_{i,t-1} + \beta_5 \text{Age}_{it} + \beta_6 \text{Subsid}_i + \beta_7 \text{Fin}_{i,t-1} + \text{Foreign dummy}_i + \beta_8 \text{dummies} + e_{it} \quad (2)$$

Expdum_{it} is a dummy representing a firm's export status, which is equal to 1 if the firm exports and 0 otherwise. We also include lagged dependent variable in our model. Those firms that were already exporting in previous years will not bear sunk cost in the current year; this may create a dependence of current year exporting on the previous year exporting status. Age, size, wage, and productivity are used as controls in export decision (e.g. Bernard and Wagner, 2001; Bernard and Jensen, 1999; Isgut, 2001; Melitz, 2003; Bernard, et al., 2007). Size is measured by the natural log of number of employees. We expect a positive link between a firm's size and a firm's decision to export. Age is calculated by the current year minus the year of incorporation of the firm. Wage rate is calculated by natural log of cost of employees. TFP is a natural log of total factor productivity. To estimate TFP, we use dynamic production function derived from Cobb-Douglas production function. The details of the TFP

estimation are described in appendix 3B.3. In the literature, productivity is positively related to export decision. Subsid s a time-invariant dummy variable that is equal to 1 if the firm has more than 1 business unit, and 0 otherwise. We include this variable as a firm with subsidiaries is considered extensive and affects the firm's decision to export. By following the literature by Bellone et al. (2009), we expect a positive link between a firm's dummy of subsidiaries and a firm's decision to export.

We also include foreign ownership dummy, and regional, time, and industry dummies. Firms with foreign ownership, and located in more developed regions, are more likely to export; therefore, we also include foreign ownership dummy and regional dummies to control for these effects. Foreigndum is a time-invariant dummy variable equal to 1 if the firm is foreign-owned. By following Saeed and Sameer (2015), we define a firm as foreign-owned if it has 50 per cent or more foreign shareholders. We expect that foreign ownership has a positive impact on firms' exporting decisions. We also include regional dummies. We expect that firms in large provinces (Punjab and Sindh) to be larger, older, and more productive. The dummy variables for these regions are expected to be positively associated with the export decision. We also add industry dummies to control for sectorial fixed effects. Time dummies are also added to control for business cycle trends and effects.

Our main variable of interest is $Fin_{i,t-1,}$ which is the indicator of a firm's financial constraint. These are measured by WW index, assets tangibility, leverage ratio, or liquidity ratio. The higher the value of WW index, the more a firm is financially constrained (Whited and Wu, 2006). We expect WW index to negatively relate to the decision to export. Almeida and

Campello (2006) argue that firms with more tangible assets are less likely to be financially constrained. We expect a positive relationship between a firm's tangible assets and export decision. Firms are considered less financially constrained if they have higher liquidity ratio and lower leverage ratio in the literature (such as Greenaway, et al., 2007). However, our study argues that these two variables proxy for financial health; therefore, we will see how they perform in our case.

To address the issue of endogeneity, we lagged all the explanatory variables once, except for time-invariant variables, to control for the possibility of endogeneity as a general practice in literature (such as Bernard and Jensen, 1999; 2004; Greenaway, et al., 2007; Nagaraj, 2014). We use fixed effect to control the issues of correlation between firms observed characteristics and firm's unobservable. We also use Random Probit effect and Random Logit effect estimators as our dependent variable, exporting decision, is a binary variable. However, firm's current period probability to export correlates to previous year's export status as existing exporters do not need to pay sunk cost in the current year. This may cause endogeneity because of autocorrelation between the errors. Therefore, we will also estimate the empirical specification with system GMM given by Arellano and Bover (1995) and Blundell and Bond (1998). By accumulating an additional assumption of uncorrelation between the first differences of instrument variables and fixed effects, Arellano and Bover (1995) and Blundell and Bond (1998) improve the efficiency of original difference GMM (Roodman, 2009) in System GMM. Even though, these estimators have limitations too to estimate this kind of empirical model[32]. To get the robust results, we estimate our empirical

[32] Due to the binary nature of the dependent variable a pooled probit estimator, which controls for clustering, has been used by Greenaway et al. (2007). However, clustering observe the fact the observations within the same firms are not independent. Hence, unobserved heterogeneity is not fully controlled in Pooled Probit. Random effect takes the unobserved heterogeneity into account; however, the random effect probit requires that firm

specification with these all estimators; fixed effect model, System GMM, Random-probit and Panel - logit model.

We then compare the ex-ante financial situation for export starters and non-exporters. In doing so, we will have a deep insight into the role of financial status in exporting. The aim is to find out whether entrants become less financially constrained up to two years before entering export markets. The econometric specification is taken from Bernard and Jensen (1999) and Bellone et al. (2007). We only focus on non-exporting firms and export starters for their level of financial status one and two years before starting export. Hence, t is the year when a firm enters into the foreign market. We estimate the following specification:

$$\mathrm{Fin}_{i,t-s} = \alpha + \beta\,\mathrm{Starters}_{it} + \Upsilon\,\mathrm{Size}_{i,t-s} + \eta\,\mathrm{TF\,P}_{i,t-s} + \varepsilon it \quad (3)$$

Where Fin is one of our four measures of financial status. Starters is the dummy for export status where the firm does not export in the first year and switches only once in the remaining period. Size is number of employees, and TFP is total factor productivity. These are firm-specific controlled variables. Time dummies and industry dummies are also included.

specific unobserved effects are uncorrelated with the regressors. The standard estimator that is used to eliminate the potential bias caused by omitted heterogeneity is the fixed effect estimator (Wooldridge, 2002), although fixed effects gives biased and inconsistent parameters estimates, especially for the coefficients on the lagged dependent variables. GMM has also been used in panel data when the model includes a lagged dependent variable along with an unobserved effect (Wooldridge, 2002). However, GMM may fail to properly capture the curvature of the regression function in the proximity of 0 and 1. Greenaway et al. (2007) has used first difference GMM to estimate export decision (binary dependent variable).

Finally, to check whether exporting improves the financial condition of the firms after entry, we focus only on the starters and non-exporters to check for the ex-post advantages that exporting might provide to exporters in terms of financial benefits. We follow Bernard and Jensen (1999) and Bellone et al. (2010) and estimate the following model:

$$\Delta FIN_{i,\frac{t}{t+s}} = \alpha + \beta Starters_{it} + \Upsilon Size_{it} + \eta TFP_{it} + \varepsilon_{it} \quad (4)$$

Where $\Delta FIN_{i,\, t/t+s}$ captures the change in financial variable between t + s and t period. Here, s varies between t+1 and t+3 as t is the period when the firm starts exporting. Starter is the dummy indicating export status. The other control variables are size and productivity. We also include time and industry dummies in the estimated specification. β is our key coefficient of interest in equation 4, which shows the growth in the exporting firm's financial status in comparison to non-exporters.

4.2 Measures of financial constraints

The first measure of financial constraint for this empirical study is WW index, developed by Whited and Wu (2006). We use this index as it is built on the structural model of financial constraints rather than on the traditional regression of investment on Tobin's q, as there is a measurement problem with Tobin's q (Erickson and Whited 2000; Bond and Cummins, 2001)[33].

Our second measure of financial constraint is taken from the concept of asset tangibility, which is given by Almeida and Campello (2006). Their theoretical argument considers

[33] The calculation of WW index is provided in chapter 2.

tangibility of a firm's assets is the factor that encourages external financing because of having the ability to reduce the contractibility problems[34].

Leverage and liquidity have been widely used before as proxy for financial health in literature. We also use these two measures in our study to compare the results. Leverage ratio is measured by ratio of short-term debt to total assets. Liquidity ratio is measured by ratio of total current assets minus current liabilities to total assets.

4.3 Data

The main source of data collection remains the same as explained in chapter 2. For this chapter, we exclude transportation and public utilities, services, public administration, and non-classifiable establishments from the sample to concentrate on the manufacturing sector only. The detailed industry classification is given in appendix 3B.2. We only look at firms with positive values of sales, capital, and total assets. We include only those firms that have observations for a minimum of two consecutive years. The final sample consists of an unbalanced panel of 1316 firm-year observations of 298 firms for the period 2006–2014.

Since this database does not provide export sales information, we collect this information from annual financial reports' analysis of companies, and merge them into the firm data.[35]

[34] The calculation of asset tangibility is provided in chapter 2.

[35] State bank of Pakistan provides financial statement analysis of non-financial KSE listed firms from 1999 to 2014. Hence, statements reporting export sales are available only until 2014 at the time when study was conducted.

4.4 Summary statistics

Table 3.1 reports mean and standard deviation for the entire sample and for the exporters and non-exporters for main variables. It also reports mean differences for the exporters and non-exporters. Column 1 refers to the entire sample; column 2 refers to firms that export to the international market; column 3 refers to firms that never exported in the entire sample period; and column 4 reports the mean difference between exporters and non-exporters. Summary statistics confirm the stylised facts found by others in the literature, that exporters are different from non-exporters.

At the mean exporters are older, larger, pay higher wages and are more productive, differences in column 4 are also highly significant at the 1 per cent level.

Comparing firms by financial status, the mean difference between exporters and non-exporters on the basis of liquidity is insignificant. However, exporters are more levered; this difference is also statistically significant. Exporters also have a lower WW index and higher assets tangibility. The differences between the mean values are also statistically significant, showing that exporters are financially less constrained.

Comparing firms by ownership, the average export intensity of foreign multinationals are slightly higher than non-exporters, from .07 to .10. Moreover, firms with subsidiaries have a considerably higher intensity to export than single firms do.

Table 3.1: Descriptive statistics for key regression variables

Variables	**Full sample**	**Exporters**	**Non-exporters**	**Mean diff**
		Expdum =1	**Expdum =0**	**(t-statistics)**
	1	**2**	**3**	**4**
Age	35.79	37.0	33.8	-3.21***
	(21.20)	(20.3)	(22.5)	(1.20)

Number of employees	1137.5	1462.5	607.03	-855.5***
	(1809.9)	(2160.6)	(744.2)	(100.0)
Log(TFP)	2.067	2.080	2.05	-.0339***
	(.148)	(.114)	(.190)	(.008)
Real wage	376792.9	449247.4	258547.1	-190700.3***
	(920422.2)	(1111846)	(436922.2)	(52028.5)
Liquidity	.037	.039	.042	.002
	(.285)	(.202)	(.300)	(.014)
Leverage	.209	.236	.165	-.071***
	(.161)	(.154)	(.160)	(.009)
WW index	-.036	-.046	-.019	.027***
	(.077)	(.071)	(.086)	(.004)
Asset tangibility	.980	.988	.968	-.020***
	(.131)	(.115)	(.152)	(.007)
Foreign dum	.089	.1005	.07	-.030**
	(.285)	(.3008)	(.26)	(.016)
Subsidiary dum	.291	.339	.212	-.127***
	(.454)	(.474)	(.409)	(.026)
Observations	1316	816	500	

Note: Standard errors are given in parentheses. Expdum =1 represents exporters. Expdum =0 represents non-exporters. Liquidity ratio is measured by ratio of total current assets minus current liabilities to total assets. Leverage ratio is measured by ratio of short-term debt to total assets.. WW index is summation of six variables: cash flow, dummy of dividend, total debt, firms' sales growth, industry sales growth and total assets. Assets tangibility is summation of inventory, receivables and capital of firms.

5. Empirical Results

5.1 Comparison of exporters and non-exporters in terms of financial condition

To confirm the differences between exporters and non-exporters in terms of finance, we begin by regressing the firm's financial variable on its export status, while controlling the age and size alongside (equation 1). Table 3.2, columns 1–4, presents the results from the estimation of linear probability model (regression 1) by pooled OLS estimator. Column 1 gives the regression results when WW index as a measure of financial constraint is used. The coefficient of export dummy is significant and negative (-.0086), which means exporters are less financially constrained than non-exporters. We also find that age of the firm is also a significant factor of the firm's financial status. Column 2 gives the estimation results using assets tangibility as the measure of financial constraint. The coefficient is significant with a positive sign. It means exporters have higher tangible assets than non-exporters, and are less financially constrained as a consequence. So far, the regression results confirm that exporters are less financially constrained.

Column 3 shows the results for leverage ratio. The results show that exporters are more highly leveraged than non-exporters. It shows that exporters are borrowing extensively, perhaps to pay the sunk cost to enter the export market. It further shows that exporter's financial condition is different from non-exporters. In contrast to previous study (Greenaway, et al., 2007) which was conducted for developed country UK, we find that exporters are highly leveraged in the case of developing country.

Column 4 reports the results when using liquidity ratio as a measure of financial health. We find that exporters are highly liquid. In contrast to the measure of leverage ratio, firms are healthy in terms of liquidity (hoarding cash) in Pakistan.

These results highlight that exporters are financially less constrained as they are able to take out loans. The higher leverage ratio of exporters confirms that exporters are borrowing extensively. Moreover, exporters are more liquid.

Table3.2: Difference between exporters and non-exporters in terms of financial status

	(1) WW index	(2) Tangibility	(3) Leverage	(4) Liquidity
Export dummy	-0.00861**	0.0226**	0.0531***	.0249**
	(0.00404)	(0.00905)	(0.00918)	(.014)
Age	0.000155*	0.000294*	-0.000189	.0009
	(9.01e-05)	(0.000155)	(0.000234)	(.0004)
Log of employees	-0.0404***	-0.00930**	0.00109	.015
	(0.00188)	(0.00438)	(0.00478)	(.008)
Observations	1,310	1,310	1,310	1,310
R-squared	0.443	0.108	0.184	0.137

Note: Standard errors are reported in parentheses. Export dummy is equal to 1 if firm exports and '0' otherwise. *** p< .01 , ** p<.05, * p<0.1. Liquidity ratio is measured by ratio of total current assets minus current liabilities to total assets. Leverage ratio is measured by ratio of short-term debt to total assets.. WW index is summation of six variables: cash flow, dummy of dividend, total debt, firms' sales growth, industry sales growth and total assets. Assets tangibility is summation of inventory, receivables and capital of firms.

5.2 Relationship between financial status and exporting decision

To estimate the effects of financial condition on the extensive margin, we will estimate the linear probability model for equation (2). We report the results acquired by four different estimators: Fixed effect, System GMM, Random probit, and Panel logit model for two measures of financial constraints: WW index, tangibility, leverage, and two measures of financial policies: liquidity ratios in tables 3.3, 3.4, 3.55, and 3.6 respectively.

Table 3.3 reports the results when WW index is used as a measure of financial constraint. We find that lagged export status has a strong and significant impact on the firm decision to export. Size, wage, and productivity are also significant by fixed effect and GMM estimators, but not consistently. Our primary interest is coefficient on WW index. Three out of four estimators give significant and negative coefficients of WW index, confirming firms' level of financial constraint is a significant determinant of export decision of the firms, and exporters are less financially constrained.

Table 3.4 reports the results when assets tangibility is used as a measure of financial constraints. Our key interest is coefficient of assets tangibility. Except fixed effect, all other estimators give significant and positive coefficient of assets tangibility. It proves that exporters are financially less constrained as they do have higher tangible assets to get external funds. Dummy of lagged export status is also consistently significant with positive sign.

Table 3.5 reports the results when leverage ratio is used as a measure of financial policy. Three out of four estimators give significant and positive coefficient of leverage ratio in columns 1, 3, and 4. It means that exporters have higher debt ratio. It shows financial policies of the exporters are different from non-exporters. Exporters are borrowing heavily. This further shows the higher debt ratio of the exporters, showing exporters are not financially healthy. The high debt ratio can be the result to fulfil additional expenditures to export to international market. Our results for leverage ratio contradict to the prediction of (Greenaway, et al., 2007) who find a negative relationship between the propensity to export and leverage ratio for the case of UK firms. However, our study covers the sample of

developing country; therefore, results could differ for the different financial policies of the exporters of developing country.

Table 3.6 reports the results when liquidity ratio is used as a measure of financial health. None of our estimators give significant coefficient of financial variable (liquidity ratio). It shows that Liquidity ratio is not playing a prominent role in a firms' decision to export for the case of exporters in Pakistan. The results contrast the results of (Greenaway, et al., 2007) who find a positive relationship between the firms' propensity to export and firms' liquidity ratio. Our results do not indicate that exporters are holding too much cash or struggling to pay short term debt. So it does not show any different financial shape of exporters as compared to non-exporters in terms of holding liquid assets.

Taken together, our results of empirical specification show that there is an advantage to capturing more comprehensive aspects of financial constraints by using WW index and assets tangibility rather than the measures of financial policies, i.e. leverage ratio and liquidity ratio. Our measures of financial constraints clearly show that exporters are financially less constraints as compared to non-exporters. It further shows easy access of exporters to financial markets to raise external source of funds, as exporters are borrowing heavily. The results also confirm that the role of leverage and liquidity ratios is different in the exporting decision for the case of Pakistani listed firms. Pakistan is developing economy with underdeveloped financial and capital markets; therefore, the implication of financial policies could be different from developed countries. We argue that we uncover the significant impact of being financially less constrained on the export entry decision of firms. WW index and

assets tangibility, as measures of financial constraints, indicate the significant role of being financially less constrained for firms to enter to foreign market.

Table3.3: Determinants of the decisions to export: WW index

	Fixed effect	GMM	Random probit	Logit model
	1	2	3	4
Expdum$_{t-1}$	0.205***	0.542***	2.755***	4.936***
	(0.0701)	(0.0168)	(0.149)	(0.311)
Employee$_{t-1}$	-0.0133	0.0659***	0.0878	0.198
	(0.0511)	(0.0117)	(0.102)	(0.198)
TFP$_{t-1}$	-0.0698	-0.220***	0.381	0.752
	(0.0785)	(0.0534)	(0.841)	(1.649)
Wage$_{t-1}$	0.0144	0.0187***	0.0432	0.0237
	(0.0210)	(0.00314)	(0.115)	(0.215)
Age	0.0737	-0.00119	0.00225	0.00325
	(0.151)	(0.00132)	(0.00302)	(0.00560)
WW index$_{t-1}$	-0.00463	-0.0016***	-0.0720**	-0.141**
	(0.00369)	(0.000475)	(0.0305)	(0.0607)
Foreigndum			-0.104	-0.123
			(0.242)	(0.494)
Subdum			0.280	0.634*
			(0.171)	(0.342)
Sargan(p)		0.06		
AR2(P)		0.607		
Observations	995	995	946	946

Notes: Standard errors in brackets. * Significant at 10%, ** significant at 5%, *** significant at 1%. The Sargan test is a test of the over-identifying restrictions asymptotically distributed as chi-square under the null of instrument validity. AR(2) is a test for second-order serial correlation in the first-difference residuals, under the null of no second-order serial correlation. If the instruments are acceptable, the p-value of Sargan test and AR(2) should be greater than 0.05. The two-step system GMM estimator uses lagged values of all right side variables dated t-3 as instruments. The dummies of foreign ownership and subsidiary are dropped by Fixed effect and GMM due to the time-invariant feature of these.

Table3.4: Determinants of the decisions to export: Assets tangibility

	Fixed effect 1	GMM 2	Random probit 3	Logit model 4
$Expdum_{t-1}$	0.206***	0.519***	2.662***	4.765***
	(0.0701)	(0.0174)	(0.139)	(0.288)
$Employee_{t-1}$	-0.0142	0.102***	0.159	0.331*
	(0.0520)	(0.0101)	(0.0993)	(0.192)
TFP_{t-1}	-0.0864	-0.205***	0.454	0.952
	(0.0803)	(0.0488)	(0.843)	(1.654)
$Wage_{t-1}$	0.0134	0.0150***	0.0465	0.0377
	(0.0207)	(0.00368)	(0.111)	(0.208)
Age	0.0896	-0.00407***	0.000855	0.000860
	(0.157)	(0.00133)	(0.00301)	(0.00563)
$Tangibility_{t-1}$	0.0336	0.247***	1.207*	2.460**
	(0.186)	(0.0436)	(0.635)	(1.252)
Foreigndum			-0.0812	-0.144
			(0.231)	(0.463)
subdum			0.332*	0.746**
			(0.170)	(0.337)
Sargan(P)		0.317		
AR (2)		0.548		
Observations	995	995	946	946

Notes: Standard errors in brackets. * Significant at 10%, ** significant at 5%, *** significant at 1%. The Sargan test is a test of the over-identifying restrictions asymptotically distributed as chi-square under the null of instrument validity. AR(2) is a test for second-order serial correlation in the first-difference residuals, under the null of no second-order serial correlation. If the instruments are acceptable, the p-value of Sargan test and AR(2) should be greater than 0.05. The two-step system GMM estimator uses lagged values of all right side variables dated t-3 as instruments. The dummies of foreign ownership and subsidiary are dropped by Fixed effect and GMM due to the time-invariant feature of these.

Table3.5: Determinants of the decisions to export: Leverage ratio

	Fixed effect	GMM	Random probit	Logit model
	1	2	3	4
Expdum$_{t-1}$	0.204***	0.613***	2.643***	4.713***
	(0.0696)	(0.0132)	(0.138)	(0.284)
Employe$_{t-1}$	-0.0166	0.0457***	0.122	0.247
	(0.0515)	(0.00918)	(0.0992)	(0.193)
TFP$_{t-1}$	-0.0454	-0.161***	0.520	0.882
	(0.0845)	(0.0380)	(0.825)	(1.616)
Wage$_{t-1}$	0.0128	0.0188***	0.0521	0.0515
	(0.0208)	(0.00359)	(0.112)	(0.210)
Age	0.0933	-0.00131*	0.00124	0.00206
	(0.150)	(0.000745)	(0.00302)	(0.00571)
Leverag$_{t-1}$	0.153*	-0.0173	1.017**	1.860*
	(0.0868)	(0.0201)	(0.497)	(0.980)
Foreigndum			0.0130	0.0595
			(0.225)	(0.462)
Subdum			0.285*	0.629*
			(0.165)	(0.325)
Sargan(p)		0.191		
AR(2)		0.516		
Observations	995	995	946	946

Notes: Standard errors in brackets. * Significant at 10%, ** significant at 5%, *** significant at 1%. The Sargan test is a test of the over-identifying restrictions asymptotically distributed as chi-square under the null of instrument validity. AR(2) is a test for second-order serial correlation in the first-difference residuals, under the null of no second-order serial correlation. If the instruments are acceptable, the p-value of Sargan test and AR(2) should be greater than 0.05. The two-step system GMM estimator uses lagged values of all right side variables dated t-3 as instruments. The dummies of foreign ownership and subsidiary are dropped by Fixed effect and GMM due to the time-invariant feature of these.

Table3.6: Determinants of the decisions to export: Liquidity ratio

	Fixed effect	GMM	Random probit	Logit model
	1	2	3	4
Expdum$_{t-1}$	0.206***	0.550***	2.681***	4.782***
	(0.0699)	(0.0133)	(0.137)	(0.284)
Employee$_{t-1}$	-0.00681	0.0535***	0.134	0.279
	(0.0504)	(0.00889)	(0.0975)	(0.189)
TFP$_{t-1}$	-0.00746	-0.193***	-0.00261	-0.206
	(0.0782)	(0.0277)	(0.925)	(1.816)
Wage$_{t-1}$	0.0107	0.0312***	0.0781	0.116
	(0.0204)	(0.00342)	(0.115)	(0.220)
Age	0.0970	-0.00115	0.000478	-0.000440
	(0.147)	(0.00115)	(0.00299)	(0.00557)
Liquidity$_{t-1}$	-0.148	0.0561**	0.302	0.800
	(0.0981)	(0.0269)	(0.375)	(0.767)
Foreign dum			-0.0178	-0.00708
			(0.224)	(0.459)
Subdum			0.274*	0.620*
			(0.164)	(0.325)
Sargan(p)		0.098		
AR(2)		0.529		
Observations	995	995	946	946

Notes: Standard errors in brackets. * Significant at 10%, ** significant at 5%, *** significant at 1%. The Sargan test is a test of the over-identifying restrictions asymptotically distributed as chi-square under the null of instrument validity. AR(2) is a test for second-order serial correlation in the first-difference residuals, under the null of no second-order serial correlation. If the instruments are acceptable, the p-value of Sargan test and AR(2) should be greater than 0.05. The two-step System GMM estimator uses lagged values of all right side variables dated t-3 as instruments. The dummies of foreign ownership and subsidiary are dropped by Fixed effect and GMM due to the time-invariant feature of these.

5.3 Financial status of firms before entering export markets

The above discussion highlights the importance of financial condition for export entry. To further explore the financial condition of exporters, our study now looks at export entrants and non-exporters only[36].

Columns 1 and 2 of table 3.7 provide results when WW index is used in equation (3) to estimate this empirical specification. The results do not show that starters become less financially constrained one or two years before exporting. Size is found to be significantly associated with export status of starters but with negative sign, showing starters are not large firms in size in comparison to non-exporters. Previously, we found in tables 3.3 to 3.6 that exporters are larger in size in comparison to non-exporters. The negative sign with the coefficient of size variable of starters is possibly that these firms are small in size in the beginning but extend their size in the future.

Columns 3 and 4 of table 3.7 give the results when we apply assets tangibility as a measure of financial constraints. The results show that starters appear less financially constrained one year and two years before entering the export market. The significant and positive coefficients 0.0245 and 0.0306 in columns 3 and 4 respectively indicate that starters have higher assets tangibility before entering to export, which increases their access to external funds.

Columns 5 and 6 of table 3.7 give results with leverage ratio. We do not find significant coefficients for entrants. It shows that debt ratio has an insignificant role in a firm's decision to export. Columns 7 and 8 give results when liquidity ratio is used. We find insignificant coefficient of starters dummy showing that starters do not show differences in liquidity in comparison to non-exporters.

[36] Entrants are the firms that do not export in the first year and switch only once in the remaining period.

These results weakly support the previous findings (such as Greenaway, et al., 2006; Bellone, et al., 2009), which argue that export starters behave differently in terms of liquidity and leverage ratio before starting to export. However, we find that starters become less financially constrained in terms of assets tangibility before entering the export market. It further shows that starters are able to raise external funds for additional expenditures, but debt ratio and liquidity level do not show the variations in the beginning.

5.4 Ex-post effects of trade on the firm's financial status

To detect the ex-post effects of trade on finance, we estimate equation (4) with OLS estimator.

The results in table 3.8 do not give any evidence to support the argument that export entrants improve a firm's financial condition or financial health in the near future. We check the change of financial conditions over a first year period and third year period after entering the export market. None of the measures of financial conditions provide significant coefficient for entrants.

However, these results of ex-post effects of export do not rule out any financial advantage to the exporting firms in the long run. Our data limitations do not allow us to look at the long run, but nevertheless, it appears that firms do not have financial benefits from exporting in the short run for this case of Pakistani listed firms. This evidence is consistent with previous findings (such as Bellone, et al., 2009).

Table 3.7: Ex-ante effects of export

	WW index		Assets tangibility		Leverage ratio		Liquidity ratio	
	t-1	t-2	t-1	t-2	t-1	t-2	t-1	t-2
	1	2	3	4	5	6	7	8
Starter	-0.310	-0.331	0.0245*	0.0306**	-0.00669	-0.00189	-0.0170	-0.0238
	(0.289)	(0.355)	(0.0136)	(0.0149)	(0.0145)	(0.0155)	(0.0220)	(0.0223)
Employee$_{t-1}$	-0.413***		-0.00520		0.0156**		-0.0351***	
	(0.0928)		(0.00466)		(0.00617)		(0.00818)	
TFP$_{t-1}$	-0.940		-0.127**		-0.259***		0.737***	
	(0.802)		(0.0511)		(0.0660)		(0.101)	
Age	0.00101	0.000345	0.000205	0.000249	0.000542**	0.00074***	0.000615*	0.000414
	(0.00345)	(0.00377)	(0.000146)	(0.000166)	(0.000270)	(0.000277)	(0.000362)	(0.000364)
Employee$_{t-2}$		-0.400***		-0.00618		0.0100		-0.0291***
		(0.112)		(0.00505)		(0.00679)		(0.00942)
TFP$_{t-2}$		0.0158		-0.117*		-0.290***		0.741***
		(0.955)		(0.0609)		(0.0743)		(0.126)
Observations	624	475	633	481	644	488	644	488
R-squared	0.313	0.300	0.213	0.251	0.269	0.290	0.338	0.349

Notes: Standard errors in brackets. * Significant at 10%, ** significant at 5%, *** significant at 1%. Entrant is the dummy of those firms that do not export in the first year and switch only once in the remaining period. Liquidity ratio is measured by ratio of total current assets minus current liabilities to total assets. Leverage ratio is measured by ratio of short-term debt to total assets.. WW index is summation of six variables: cash flow, dummy of dividend, total debt, firms' sales growth, industry sales growth and total assets. Assets tangibility is summation of inventory, receivables and capital of firms.

Table 3.8: Ex-post effects of export

	WW index		Assets tangibility		Leverage ratio		Liquidity ratio	
	t+1	t+3	t+1	t+3	t+1	t+3	t+1	t+3
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Entrant	-0.0345	-0.723	-0.000596	-0.00165	-0.0204	-0.0399	0.000741	-0.000317
	(0.536)	(0.745)	(0.00560)	(0.00924)	(0.0140)	(0.0274)	(0.0151)	(0.0321)
Employee$_t$	-0.00034	-0.00023	0.000006	0.000004	0.000123	0.00032	-0.00023	-0.00012
	(0.00002)	(0.00001)	(0.0000001)	(0.0000002)	(0.000010)	(0.000001)	(0.000011)	(0.000010)
TFP$_t$	-0.00555	0.00786	-0.000186	-0.000900	-0.00133	0.00113	0.00308***	-0.00132
	(0.0381)	(0.0505)	(0.000403)	(0.000639)	(0.00101)	(0.00167)	(0.00109)	(0.00222)
Constant	-1.284	2.080	-0.0458***	0.0175	0.0277	0.00792	-0.0351	-0.0303
	(1.418)	(1.973)	(0.0120)	(0.0178)	(0.0300)	(0.0656)	(0.0325)	(0.0619)
Observations	571	289	600	300	600	300	600	300
R-squared	0.321	0.285	0.370	0.166	0.039	0.051	0.069	0.079

Notes: Standard errors in brackets. * Significant at 10%, ** significant at 5%, *** significant at 1%. Entrant is the dummy of those firms that do not export in the first year and switch only once in the remaining period. Liquidity ratio is measured by ratio of total current assets minus current liabilities to total assets. Leverage ratio is measured by ratio of short-term debt to total assets.. WW index is summation of six variables: cash flow, dummy of dividend, total debt, firms' sales growth, industry sales growth and total assets. Assets tangibility is summation of inventory, receivables and capital of firms.

6. Conclusion

This chapter uses a sample of manufacturing listed firms from Pakistan for the period 2006–2014 to scrutinize the relationship between financial constraint and export decision at firm level. We use two different measures of financial constraints; WW Index and Assets tangibility. By following literature and for the comparison, we also use leverage ratio and liquidity ratio as financial health of the firms to see the role of these on export decision of the exporters.

We find that exporters are financially less constrained in terms of WW Index and Assets tangibility. Leverage ratio is found significant determinant of the export decision of Pakistani firms too. Our results show that exporters have higher level of debt ratio as compared to non-exporters. The higher borrowing of exporters may indicate their additional expenditures to participate in foreign export market. Our results further suggest that level of firms' liquidity is not a significant determinant of firms' export decision.

We do not find any clear evidence of ex-ante financial advantage to future exporters. Coefficients of assets tangibility are significant; they indicate that starters have high tangible assets one and two years before starting to export. However, the coefficients of WW index, leverage, and liquidity ratios are not significant at either one or three years before starting to export. The evidence is mixed and varies alongside different measures of financial status.

Our study does support already existing evidence that export does not bring financial benefits to export entrants. Exporting to the international market does not provide easy access to external finance for entrants, at least in the short run. It is important to highlight that we cannot extend these results into the long run. The hypothesis, that internationalization leads to access to external finance, may be true in the long run.

Overall, our empirical study backs the models of international trade, which is based on firm heterogeneity and sunk entry cost for the case of developing country. On the basis of these results, policy makers of the country can draw such policies, which can help the efficient but financially constrained listed firms to enter the international export market.

Appendix 3B:

3B.1. Definitions of the variables used

Expdum: A dummy variable equal to 1 if the firm exports a positive amount, and 0 otherwise.

Leverage ratio: A ratio of a firm's short-term debt over current assets.

Liquidity ratio: A ratio of a firm's current assets minus its short-term debt over total assets.

WW index: A combination of following variables.

Cash flow: Measured as sum of net income and depreciation.

Divpos: A dummy variable that takes the value of 1 if firm pays cash dividend, otherwise 0.

Long term debt: Long-term financial debts to credit institutions (loans and credits).

Total Assets: Book value of total assets.

Firm sales growth: Sales is net sales.

Industry Sales growth : it is 2-digit industry sales growth rate

Assets Tangibility: At the firm level, asset tangibility is measured by the following formula:

$$Assets\ Tangibility = (Cash + 0.715 * \text{Receivables} + 0.547 * \text{Inventory} + 0.535 * \text{Capital})/\text{total assets}$$

Where

Cash : cash in hand of the company

Receibales: firm's accounts receivable.

Inventory: value of a firm's inventory.

Capital: value of a firm's fixed assets.

Total assets: firm's book value of total assets

3B.2. Table: Industry classification

Industry	Two-digit SIC code	Number of firms	Percentage of entire sample
Food &Tobacco	1,2, 9, 20,21,54	38	11
Basic industries including petroleum	10, 12, 13, 14, 24, 26, 28, 29, 33	54	17
Construction	15, 16, 17, 32, 52	35	11
Textile & Trade	22, 23, 31, 51, 53, 56, 59	135	42
Consumer durable	25, 30, 36, 37, 39, 50, 55, 57, 34, 35, 38	33	10
Others	No specific SIC code	27	9
Total Sample		322	100

3B.3. Calculation of total factor productivity

To measure TFP, we use log linear production function stemmed from Cobb-Douglas production function. By following Olley and Pakes (1996), the model is estimated in log linear form. It takes following shape:

$$y_{it} = \beta_0 + \beta_k K_{it} + \beta_a a_{it} + \beta_l l_{it} + w_{it} + \varepsilon_{it} \qquad (1)$$

Where y_{it} , log of value added of firm i is a function of the log of firm's state variable capital and age, and a variable input, labour. The error structure includes w_{it}, firms unobserved productivity, is a state variable and influences firms' decision of investment and exit. Because unobserved productivity is not directly observed in the data and productivity and input choices are likely to be correlated , estimating equation (2) is affected by simultaneity and selection biases. To tackle the biases, we follow model of unobserved productivity given by Olley and Pakes (1996). The productivity function is determined by a firm's capital K_{it} ,Age a_{it} , investment i_{it} , and economic environment r_{it} . It is mentioned as $w_{it} = f_t (i_{it} , K_{it} , a_{it} , r_{it})$. By following Rizov and Zhang(2013), we extend the Olley and Pakes (1996) model of unobserved productivity and adjust the model of productivity to allow for exporting status. Hence the productivity function will become as $w_{it} = f_t (i_{it} , e_{it} , _{Kit} , a_{it} , r_{it})$. Substitution of this productivity function into equation (1) gives us:

$$y_{it} = \beta_0 + \beta_k K_{it} + \beta_a a_{it} + \beta_l l_{it} + \Phi_t(i_{it}, e_{it}, K_{it}, a_{it} + r_{it}) + \varepsilon_{it} \quad (2)$$

By following Olley and Pakes (1996), we require the constant, K_{it} and a_{it} to be combined into a function Φ_t (i_{it} , e_{it} , K_{it} , a_{it} , r_{it}) such that equation (2) becomes

$$Y_{it} = \beta_l l_{it} + f_t(i_{it}, e_{it}, K_{it}, a_{it} + r_{it}) + \varepsilon_{it} \quad (3)$$

Equation (3) represents the first stage of estimation algorithm and is estimated by OLS. The first stage estimate labour coefficient and Φ_t for using in second stage.

$$\acute{w}_{it} = \hat{\Phi}_{it} - \beta_0 - \beta_k k_{it} - \beta_a a_{it} \quad (4)$$

The capital and age coefficients are identified in the second stage of our estimation algorithm. Firm's decision to exit directly depend upon w_{it}, therefor, the second stage of estimation is influenced by endogenous selection. By following Olley and Pakes (1996), we add survival propensity in f(.) function to account for endogenous selection on productivity:

$$w_{it} = \hat{f}(w_{it-2}, w_{it-1}, \hat{P}) + \eta_{it} \quad (5)$$

$\hat{P}$ is survival propensity score which controls for the impact of selection on the expectation of w_{it}. The second stage of our estimation gives the coefficient of capital and age. We put equation 4 and 5 into equation 1 which gives us:

$$y_{it} - \hat{\beta}_l l_{it} = \beta_k K_{it} + \beta_a a_{it} + \hat{f}(\hat{\Phi}_{it-1} - \beta_K K_{it-1} - \beta_a a_{it-1}, \hat{\Phi}_{it-2} - \beta_k K_{it-2} - \beta_a a_{it-2}, \hat{P}_{it}) + \varepsilon_{it} \quad (6)$$

Where β_0 is encompassed into the non-parametric function, $\hat{f}(.)$ and two error terms ε_{it} and η_{it} are included into ε_{it}. Equation (6) is estimated by non-linear least squares(NLLS), which give $\hat{\beta}_k$ and $\hat{\beta}_l$.

Finally, we calculate TFP as a residual by subtracting the shares of capital and labour from the total output.

Chapter 4: Political Connections, Financial Constraints and Performance: Firm-level Evidence from Pakistan

1. Introduction

The complex nexus between political and business connections of the firms and patronage treatment from the government goes back to the East Asian financial crisis of 1997–1998, which brought into the spotlight the distinction of the relationship-based economic and financial system and the arm's length market-driven system (Charumilind, et al., 2006). Shleifer and Vishny (1994) introduce a model of bargaining between politicians and managers to explain how politicians grant resources towards favourite firms in the relationship-based system. Misallocation of investment, distortion of incentives, and prevalence of corruption are considered the prominent features of a relationship-based system. McMillan and Woodruff (1999) and Li et al. (2009) highlight those inadequacies in formal institutions that act like breeding grounds for the birth of a relationship-based economic and financial system. A growing amount of empirical literature acknowledges that the advantages acquired through the political connections are significant in a relationship-based system. These studies (e.g. Charumilind, et al., 2006; Fan et al., 2008; Faccio, 2009; Cooper, et al., 2010) prove the potential linkages between political connection and financing policy of the firms.

In the world of Modigliani-Miller (1958), a firm's investment decision was independent of a firm's financial position in the case of perfect capital markets. However, capital markets are not perfect in the real world due to the problem of information asymmetries; therefore, cost of internal finance and cost of external finance are not perfect substitutes (Stiglitz and Weiss, 1981a; Myers and Majluf 1984; Myers, 1984). The existence of information asymmetry and agency cost makes the capital markets imperfect. Firms may face the problem of financial constraints, and they might not invest in a particular project due to the expensive cost of

external funds. A growing body of the literature records the economic benefits of the political connections to the firms (such as Faccio, 2006; Cooper, et al., 2010). Firms with political connections need to fulfil fewer requirements such as collateral to borrow loans, in comparison to those without connections. It is argued that political connections will also make firms less financially constrained. The existing empirical evidence supports the argument that politically connected firms rely more on easily available external funding than internal funds (Xu, et al., 2013). Song et al. (2015) also argue that firms with political patronage are more likely to be less financially constrained.

The preferential treatments may further affect a firm's performance as its financial condition may affect its performance (Roberts, 1990; Fisman, 2001; Goldman, et al., 2009). Existing empirical evidence recognizes both positive and negative impacts of political connections on a firm's performance. The first school of thought considers that political connections improve a firm's performance through preferential access to credit (such as Braggion and Moore, 2011). Moreover, politicians as outside directors are considered better because of examining all the policies as an external and giving better suggestion. Besides that, they have additional experience of being a politician and playing a prominent role in policy-making at country level. In this setting, it is expected that politicians affect a firm's performance positively (Niessen and Ruenzi, 2009). The second school of thought argues that politically connected firms may have lower performance because of the following reasons: politically connected managers indulge in personal motives, misallocation of resources, and distortion of market economy. This will lead the manager to ignore to maximise the profitability of firm and results in inefficiency of firms instead (Dewenter and Malatesta, 1997).

The impacts of political connections on a firm's behaviour have been widely explored. Despite the fact that a firm's political bond affects its financial condition and its performance, only a handful of empirical studies have formalized the link between political connections of the firms and a firm's level of financial constraints. It is also important to see the impact of political connections on a corporation's performance across different financial conditions of connected firms. To the best of our knowledge, none of the studies have tested the impact of political connections on a firm's performance under different financial constraints. Our study attempts to fill these gaps using a sample of micro level data for Pakistan between 2006 and 2015.

Pakistan is particularly suitable for the study. First, there is widespread political corruption within the system. Three elected governments were dismissed in the past because of corruption. Recently, Prime Minister Nawaz Shareef has been removed by the Supreme Court of Pakistan because of involvement in corruption. Famous politicians are also running family businesses. This shows that the relationship between politicians and firms is quite strong in Pakistan. Empirical studies by Khwaja and Mian (2005) and Rehman (2006) argue that there are unlimited and uncontrolled levels of political connections of firms in Pakistan. Second, there is an insufficient level of development of financial institutions in Pakistan. It is likely that the impact of political connections on financial situation and firm performance may be more prevalent than in other countries. Third, previous studies related to developing countries usually assess the effects of affiliation with one single political party (e.g. Suharto in Indonesia and Mahatir in Malaysia). In the setting of Pakistan, we can assess the impact of political connections via affiliation with different political parties, and also affiliation with winning and losing political parties. In the previous decade, the Government of Pakistan has undertaken a number of steps to curb the corruption. Introduction of the National Anti-

Corruption Strategy (NACS) in 2002 and introduction of a law that public officials must declare their assets are the practical reforms that were taken to control the level of corruption. Nevertheless, these reforms themselves fell victim to corrupt politicians and government officers. It is important to see the effects of political connections on firms' financial situtations and, in turn, on the performance level of firms.

This chapter addresses four fundamental questions: first, whether politically connected firms are different from non-connected firms in terms of finance and productivity; second, whether the firms with political connections have easy access to external finance – in other words, whether politically connected firms are less financially constrained; third, whether political connections of the firms influence a firm's level of performance; fourth, does the impact of political ties on firm performance vary across different levels of a firm's financial condition?

This study contributes to the literature in three main aspects. First, this study extends the research on the effects of political connections on financial constraints of the firms. To the best of our knowledge, there is only one study, by Xu et al. (2013), which directly examines the effect of political connections on financial constraints and investment level for the case of Chinese firms. This study regresses investment on Tobin's q and other controlled variables. We do not use Tobin's q model because of scepticism raised by Erickson and Whited (2000) related to the measurement error problem in q theory. Our study uses a variety of appropriate measures of financial constraints, including WW index, assets tangibility, leverage ratio, and liquidity ratio. As there is a debate about the perfect measure of financial constraints, we use four different measures to check the effect of political connections on the financial condition of the firm. Using different financial measures is not only for the sake of a robustness check,

but also to see how political connections affect different financial aspects of the firms. WW index is calculated by six financial variables of the firm. Asset tangibiity is a measure of financial constraint based on a specific feature of assets: widely used leverage ratio and liquidity ratio, which have been better called as measures of financial health. By using these measures in our study, we could deeply scrutinize the role of political connections for firms' financial conditions[37].

The second contribution is to use two different measures to capture the political connections of the firms. The first measure strictly observes the formal relationship of firm directors with political parties, defined as whether firms' directors participate in the election. The second measure captures the informal relationship of directors with political parties ,defined as if the firm belongs to 38 famous groups/families in the country[38]. Given the two different definitions of political connections, our study could investigate which connection has stronger influence on a firm's behaviour.

The third contribution is to examine the effect of political connections on firm performance across different levels of financial constraints. Some studies highlight a relationship between financial constraints and firm's performance (Fowowe, 2017; Chen and Hua, 2009). Our aim is to see whether politically connected firms with fewer financial constraints affect a firm's performance differently. The purpose in doing so is to see whether political connections

[37] Financial constraints have been defined as a situation where firms do not invest in a particular project because of expensive external funds, but financial health is a situation that is linked with existence or collapse of the firm.

[38] Rehman (2006) reports the list of top 38 business groups and their associated firms in Pakistan. Rehman (2006) forms these groups on the basis of their assets. This book also traces the formation of these dominating groups because of having an informal relation with politicians, which helps to get preferential treatment from government. The detailed description is given in section 2 of the chapter.

mitigate the level of financial constraints to a firm and improve a firm's performance. The results could be interesting for the policy makers to draw policies to curb agency problems so that these preferential treatments could be used to improve the efficiency of the firms.

Our results show that formal political connections clearly make firms different from non-connected firms in terms of finance; however, for productivity, our results are mixed. Furthermore, we find that connected firms (defined as if firms' directors participate in the election) are less financially constrained. Connected firms have a low WW index, high assets tangibility, high leverage ratio, and low liquidity ratio. The coefficients of all financial variables are significantly different, showing that formal political connections influence a firm's financial condition. Connected firms are less financially constrained, meaning that they have easy access to external finance, but low level of liquidity shows that they do not need to hold much cash to fund investment. Moreover, we find that informal connected firms (defined as belonging to business groups) do not influence a firm's financial condition significantly. The results are robust to potential endogeneity issues. In addition, we look at the effects of political connections and a firm's level of financial constraints on its performance. We use return on assets (ROA), Tobin's q, and TFP to measure a firm's performance. We use two different measures of financial cosntarints; WW index and leverage ratio, we find clear evidence that connected firms are performing worse than their non-connected peers. The results indicate the deep hold of agency problem and misallocation of resources among Pakistani listed firms. We further check the effects of political connections on a firm's performance across its financial status. In other words, we try to check the indirect effect of political connection via financial status on the performance of connected firms. Some of our results support the hypothesis that politically connected firms' performances vary across different levels of financial status. Some of our evidences show

that financially constrained firms affect positively the performance of politically connected firms. The possibile jusitification of these results could be the positive effect of financial pressure on firms' performance. However, these results are appealing and assist policy makers to draw such policies that could help to extract benefits from a relationship-based economic system.

The remainder of the chapter is organised as follows: In section 2, we give a concise overview of politics business nexus in Pakistan. In section 3, we provide detailed theoretical and empirical literature. Section 4 builds hypothesis, informs about dataset, and gives summary statistics. Section 5 presents empirical results of our study. In section 6, we conclude the study.

2. The Institutional Background

Corruption, rent seeking, and clientelism have remained the prominent characteristics of Pakistani politics. The Index of Economic Freedom[39] ranked Pakistan as most un-free and corrupt country in the world. Transparency International[40] also ranks Pakistan among the most corrupted countries of the world. Pakistan lies 116th out of 176 countries, according to the Corruption Perceptions Index, 2016.

[39] The index covers 12 freedoms from property rights to financial freedom in 186 countries. Recently, in 2017, Pakistan was ranked 141 out of 186 countries in the index. More details are available at http://www.heritage.org/index/freedom-from-corruption.

[40] Transparency International, a non-governmental organization, was founded in 1993 with the purpose to combat corruption and crimes arising from corruption.

Since its birth in 1947, Pakistan has had a turbulent political history, often featuring martial law and inefficient government. Pakistan has experienced three military coups and three democratically elected assemblies up to 2008. None of the elected assemblies could complete five-year tenure and were dissolved because of poor governance, corruption, and nepotism. Between 2008 and 2018, two democratically elected civilian-led governments have completed their five-year term in office for the first time in its history. Recently, Supreme Court of Pakistan has disqualified Prime Minister Nawaz Sharif due to his involvement in companies and properties, which were originally revealed by the International Consortium of Investigative Journalists (ICIJ) in its Panama Papers leaks.

2.1 Business-politics nexus in Pakistan

Since the creation of Pakistan, business and politics have been closely connected with each other. Bhutto's privatization in 1972 has been blamed for the nexus of business and politics in Pakistan[41]. A white paper on the economy of Bhutto unearthed bad loans of at least half a million rupees. Famous politicians, dictators, and 22 dominating families have been accused of being beneficiaries of these written-off loans. Three lists of bad loans have been published since 1993, which have highlighted the names of politicians and chairpersons of dominant business groups (Rehman, 2006).

Bureaucracy has played an important role in creating a nexus between business and politics in Pakistan. The chairpersons of two major political parties, Pakistan Muslim League (PMLN) and Pakistan Peoples Party (PPP), have their own family businesses. Their governments had

[41] Zulfikar Ali Bhutto was a Pakistani politician who served as Prime Minister of Pakistan from 1973 to 1977, and prior to that as fourth President of Pakistan from 1971 to 1973.

been charged with the allegation that they could not draw a line between their business interests and interests of the state. Since the establishment of Pakistan, businessmen and industrialists have played an active role in politics. Yusuf Haroon, a famous industrialist, was First Chief Minister of Sindh[42]. Ahmed Dawood (from Dawood group) and Rafiq Saigol (from Saigol group) are popular industrialists, and also have important official posts in the ruling parties. The chairman of Nishat group, Mian Muhammad Munsha, has risen to the head of Pakistan's richest family under the umbrella of friendship with former Prime Minister Nawaz Sharif. Mian Nawaz Sharif (former Prime Minister) and Asif Zardari (former President) secured loans from banks that were in default (Rehman, 2006). Besides easy access to loans and loans default, these politicians have faced allegations of a number of preferential treatments, such as giving illegal allotments of lands and government properties to their favourite officers, awarding of contract of export at favourable prices, and tax evasion.

Moreover, the study of Khwaja and Mian (2005) shows that government banks are acting as a tool of political rents in Pakistan. This empirical study shows that government banks are giving political favours to connected firms by using loan-level dataset for 90,000 firms in Pakistan.

2.2 Role of business groups in Pakistan

Almeida and Wolfenzon (2006) define a business group as a group of firms controlled by a single family. Khanna and Rivkin (2006) describe the other forms of groups, where firms

[42] Sindh is the second largest province of Pakistan.

come together because of interlocking directorship, cross holdings of equity, or any other common interest.

Business groups are considered an important firm ownership feature of private firms in both emerging and developed economies (Manos, et al., 2007). In Pakistan, business groups are referred to as the top 38 industrial families. These groups/families have an informal relationship (close friends, related through marriages of their children) with politicians of famous political parties. The founders of some of the groups are famous politicians in the country. In addition, the members of these families are controlling banks and insurance companies. The major industrial families and entrepreneurs have connections because of the same religious sects and communities. White (1972) highlights that there were 103 cases in which one family had at least one member on the board of directors of at least one company of another family. White (1972) also mentions that 43 important families and groups controlled 98 listed non-financial firms and accounted for 53.1 per cent of the total assets for non-financial listed firms in 1968 in Pakistan. Rehman (2006) reports the list of top 38 business groups (based on their size) and their associated firms in Pakistan.

3. Literature Review

Previous evidences show that politically connected firms have three main preferential treatments from lenders and government. First, politically connected firms have privileged access to credit (Johnson and Mitton, 2003; Cull and Xu, 2005; Khwaja and Mian, 2005). Second, these firms get regulatory protections (Kroszner and Stratmann, 1998). Third, these firms acquire government bailouts easily when in trouble (Faccio, 2006). This biased behaviour from government and banks towards politically connected firms makes them different from non-politically connected firms.

Firms' political connections are classified as relationship-based resources of the firms (Barney, 1991; Wood and Jones, 1995). Rajan and Zingales (1998) explain the relationship-based system by attributing three characteristics to this system: first, the financier also has firm ownership. Second, there is a weak and inadequate law and order condition of the system. Third, this system is opaque in its form to protect the relationship from the danger of competition. Khan and Jomo (2000) define political connections of the firms as rent-seeking activities of the firms. Khan and Jomo (2000) further define Rents as incomes that are higher than they otherwise would have been. In the broad sense, these rents comprise not only of monopoly profits, but subsidies and transfers obtained through the political mechanism, illegal activities of private mafias, and short-term super profit made by innovators.

3.1 Channels of building political connections and the debate

Capital control has been taken as a tool to control the free flow of capital by the government, central bank, and the regulatory authorities of the country. Capital control promotes such an environment that breeds relationship-based capitalism (cronyism) (Rajan and Zingales, 1998). Hindrances in international capital flows also promote a relationship-based system. Johnson and Mitton (2003) look at the impact of capital control on stock returns of the politically connected firms for pre- and post-capital control phase in Malaysia. Before imposition, politically connected firms had worse stock returns, while these firms started to perform better on average after imposition of capital control. During the period of capital control, firms started to utilize their connections and got preferential treatment. Political connections and foreign securities have also been considered a close substitute. Leuz and Oberholzer-Gee (2006) argue that political patronages receive cheap loans from the government banks and they do not consider the option of foreign securities for capital.

Lawyers and politically experienced outside directors also play an important role for the relationship between government policies and firms. Directors with political experience and business acumen deal with political affairs of the firms more skilfully and predict government policies more accurately. Government banks have also been considered a vital medium to establish the political rents and are politically biased. Khwaja and Mian (2005) highlight that preferential access to loans is being given to connected firms by the government banks in Pakistan. Moreover, this preferential treatment is more likely for those politically connected firms that are bigger in size and have a higher propensity to default. Sapienza (2004) also highlights that state-owned banks serve as a medium of supplying political patronage in the form of charging lower interest rates in Italy.

The relationship-based system has always been criticised; however, some studies highlight the flipside of this system too. Rajan and Zingales (1998) evaluate the advantages and disadvantages of political connections. All developed countries, including USA and UK, had been through this system during a period of transition. This study highlights a number of advantages of this system. For example, a firm in distress can be bailed out in a relationship-based system; funding of value-adding projects is better monitored in a relationship-based system, and a lower interest rate is charged to younger firms. It is also possible to trade off short-run losses for long-term gains in a relationship-based system. Some evidence supports these arguments, (such as Fisman, 2001), which considers political connections as a valuable resource for some firms.

However, the costs of a relationship-based system make the advantages of the system suspicious. The relationship-based system ignores the price signals of markets. Prices become less informative to provide economic directions, leading to costly misallocation of resources. The relationship-based system is also distorting the allocation of funds. The economic cost of this political corruption is substantial. The defaulting rate of these politically connected firms is found to be higher than non-connected firms. It means money is poorly invested or wasted. Empirical evidence shows that connected firms have lower productivity and a poorer performance level in comparison with non-connected peers. For the case of Pakistan, Khwaja and Mian (2005) highlight the loss of 1.6 per cent of GDP because of this investment distortion.

In sum, political connections can be used as a measure by the firms to promote development and their efficiency. However, most evidence shows that the relationship-based system has been used to fulfil managers' personal motives, and results in misallocation of resources.

3.2 Theoretical underpinning

There are three main theories of modern finance, which originate from a firm's market value maximization principle in the proposition of Modigliani and Miller (1958). These theories are pecking order theory, trade-off theory, and agency cost theory.

Pecking order theory argues that cheap internal finance should be preferred over expensive external finance (Myers and Majluf, 1984). In the case of politically connected firms, literature shows that firms have easier access to bank loans because of links with government. It means firms prefer debt financing (expensive) over internal financing (cheaper). In this

setting, we can assume that pecking order theory does not work for the case of politically connected firms. Political connections may reduce the problem of information asymmetry, as Dewenter and Warther (1998) find for the case of Japan. Connected firms may also have easy access to external finance through a part in policy making (Ghemawat and Khanna, 1998; Chang and Hong, 2000). Therefore, political connections may reduce the relevance of pecking order theory of capital structure.

Political connection may also contradict the prediction of trade-off theory. Trade-off theory stresses the trade-off between the benefits from the tax deductibility of interest payments and cost of bankruptcy of the firm. The literature shows that politically connected firms reduce tax liability and reduce the bankruptcy risk by cheap credit (Adhikari, et al., 2006; Faccio, 2006). The implication of trade-off theory for politically connected firms is complicated. Trade-off theory expects that at the position of optimal capital structure, a firm's marginal benefit of debt is equal to its marginal cost. The main advantage of having debt in corporate structure is tax deductibility of interest payments; however, connected firms may reduce their tax liability by utilising political connections. Also, group-affiliated firms may create a fake tax shield by moving profit from one firm to another (Chang and Hong, 2000). The cost of having debt in capital structure is the risk of bankruptcy/default. Claessens et al. (2008) show that firms that have group affiliation may reduce the expected cost of default by using assets of another group member as collateral.

Not only is there easy access to debt financing, but managerial opportunism is another motive of politically connected firms. A firm's manager may spend more money to establish connections with politicians. Even though managers will get different benefits, e.g. if the

benefits acquired through these connections offset the cost paid by the managers to establish a relationship, this is okay, otherwise it is called agency cost.

However, Rizov (2008) highlights that most of the conventional theories of corporate finance were formulated under the assumption of hard budget constraints, while capital structure of politically connected firms can be attributed to the environments with soft budget constraints. Protection of firms from financial failures is the main characteristic of soft budget constraints (SBC) (Kornai, 1980). The characteristics of Soft budget constraints also include provision of soft credit, subsidies, and tax relaxations, and some kinds of tariffs to rescue the domestic firms. Therefore, political connections of the firms contradict the conventional theories of corporate finance, whereas political connections of the firms lie under the soft budget constraints.

3.3 The effects of political connections on a firm's financial status

There are a number of studies in literature showing that politically connected firms are different from non-connected firms in terms of debt ratio. As business connections can determine easy access to bank credit. Charumilind et al. (2006) examines whether Thai firms with connections have easier access to long term debt than firms without such ties. They found that firms with connections borrow more long-term debts as these firms need to show much less collateral to borrow long term. Moreover, the study further finds that these firms were also financially less vulnerable following the financial crisis (1997-1998).

Faccio (2009) also find that connected firms are different from non-connected firms across a large number of countries. This study uses a database which includes several thousand firms in 47 countries to see the differences between connected firms and non-connected firms. He finds that politically connected firms have higher leverage, less tax payments, stronger market power, and poorer accounting performance relative to non-connected firms. It further highlights that differences are greater when firms are connected through owners rather than directors. Likewise, differences are greater when connections are with minister rather than with the member of the parliament.

By using a unique loan level data set from Pakistan, Khwaja and Mian (2005) check presence of political rents in banking. This study further detects the channels of rent provision and economy wide costs this rent imposes. They find that politically connected firms receive 45 per cent larger loans, but the ratio of loans default is also 50 per cent higher when compared to non-connected firms in Pakistan. Besides, government banks showed political biasedness as this preferential treatment is entirely driven by loans from government banks.

Fan et al. (2008) examine the effects of corruption and rent-seeking on corporate financing pattern of those firms which bribed or connected with corrupt high-level government bureaucrats. The leverage level of these firms decreased substantially following the arresting of corrupt bureaucrats. This study further highlights that decline in leverage rate is mainly due to decrease in long-term debt only.

Faccio (2006) study 450 politically connected firms in 35 countries. This study finds evidences of greater use of debt financing in connected firms than non-connected firms. Similarly, Guo et al. (2014) find that politically connected firms in China have more accessibility of loans.

The study connected by Song et al. (2015) sees the effects of political connections on the firms' level of financial constraints. They find politically connected firms are less financially constrained when compared to non-connected firms. Times interest earned[43] index is used to divide firms into financial status. Firms' level of financial constraints is regressed on the dummy of political connections and other control variables. The results show that politically connected firms are less financially constrained.

Xu et al. (2013) use investment–cash flow sensitivity as a measure of financial constraint. They find firms with political connections have less dependency on internal funds and, therefore, are less financially constrained.

Overall, these all studies show that political connections are influencing firms' level of financial status significantly.

[43] This is an index used to measure an ability of a firm to pay its interest. Time interest earned is measured as a ratio of earning to interest cost.

3.4 The impact of political connections on firm performance

Politically connected firms get preferential treatment in the form of easier access to loans. Connected firms are bestowed by patronages either through soft terms related to loans or by paying a lower interest rate. This easier access of credit could ultimately influence firm performance. If the cheap loan credit is utilised efficiently, firms can obtain comparative advantage over their non-connected counterparts, which, in turn, improve firm performance. On the other hand, this political interference in terms of resource allocation and project selection can affect the performance of firms negatively. The literature on the impact of political connections on firms' performance give mixed evidences which are elaborated below.

Outside directors which are defined as 'all non-management members of the board can make a difference in firm performance. Peng (2004) checks the effect of affiliated and non-affiliated outside directors on Chinese firms' return on assets and sales growth. The study finds that affiliated and non-affiliated outside directors exert insignificant impact on ROA however, the impact of affiliated directors on sales growth is positive and significant.

Braggion and Moore (2011) use data on UK firms. They use Company's share price to see the effects of political connections on firms' performance. 2 to 2.5 per cent rise in share price is found if one of their directors was elected in General elections of the country. Similarly, Asquer and Calderoni (2011) find connections with the governing coalition exert positive effects on stock returns for Italian sample of firms.

Dombrovsky(2008) employs Latvanian firms to see the effects of political connections on sales. A surge in sales is found when a politician joins the firm. Moreover, the study finds that Ex-politicians are positively influencing the performance of the firms.

Capital control is considered as a channel to enhance political connection. Johnson and Mitton (2003) used sample of Malaysian firms. They find that without any capital control scheme, politically connected firms were suffering from decline in market value. After imposition of capital control, the market value of politically connected firms increased. Moreover, a number of other studies such as Faccio (2006), Fisman (2001), Roberts (1990) and Goldman et al. (2009) find a positive link between politically connected firms and the value of firms.

However, there are some other studies which find a negative relationship between firm's political connections and performance. Boubakri et al. (2008) used number of measures of firms' performance, i.e. return on sales, sales growth, earning growth, ROA and ROE. The results of estimating empirical specification showed that connected firms have poor performance. Similarly, Li et al. (2009) find that State-owned firms, which have easy access to long-term debt, are negatively associated with firm performance.

4. Baseline Specification, Estimation, Methodology, and Data

A large empirical work has found that political connections play a positive role to obtain preferential financial treatments from government-owned enterprises, such as loans (Khwaja and Mian, 2005; Faccio 2006; Fan, et al., 2008; Li, et al., 2009; Ye, et al., 2012). These studies show a positive relationship between a firm's political connections and a firm's debt financing. Other studies show that political connections help firms to get privileged treatment in competition for government contracts or bailout support (Faccio, 2006). Nevertheless, there are some studies that reject a positive relationship between a firm's political connections and debt ratio (Asquer and Calderoni, 2011). In general, the literature argues that politically connected firms enjoy preferential treatment in a number of forms and hold a higher degree of leverage than non-connected firms.

Drawing from the literature, we will examine the following hypotheses:

Hypothesis 1: Politically connected firms are different from non-connected firms in terms of financial status and performance.

The role of political and business connections is prominent in Pakistan. The incentives for businessmen to build political connections breed from corruption and bad governance. It is quite common that private banks, in general, and government banks, in particular, extend loans to firms on the basis of nepotism and favouritism rather than on the basis of collateral (Khwaja and Mian, 2005; Li, et al., 2009). As a result, the cost of external finance (debt financing) and premium of external over internal funds would be mitigated. We may observe less dependence of investment on internal finance, and firms will become less financially constrained for politically connected firms.

Hypothesis 2: Political connections assist connected firms to become less financially constrained.

Political connections may also be able to improve the performance level of the firms, if they use their resources and experience in a better manner. Politically connected directors are considered experts in decision making; they monitor a firm's decision better because of experience in politics (Fama and Jensen, 1983). The economic advantages include both tangible and intangible benefits that politically connected directors bring to firms. It is plausible to assume that such preferential lending may also influence a firm's performance. If this easy access of funding is used efficiently, it will lead to better firm performance. Boubakri et al. (2008) report that connected firms perform better than non-connected firms. In contrast, there are studies arguing that politically connected firms perform poorly when compared to non-connected firms. There is the possibility that politically connected managers may not have managerial expertise (Boubakri et al. 2008). In addition, connected managers may also use easily available funding for their personal motives rather than maximising profit of the firms (Dewenter, et al., 1997).

Hypothesis 3: Firm performance is significantly associated with political connections.

There is the possibility that firms' performances may be influenced differently if politically connected firms are also less financially constrained. We find evidence in the literature that a firm's performance is influenced by financial condition of the firm (such as Banerjee, et al., 2009; Claessens and Tzioumis, 2009).

Hypothesis 4: The performance of politically connected firms varies across different levels of financial constraints.

4.1 Estimation models

We will follow Faccio (2009) to see the difference between politically connected firms and politically non-connected firms in terms of finance (WW index, tangibility, leverage, and liquidity) and firms' performances (ROA, Tobin's q, and TFP). We will estimate the following model by OLS estimator:

$$X_{it} = \alpha + \beta_1 Polcon_i + \beta_2 Size_{it} + \beta_3 Foreigndum_{it} + \varepsilon_{it} \qquad (1)$$

Where X_{it} will take one of the following variables: WW index, tangibility, leverage ratio, liquidity ratio, ROA, Tobin's q, and TFP. PolCon is time-invariant dummy variable – it is equal to 1 if firm has political connections and 0 otherwise. We will estimate the empirical specification given in equation (1) separately for each variable. ROA is calculated by profit before taxes divided by total assets. Tobin's q is defined by ORBIS database as ratio of market capitalization over total assets. TFP is total factor productivity measured by dynamic production function stemmed from Cobb-Douglas production function. Size as independent variable is measured by log of number of employees. Foreigndum is a time-invariant dummy variable equal to 1 if the firm has foreign ownership.

To check the relationship between connected firms and their level of financial constraints, we will estimate the following model which resembles to the framework given by Charumilind et al.(2006) and Frasen et al.(2006) :

$$FC_{it} = \beta_0 + \beta_1 Polcon_i + \beta_2 Age_{it} + \beta_3 Size_{i,t-1} + \beta_4 Collateral_{i,t-1} + \beta_5 Profit_{i,t-1} + \beta_6 GrowthOpp_{i,t-1} + Foreigndum_i + dummies \quad (2)$$

FC is our measure of financial constraints. Polcon is a dummy, which is equal to 1 if firms are politically connected. Polcon is a time-invariant dummy variable. Age is calculated by the current year minus the year of incorporation of the firm. Size is measured by number of employees of the firm. Collateral is measured by ratio of fixed assets to total assets. Profit is measured by the ratio of profit before tax to total assets. A growth opportunity is measured by Tobin's q. Dummies include regional, year, and industry dummies. We will estimate the model by pooled OLS.

To check the effect of political connections on firm performance level, we will estimate the following model. This model is similar to the models used by Saeed et al. (2015), Boubakri et al. (2008), and Wu et al. (2010).

$$\text{Firm Performance}_{\text{it}} = \beta_0 + \beta_1 Polcon_i + \beta_2 Size_{i,t-1} + \beta_3 Capinten_{t-1} + \beta_4 FC_{i,-t-1} + Foreigndum_i + dummies \quad (3)$$

Where a firm's performance is measured by ROA, Tobin's q, or TFP. Polcon is time-invariant dummy variable. It is equal to 1 if the firm has political connections and 0 otherwise. Size is found in the literature to be an important factor in affecting firm

performance level. Large firms can positively affect firm performance via diverse capabilities and economies of scale. On the other hand, complex and extensive bureaucratization and hierarchies may reduce the efficiency of managers and affect a firm's performance negatively. Capinten is capital intensiveness which is calculated by the ratio of capital to labour.

FC is a measure of financial condition of the firm. Theoretically, the impact of financial status on a firm's performance is given by Fama and Jensen (1983), who suggest that debt affects a firm's performance by reducing the problem of agency cost. Mao and Gu (2008) also empirically prove that leverage policy is influencing a firm's performance in the restaurant industry in US. We will use WW index and leverage ratio, two different measures of financial conditions, in our robustness check study.

The effect of firm ownership on performance level has also been discussed extensively, especially in the context of the effects of foreign direct investment on the host country (Malek, 1974). Malek (1974) blames foreign direct investment as foreign-owned firms are performing worse than domestic firms in the sample of his study. However, other studies, such as Dunning (1981), argue that foreign-owned firms have superior capabilities/techniques in productivity, and therefore positively influence a firm's performance.

There is the possibility of endogeneity in our model (3), as firm performance may have an effect on the lending decision, as level of leverage may influence the firm's performance and vice versa (Dessi and Robertson, 2003). We can assume that financial variable is the endogeneous variable and the error term of equation (3) will be correlated to WW index and leverage ratio, which may give biased results if the equation is estimated by OLS. To check

this issue, we use two different tests to check the endogeneity of WW index and leverage ratio in our model. First, we test under the null hypothesis of the Durbin and Wu-Hausman tests are that the financial variable (WW index, leverage ratio) can be treated as exogenous (Hausman, 1978). We reject the null hypothesis as we get a statistically significant result and, alternatively, the financial variable is endogenous in our model. Second, we follow Wooldridge (2002) to check the assumption of strict exogeneity by using fixed effect model. Our test also proves those WW index and leverage ratios are endogenous variables. Therefore, we need an instrument variable that is highly correlated to a financial variable, and that can be correlated to a firm's performance but only via a financial variable (Wooldridge, 2002). Following the work of Cho (1998) and Demsetz and Villalonga (2001), we will use instrument variable approach, two-stage least square (2SLS), to tackle the problem of endogeneity. Following the work of Campello (2005) and Saeed et al. (2015), we argue that due to the presence of underdeveloped financial markets and contracting imperfection, the demand of collateral by the lenders is quite common, particularly in our case. Campello (2005) argues that a firm's collateral establishes a firm's financing capacity; however, a firm's tangible assets do not affect a firm's performance, except for the connection with financing itself. In our sample, the correlation between leverage and collateral (0.26) is higher than the correlation between leverage and assets tangibility (0.15). Hence, a firm's collateral can be taken as a suitable instrument for leverage of the firms in our study .[44]

As our financial variables have different formations, WW index is calculated by six accounting variables, and we cannot use the same instrument (collateral) for WW index[45]. We do not find any suitable instrument for WW index in the literature, as literature is mainly relying on the old measures. Equity financing is the second important component of external

[44] The exogeneity and suitability of instrument have been tested by a number of tests in the study.
[45] Some tests of valid instruments also show that collateral is a weak instrument for WW index.

finance of the firms. Equity financing can be highly correlated to the measure of financial constraint i.e., WW index, as higher equity financing means higher access to external finance. We check the correlation between WW index and shareholders' equity of the firms and find it around 0.15, we use shareholder's equity as the instrument for WW index as it passes various tests. Econometrically, firm's financial status (WWindex and leverage ratio) is regressed on instruments (shareholders equity and collateral respectively) alongside other controlled variables of equation 3. Consequently, the fitted value of financial status variables is used as a regressor in second stage. In addition to the test of endogeneity for endogenous variables, we also perform the test to check the validity of instrument by F-test for the joint significance of the instruments (Stock et al., 2002). We get significant F-statistics which reject the null hypothesis of instruments are weak. Our F- statistics also exceed 10 for inference based on 2SLS, which further proves the validity of instruments (Stock et al., 2002)[46].

To check the effect of political connections on a firm's performance across different levels of financial constraints, we will include an additional term to the equation (3). The new equation takes the following form:

$$\text{Firm Performance}_{\text{it}} = \beta_0 + \beta_1 Polcon_i + \beta_2 Polcon_i * FC_{i,t-1} + \beta_2 Size_{i,t-1} + \beta_3 FC_{t-1} + \beta_4 Capitalinten_{t-1} + Foreigndum_i + dummies \qquad (4)$$

Here, the additional term, Polcon dummy *FC, is an interaction term between the dummy of political connection and the measure of financial constraint.

[46] We perform these all tests of valid instrument after each specification, with different measures of financial status and different measures of performance.

In order to resolve the issue of endogeneity due to the WW index and leverage ratio, as we explained earlier, we will use 2SLS to estimate our empirical specification given in equation (4). In addition to the financial variables (WW index and leverage ratio), the interaction term will also be considered as endogenous because of including financial status variable. Moreover, there could be the issue that political connection affects the financial constraint in advance, i.e. financial status may already contain the effect of political connection. 2SLS is the best choice where FC and Polcon dummy *FC will be estimated in the first stage, and then predicted value will be used in the second stage. In the light of the explanation given before, we will use collateral as a dummy for leverage ratio and collateral *Polconnection dummy as an instrument for interaction term (Polcon dummy*FC). For WW index, we will use shareholder's equity as an instrument. For interaction term (WW index*politic connection), we will use equity *political connection as an instrument in 2SLS.

4.2 Measures of political connections

We will use two measures of political connections. Our first measure comes from the mainstream literature (Khwaja and Mian, 2005; Faccio, 2006). According to this academic literature, "A firm is connected with a politician if at least one member of the company's board of directors is also a politician". In this study, a politician is defined as an individual who participated in national or provincial elections, held in 2008 and 2013. A politician's full name (first, middle, and last) is matched to the full name of the firm's director. If the name matches, that firm is then taken as a politically connected firm. In doing so, one politician was matched to one firm. In our sample firms, 134 firms are considered politically connected by our first measure of financial constraint.

For our second measure of political connection (better known as measure of informal political connections), we take informal political and business connections of the firms. According to this measure, a firm is politically connected if it belongs to 30 industrial groups of Pakistan. The top 30 industrial families are dominating the corporate sector in Pakistan. These groups/families have informal relationships (close friends, relationships through marriages of their children) with politicians of famous political parties. The founders of some groups are also famous politicians in Pakistan.

Table 4.1 presents the distribution of the sample firms through Measure I and Measure II of political connections**.** Following Measure I, 134 firms out of 326 are politically connected, while 192 firms are stand-alone. Following Measure II, 101 firms out of 326 are politically connected, while 225 are stand-alone firms.

Table4.1: Sample description

	Total sample		**Politically connected**		**Politically non-connected**	
	Number	**Percentage**	**Number**	**Percentage**	**Number**	**Percentage**
Measure- I	326	100	134	41	192	59
Formal (Politician)						
Measure- II	326	100	101	31	225	69
Informal (Group)						

4.3 Measures of financial constraints and firm performance

Testing our research questions includes measuring a firm's level of financial constraint. One perfect and particular measure of financial constraint is a matter of controversial debate in literature. There are a number of measures, as discussed in chapter 2. We will use four different measures of financial constraints.

Our first measure of financial constraint is WW index, given by Whited and Wu (2006)[47]. The higher value of WW index means a higher level of financial constraints.

Our second measure of financial constraint is asset tangibility (tangibility).The concept of asset tangibility is given by Almeida and Campello (2004), who argue theoretically that tangible assets encourage external financing. ?

We also use widely used measures, leverage ratio, and liquidity ratio, in existing literature. The third measure is leverage ratio. It has been commonly used in the literature of effects of political connections on a firm's financial condition. Debt is an important element of external funding of the firms. The positive relation between leverage and default probability suggests that firms with higher leverage ratio are more financially constrained in the literature, but on the other hand, it also shows that firms are able to access external funds. Leverage is measured as the ratio of a firm's total debt to total assets.

Our final measure of financial constraints is liquidity ratio. Holmström and Tirole (2000) argue that firms should have enough liquidity to cope to investment and production plans in the case of negative liquidity shocks. Hence, financially non-constrained firms have higher liquidity. Liquidity ratio is measured by a ratio of a firm's current assets minus its short-term debt over total assets.

[47] The calculation of WW index is provided in chapter 1. We will prefer this measure as this technique avoids the calculation of q, which involves measurement-error problem, as shown by Erickson & Whited (2000).

However, we argue that WW index and asset tangibility are better to indicate the level of financial constraint of firms, as Almeida and Campello (2006) argue that financially constrained firms may hoard cash and have higher liquidity ratio. Similarly, a higher leverage ratio could imply that firms are enjoying easy external funds, which means firms are not financially constrained. Nevertheless, even with the criticism of leverage ratio and liquidity ratio as measures of financial constraints, the literature relies mainly on these two measures.

Firm performance has been measured in the literature by different measures such as profit maximization, return on assets, and return on investment (e.g. Boubakri, et al., 2008; Dombrovsky, 2008; Fan, et al., 2008). Some other studies have measured a firm's performance by a firms' growth opportunities, e.g. growth in sales, employment growth, and Tobin's q. TFP has also been used as a measure of a firm's performance (such as Abramovitz, 1956; Hulten, 2000). Although there are many measures to calculate a firm's performance, for the purpose of this study, we will use ROA, growth opportunities (Tobin's q), and TFP.

4.4 Sample data and summary statistics

For information on the firm's political connections, we rely on the Election Commission of Pakistan (ECP). ECP provides the list of all the candidates participating in the previous elections, both at national and provincial levels. Given the study covers the time period 2006–2015, this study needs the information of those candidates who participated in the general elections held in 2008 and 2013. The lists of information provided by ECP do not only

include the full names of participating candidates, but also the information of affiliated parties and information about the votes each candidate received. Following Khwaja and Mian (2005), all participating candidates have been considered as politicians.

To get the information about the major economic groups that are well-known for their informal relationships with politicians in Pakistan, our study follows Rehman (2006). A list of top 30 groups alongside their affiliated listed and unlisted, financial and non-financial firms, is provided by Rehman (2006). Ashraf and Ghani (2005) and Masulis et al. (2011) have also used the same source to identify the business group affiliation.

Firm data remains the same as given in chapter 2. The important sample selection criteria is that firms need to report a minimum of two consecutive years' information to assess the changing in the financing structure of the firms. The final sample consists of an unbalanced panel of 1829 firm-year observations of 326 firms.

Summary statistics

The preliminary univariate of comparison of financing pattern and other characteristics between politically connected firms and non-connected firms is provided in table 4.2. Column 1 of table 4.2 gives the mean value of important variables for the full sample. Columns 2, 3, and 4 give mean values of variables for politically connected and non-connected firms according to Measure I of political connection. Columns 5, 6, and 7 give mean values for connected and non-connected firms according to Measure II of political connection.

When political connection is measured by Measure I, we get lower value of WW index for

connected firms (-.049). This difference is also significant at 5 per cent level. Similarly, connected firms also have higher tangible assets. The difference is also highly significant. Connected firms have higher leverage but lower liquidity ratio with formal measure of political connections. We also find that connected firms are larger in size. Further, they have higher collateral. All these differences are also statistically significant. For a firm's age, Tobin's q, TFP, and ROA, we do not find a significant difference between politically connected and non-connected firms. Politically connected firms are also larger in size, have more exporters and have larger size of board of director as compared to non-connected firms.

When political connection is proxied by informal connections of the firms, we do not find a significant difference for mean values between politically connected and non-connected firms for any measure of financial condition of the firm. However, informal connections bring a significant difference in investment opportunities of connected and non-connected firms. Even firms with informal political connections are larger in size are older in age as compared to politically non-connected firms. Connected firms have also more foreign firms and larger size of board of director as compared to stand-alone firms.

Overall, the summary statistics show that formal political connections affect the financial condition of the firms. As far as the impacts of political connections on a firm's performance are concerned, the summary statistics do not give any significant differences, except for evidence of bad performance of politically connected firms by informal measure. We can assume that formal measure of political connection seems stronger than informal measure of political connections for our sample firms.

Table4.2: Summary statistics for key variables

		Measure I (Formal)			Measure II (Informal)		
	Total sample	**Connected**	**Non-connected**	**Mean diff t-test**	**Connected**	**Non-connected**	**Mean diff t-test**
	Mean	**Mean**	**Mean**		**Mean**	**Mean**	
WW index	-.039	-.049	-.025	.024**	-.039	-.039	.0002
	(.264)	(.099)	(.329)		(.117)	(.308)	
Tangibility	.9897	1.002	.9823	.006***	.9843	.9920	.007
	(.130)	(.129)	(.1317)		(.128)	(.131)	
Leverage	.4381	.4784	.4117	.016***	.4267	.4432	.0165
	(.341)	(.462)	(.227)		(.327)	(.347)	
Liquidity	-.0007	-.0552	.0349	.017***	.0079	-.0046	-.0126
	(.364)	(.477)	(.260)		(.345)	(.373)	
Age	34.07	34.26	33.95	.310	37.11	32.71	-4.27***
	(19.7)	(22.96)	(17.29)		(20.12)	(19.39)	
Employees	1085.5	1365.5	900.5	.133***	1521.4	889.7	-.390***
	(1733.3)	(2215.1)	(1290.4)		(2525.0)	(1170.5)	
Tobin's q	.541	.5286	.5565	.0599	.3328	.636	.309***
	(1.25)	(1.45)	(1.11)		(.684)	(1.42)	
Collateral	.5754	.591	.5653	.009***	.5779	.5743	-.0036
	(.2052)	(.198)	(.209)		(.183)	(.214)	
ROA	.0486	.463	.0501	.0076	.0466	.0496	.0030
	(.159)	(.187)	(.138)		(.168)	(.155)	
ln (tfp)	2.064	2.059	2.067	.0	2.064	2.064	.0004
					(.149)		

	(.1604)	(.147)	(.168)			(.166)	
Foreign dummy	.09076	.091	.0903	.0137	.049	.1095	.060***
	(.287)	(.29)	(.29)		(.216)	(.312)	
Export	.7272	.753	.7100	.021***	.8155	.6873	-.128***
dummy	(.445)	(.43)	(.45)		(.39)	(.464)	
Board of director dum	.69	.77	.6504	.022***	.6872	.7039	.0168
	(.46)	(.42)	(.48)		(.464)	(.46)	
No of observations	1829	722	1107		569	1260	

Notes: Standard errors in brackets. * Significant at 10%, ** significant at 5%, *** significant at 1%. No of observations for age and lntfp are different, that is, 1828 and 1669 respectively. For Measure I 653, 1016 for connected and non-connected respectively. For Measure II, 525 and 1144 respectively.

5. Empirical Results

5.1 Difference between connected firms and non-connected firms

We test for our first research question: whether politically connected firms are different from politically non-connected firms. Equation (1) is estimated by OLS. Empirical model also controls for region, industry, and year fixed effects.

Panel I of table 4.3 shows the results of empirical specification, given in equation (1), corresponding to Measure I of political connections. Panel II of table 4.3 gives the results of empirical specification, given in equation (1), corresponding to Measure II of political connections. Panel I reports that connected firms are different from non-connected firms in terms of finance. Connected firms have a lower WW index, which shows these firms are less financially constrained. The coefficient of assets tangibility is also significant and positive, meaning connected firms have higher assets tangibility, which shows connected firms are less

financially constrained. The coefficients of leverage ratio and liquidity ratio are also significant. Connected firms are more levered; it justifies the theoretical prediction that connected firms have preferential treatments. Hence, it contrasts the definition of financial constraints, as literature says the higher the value of leverage ratio, the more the firms are considered financially constrained. This definition of leverage ratio as a measure of financial constraint has been questioned/ criticised by Almeida et al. (2004). Moreover, our results highlight that connected firms have lower liquidity ratio. If connected firms get preferential treatments in the form of easy access to loans, which would show a higher leverage ratio of connected firms, the connected firms should have higher liquidity ratio. There is a possibility that these loans are being used for personal motives by the managers, with a subsequent presence of agency cost. There might be another possibility of holding less cash, as connected firms can always get access to funds; therefore, there is no need to hold much cash due to soft budget constraints (Megginson et al., 2014). Overall, connected firms are different from non-politically connected firms in terms of finance. All four measures of financial constraints give significant results.

As far as measures of performance are concerned, we do not find a different performance for politically connected firms when using ROA and Tobin's q as measures of performance. We find politically connected firms are performing worse than non-connected firms when using TFP as a measure of performance. It implies that political connections do not affect a firm's ROA and growth opportunities (Tobin's q), but do negatively affect a firm's productivity.

Panel II of table 4.3 reports that informally connected firms are different from non-connected firms in terms of growth opportunities (Tobin's q) only. Our informal measure of political connections does not suggest that connected firms are different from non-connected firms in

terms of finance. It shows informal connections play an insignificant role in a firm's financial condition. It further highlights that firms might not use informal connections to get easy access to external funds, but for some other forms of preferential treatments. However, these informal relations are associated with a firm's performance in terms of reducing investment opportunities.

This initial analysis, to see the difference between politically connected and non-connected firms in terms of finance and performance, gives us a clue that connected firms are different from non-connected firms, and the formal measure of political connections gives more significant differences when compared to the informal measure of political connections.

Table4.3: Differences between politically connected and non-connected firms in terms of financial status and performance

Panel I

Dependent variables =	WW index	Tangibility	Leverage	Liquidity	ROA	q	Ln(tfp)
	1	2	3	4	5	6	7
Polcon	-0.649**	0.0170***	0.0890***	-0.0960***	-0.00317	-0.0261	-0.0128*
	(0.327)	(0.00606)	(0.0157)	(0.0171)	(0.00766)	(0.0571)	(0.00742)
Size	-0.205	-0.000461	-0.0606***	0.0653***	0.0103***	0.0568**	0.0527***
	(0.148)	(0.00274)	(0.00710)	(0.00771)	(0.00347)	(0.0258)	(0.00339)
Foreigndum	-0.958*	0.00130	-0.0450*	0.0633**	0.0281**	0.678***	-0.00811
	(0.560)	(0.0104)	(0.0269)	(0.0293)	(0.0131)	(0.0980)	(0.0126)
Constant	-0.0372	1.144***	0.664***	-0.0887	-0.0147	0.365	1.713***
	(2.583)	(0.0479)	(0.124)	(0.135)	(0.0606)	(0.452)	(0.0574)
Observations	1,829	1,829	1,829	1,829	1,829	1,829	1,669
R-squared	0.161	0.101	0.117	0.085	0.033	0.134	0.197

Panel II

Dependent variables =	WW index	Tangibility	Leverage	Liquidity	ROA	q	Ln(tfp)
	1	2	3	4	5	6	7
Polcon	0.438	-0.00328	-0.0232	0.0154	0.00393	-0.143**	0.00500
	(0.366)	(0.00680)	(0.0177)	(0.0193)	(0.00858)	(0.0639)	(0.00833)
Size	-0.237	8.72e-05	-0.0575***	0.0623***	0.0101***	0.0610**	0.0521***
	(0.148)	(0.00275)	(0.00717)	(0.00779)	(0.00347)	(0.0258)	(0.00340)
Foreigndum	-0.861	0.000596	-0.0500*	0.0665**	0.0289**	0.645***	-0.00704
	(0.567)	(0.0105)	(0.0274)	(0.0298)	(0.0133)	(0.0989)	(0.0128)
Constant	-0.346	1.154***	0.713***	-0.144	-0.0159	0.323	1.706***
	(2.579)	(0.0479)	(0.125)	(0.136)	(0.0605)	(0.450)	(0.0573)
Observations	1,829	1,829	1,829	1,829	1,829	1,829	1,669
R-squared	0.160	0.097	0.102	0.069	0.033	0.136	0.195

Note: Standard errors in brackets. * Significant at 10%, ** significant at 5%, *** significant at 1%. PolCon is a dummy of political connection. Size is measured by number of employees. Panel I reports the results when we use formal measure of political connections. Panel II reports the results when we use informal measure of financial constraints.

5.2 Financial constraints and politically connected firms

We use equation (2) to test our second hypothesis that politically connected firms are financially less constrained than their non-politically connected peers. Table 4.4 shows the pooled regression results. All regressions include regional, industry, and time-fixed effects. In panel I, column 1 reports the regression results of political connection alongside other control variables on the WW index. The estimated coefficient on political connection is negative and statistically significant at the 5 per cent level. The magnitude of coefficient shows that firms with political connections have a lower level of financial constraints with 86 per cent less WW index. In column 2, the regression results of political connections and other control variables on the assets tangibility is provided. The estimated coefficient on political connections is positive and statistically significant at the 5 per cent level. The magnitude of coefficient shows that firms with political connections are less financially constrained with 1% higher assets tangibility. In column 3, the estimated coefficient of leverage ratio is highly significant with magnitude revealing that connected firms have 7 per cent higher debt ratio than non-connected peers. In column 4, the estimated coefficient of liquidity ratio is negative and highly significant. It means connected firms have 7 per cent less liquidity than non-connected firms.

Panel II of table 4.4 reports the estimated results of the same regression, but with Measure II of political connections. The regression results with our initial two measures of financial constraints, WW index and assets tangibility, give insignificant coefficients. The regression result with leverage ratio reports negative and significant coefficient. It means informally connected firms have 2 per cent lower debt ratio than non-connected firms. The coefficient of liquidity ratio is positive and significant. The results show that connected firms have 3 per cent higher liquidity level than non-connected firms.

If we compare the results of two different measures of political connections, it shows that firms which have formal political connections get clear preferential treatments (in terms of leverage) and are less financially constrained (in terms of WW index and assets tangibility). However, the informal relationship through group connections is not shown to get preferential treatment in terms of easy access of borrowing. Instead, these informal relations are making them more liquid.

Table4.4: Relationship between financial constraints and political connection of firms

Panel I

Dependent variable =	**WW index**	**Tangibility**	**Leverage**	**Liquidity**
	1	**2**	**3**	**4**
Pol connection	-0.863**	0.0155**	0.0737***	-0.0786***
	(0.366)	(0.00621)	(0.0150)	(0.0152)
$Collateral_{t-1}$	-0.370	0.0973***	-0.282***	-0.590***
	(1.063)	(0.0180)	(0.0434)	(0.0440)
ROA_{t-1}	-2.711*	-0.131***	-0.683***	0.735***
	(1.441)	(0.0244)	(0.0589)	(0.0596)
$Employees_{t-1}$	-0.0254	0.00249	-0.0352***	0.0354***
	(0.181)	(0.00307)	(0.00739)	(0.00748)
Q_{t-1}	0.0335	-0.00676**	0.0107	-0.0106
	(0.177)	(0.00300)	(0.00723)	(0.00732)
age	0.00613	0.000391**	-0.00138***	0.00128***
	(0.00958)	(0.000162)	(0.000391)	(0.000396)
Foreigndum	-0.932	0.0124	-0.0320	0.0236
	(0.634)	(0.0107)	(0.0259)	(0.0262)
Observations	1,503	1,503	1,503	1,503
R-squared	0.175	0.157	0.215	0.317

Panel II

Dependent variable =	WW index	Tangibility	Leverage	Liquidity
	1	2	3	4
Pol Connection	0.353	-0.00322	-0.0293*	0.0342**
	(0.412)	(0.00698)	(0.0169)	(0.0171)
Collateral$_{t-1}$	-0.434	0.0982***	-0.276***	-0.596***
	(1.065)	(0.0181)	(0.0438)	(0.0443)
ROA$_{t-1}$	-2.614*	-0.132***	-0.691***	0.743***
	(1.442)	(0.0245)	(0.0593)	(0.0601)
Employees$_{t-1}$	-0.0662	0.00313	-0.0318***	0.0316***
	(0.181)	(0.00307)	(0.00744)	(0.00754)
Q$_{t-1}$	0.0341	-0.00671**	0.0107	-0.0105
	(0.177)	(0.00301)	(0.00729)	(0.00738)
age	0.00547	0.000397**	-0.00133***	0.00122***
	(0.00963)	(0.000163)	(0.000396)	(0.000401)
foreigndum	-0.863	0.0118	-0.0377	0.0303
	(0.641)	(0.0109)	(0.0263)	(0.0267)
Observations	1,503	1,503	1,503	1,503
R-squared	0.173	0.154	0.204	0.306

Note: Standard errors in brackets. Pol Connection is a dummy equal to 1 if firms are politically connected and 0 otherwise. * Significant at 10%, ** significant at 5%, *** significant at 1%. Panel I reports the results when we use formal measure of political connections. Panel II reports the results when we use informal measure of financial constraints.

Robustness test

Endogeneity between political connection and financial condition can be a concern in our study. For example, some firms may have easier access to make political connections because of having different resources. Similar to Wu et al. (2012) and Xu et al. (2013), to take into account the possibility of self-selection, we will now apply Heckman's (1979) two-stage treatment effect model.

Econometrically, the Heckman model is used to correct the sample selection bias. This sample selection bias arises due to the possibility of a non-random selection of samples. The Heckman model is an estimation procedure that eliminates the specification error for the case of a non-randomly selected sample.

In our study, Heckman sample selection model is based on the assumption that the problem of non-random sample selection occurs as firms may self-select into the political activity that offers a better match with their resources and thereby, their economic output. Therefore, our selection equation will see whether firms are politically connected or not. Without modelling such self-selection, a regression of financial constraint measures on the choice of political connectedness may lead to erroneous results for each connected and non-connected category.

The first stage of the procedure includes a probit estimation, in which a dummy variable indicates the political connection of the firms. We regress this dummy variable against the same independent variable used in the main model plus three additional variables (instruments). For the case of Pakistan, the ethnic background of Pakistan's leading business elites has been established (Rehman, 2006). The major industrial families belong to five ethnic groups, which are settled into two developed provinces: Punjab and Sindh. Therefore, firms located in these two provinces are more likely to have political connections. In addition, previous studies (Agrawal and Knoeber, 2001; Boubakri, 2008) have proved that a firm's location is related to political connections. Therefore, we will use location dummy as our first instrument variable. Firms with a larger size of board of directors (BOD) tend to have political connections. Boubakri (2008) highlights that politically connected firms have a larger board of director than non-connected firms. It means the size of the board is positively related to the firm's political connections. Hence, we will use dummy of Board of director as our second instrument variable. Apart from this, a firm's status to foreign trade is also linked with political connections of the firms; therefore, our third instrument variable is dummy of firm export status.

The second stage regression will use the estimated probability of political connections, which has been estimated in the first stage and is called the treatment effect instrument. Inverse Mills Ratio (IMR) will be generated from these estimated probabilities of first stage regression. This IMR will be included in the second stage regression equation. The rest of the control variables remain the same.

Our regression equations for stage one and stage two will be as follows:

$$Polcon_i = \beta_0 + \beta_1 Location\ dummy + \beta_2 BOD\ dummy + \beta_3 Exp\ dummy_{it} + \beta_4 Age_{it} + \beta_5 Size_{i,t-1} + \beta_6 Collateral_{i,t-1} + \beta_7 Profit_{i,t-1} + \beta_8 Growth\ opportunities_{i,t-1} + Foreign\ dummy_i + industry\ \&year\ dummies \quad \text{Stage I}$$

In stage I, Polcon is dummy variable, which is equal to 1 if the firm is politically connected and 0 otherwise. Location dummy is equal to 1 if firms are located in two large provinces: Punjab or Sindh, and 0 otherwise. BOD dummy is equal to 1 if the firm has more than two board of directors, and 0 otherwise. Export dummy is equal to 1 if the firm exports to foreign market, and 0 otherwise. All other controlled variables are calculated the same as were used before.

$$FC_{it} = \beta_0 + \beta_1 Polcon_i + \beta_2 Age_{it} + \beta_3 Size_{i,t-1} + \beta_4 Collateral_{i,t-1} + \beta_5 Profit_{i,t-1} + \beta_6 Growthopportunities_{i,t-1} + foreign\ dummy_i + industry\&year\ dummies \quad \text{Stage II}$$

Panel I gives the estimation results corresponding to Measure I (formal) of political connections. Panel II gives the estimation results corresponding to Measure II (informal) of political connections.

Panel I(A) of table 4.5 shows that the number of board of directors' members and firm size are positively connected to the firm's political connections. In Panel I(B), IMR for WW index and assets tangibility are not significant, which means that there is no sample selection problem. The coefficients of both are somehow decreased in panel B of table 4.5, in comparison with the coefficients of both variables in panel I of table 4.4. The coefficients of IMR of leverage and liquidity are significant, which shows that a sample selection problem may exist. We get significant coefficient of political connection dummy while using leverage ratio and liquidity ratio as a measure of financial status. The coefficients of both leverage and liquidity ratios have increased somehow.

Panel II (B) of table 4.5 shows that sample selection was a problem for leverage and liquidity ratio, as coefficients of IMRs are weakly significant in panel B. The results, even after controlling for endogeneity, show that informal relations do not bring significant financial patronage to firms.

Overall, on the basis of all these econometric estimations, we can argue that formal political relationships of firms bring significant financial advantages to firms when compared with informal political connections of the firms in Pakistan.

Table4.5: Heckman treatment model

Panel I

Dependent variable = Dummy of political connections	**Measure I**
Panel A: First stage probit model of the Heckman treatment effect test	
Collateral$_{t-1}$	0.188
	(0.204)
Profit$_{t-1}$	-0.312
	(0.280)
Location dummy	-0.100
	(0.132)
BOD dummy	0.385***
	(0.0767)
Exp dummy$_{it}$	0.136
	(0.0964)
Age$_{it}$	-0.000418
	(0.00178)
Size$_{t-1}$	0.104***
	(0.0355)
Growth opportunities$_{t-1}$	0.0202
	(0.0333)
Foreign dummy	-0.0466
	(0.120)
Constant	-1.256***
	(0.318)
Observations	1,503

	WW index 1	Tangibility 2	Leverage 3	Liquidity 4
Panel B: Second stage regression after controlling for selection bias				
Pol connection	-0.853**	0.0165***	0.0809***	-0.0859***
	(0.369)	(0.00628)	(0.0151)	(0.0153)
$Coll_{t-1}$	-0.212	0.0943***	-0.257***	-0.617***
	(1.069)	(0.0182)	(0.0438)	(0.0443)
ROA_{t-1}	-2.542*	-0.138***	-0.739***	0.791***
	(1.468)	(0.0250)	(0.0602)	(0.0608)
$Employees_{t-1}$	-0.00561	0.00253	-0.0148*	0.0153*
	(0.198)	(0.00337)	(0.00811)	(0.00820)
Q_{t-1}	-0.0138	-0.00596**	0.0128*	-0.0130*
	(0.175)	(0.00298)	(0.00719)	(0.00726)
Age_t	0.00407	0.000459***	-0.00149***	0.00138***
	(0.00949)	(0.000162)	(0.000389)	(0.000394)
invmills1	-2.793	0.130	1.045***	-1.039***
	(4.889)	(0.0832)	(0.200)	(0.203)
Constant	1.247	0.909***	0.148	0.778***
	(3.735)	(0.0636)	(0.153)	(0.155)
Observations	1,503	1,503	1,503	1,503
R-squared	0.172	0.147	0.207	0.312

Note: Standard errors in brackets. Pol connection is a dummy equal to '1' if firms are politically connected and '0' otherwise. Location dummy is equal to 1 if firms are located in two large provinces: Punjab or Sindh, and 0 otherwise. BOD dummy is equal to 1 if the firm has more than two board of directors, and 0 otherwise. Export dummy is equal to 1 if the firm exports to foreign market, and 0 otherwise. * Significant at 10%, ** significant at 5%, *** significant at 1%.

Panel II

Dependent variable = Dummy of political connections	**Measure II**
Panel A: First stage probit model of the Heckman test	
Collateral$_{t-1}$	0.379*
	(0.228)
Profit$_{t-1}$	0.0467
	(0.302)
Location dummy	-0.279*
	(0.144)
BOD dummy	0.0448
	(0.0808)
Exp dummy$_{t}$	0.209*
	(0.110)
Age	0.00528***
	(0.00194)
Size$_{t-1}$	0.105***
	(0.0391)
Growth opportunities$_{t-1}$	-0.124**
	(0.0564)
Foreign dummy	-0.653***
	(0.138)
Constant	-0.546*
	(0.316)
Observations	1,425

	WW index 1	Tangibility 2	Leverage 3	Liquidity 4
Panel B: Second stage regression after controlling for selection bias				
Pol connection	0.413	-0.00629	-0.0164	0.0212
	(0.409)	(0.00679)	(0.0173)	(0.0175)
$Coll_{t-1}$	-0.355	0.0705***	-0.255***	-0.620***
	(1.121)	(0.0186)	(0.0475)	(0.0480)
ROA_{t-1}	-2.932**	-0.104***	-0.704***	0.758***
	(1.483)	(0.0247)	(0.0628)	(0.0635)
$Employees_{t-1}$	-0.206	-0.00179	-0.0246***	0.0243**
	(0.223)	(0.00371)	(0.00946)	(0.00956)
Q_{t-1}	0.107	-0.00753**	0.00626	-0.00593
	(0.187)	(0.00310)	(0.00791)	(0.00799)
age	0.00217	0.000482***	-0.00100**	0.000905**
	(0.0102)	(0.000170)	(0.000432)	(0.000437)
invmills1	-5.943	-0.0453	0.433*	-0.457*
	(5.849)	(0.0972)	(0.248)	(0.250)
Constant	2.741	1.058***	0.619***	0.321*
	(4.297)	(0.0714)	(0.182)	(0.184)
Observations	1,425	1,425	1,425	1,425
R-squared	0.174	0.140	0.166	0.291

Notes: Standard errors in brackets. Pol connection is a dummy equal to '1' if firms are politically connected and '0' otherwise. Location dummy is equal to 1 if firms are located in two large provinces: Punjab or Sindh, and 0 otherwise. BOD dummy is equal to 1 if the firm has more than two board of directors, and 0 otherwise. Export dummy is equal to 1 if the firm exports to foreign market, and 0 otherwise. * Significant at 10%, ** significant at 5%, *** significant at 1%.

5.3 The effects of political connection on firm performance

We then present the results estimated by the equation 3 to see the impacts of political connections on firm performance for the period 2006-2015. To see the impact of political connections on performance, we use WW index and Leverage ratio as measures of financial constraints[48]. We use Return on Assets (ROA), Tobin's Q and Total Factor Productivity (TFP) to measure firms' performance. All specifications include regional, time and industry dummies. In the previous section, we have seen that Measure I of Political connections is far stronger than Measure II. For the remaining analysis of our study, we will only report the results with Measure I of Political connection.

[48] The reason to use Leverage ratio is the popularity of this variable in the literature. We also use WW index as it is a popular measure of financial constraint.

Columns 1 and 2 of Table 4.6 report the results when dependent variable is Return on Assets (ROA). Column 1 gives the results when measure for financial constraint is WW Index. Column 2 gives the results when measure for financial status is Leverage ratio. Firm performance is regressed on dummy of political connection, financial variable and other controlled variables. The coefficient of dummy of political connection is significant and negative with our both measures of financial constraint in column 1 and 2. It shows that firms with political connections have lower return on assets relative to non-connected firms. More specifically, it shows that firms with political connections have 4 per cent lesser return on assets as compared to non-connected firms. To establish this result more strongly, we will re estimate the equation 3 with alternative measure of firm performance. Columns 3 and 4 of Table 4.8 report the results when dependent variable is Tobin's Q (growth opportunities). The coefficients of dummy of political connection are significant and negative with both measures of financial status; WW index and leverage ratio. It further proves that firms with political connections have lower investment opportunities as compared to with those which have no political connections by 10 per cent and 8 per cent, when using two different measures of financial status; WW index and Leverage respectively. Columns 5 and 6 report the results when dependent variable is Total Factor Productivity (TFP). The coefficients of dummy of political connections are significant and negative with both measures of financial constraints. It shows firms with political connections have lesser productivity by 2 and 3 per cent. Our results of effects of political connections on firms performance are consistent to previous studies (such as Saeed et al., 2015, Fan et al., 2008 ; Khawja and Mian, 2005).

These results are robust for all three different measures of firms' performance. The negative impact of political connections on firm's performance shown by leverage ratio further suggests that managers of connected firms are exacerbating agency problem by utilising

easily available funding to personal interests. This also shows that Pakistani financial institutions are not only biased to politically connected firms but also highlight the misallocation of resources. It also rejects the possibility that financial capital is provided to politically connected firms as they are efficient.

The control variable like Size is expectedly and consistently positive and significant in all regression estimations. It means that large firms are more expected to perform better as these have more market power and resources. Foreign ownership is also performing positively in most of estimation results. The coefficient of capital intensiveness is also significant and positive in all empirical specifications. It shows higher the firms are capital intensive, better the firm's performance is.

Next, WW index (measure of financial condition) and leverage are both positively correlated with all measures of firms' performance. These results are consistent with some studies in literatures (such as, Cull etal., 2014 ; Musso and Schiavo, 2008). One possible explanation of a positive correlation between financially constrained firms and firm's performance could be that constrained firms are good firms and quickly transform internal and external finance into high return of assets, high investment opportunities and high productivity. There could also be the possibility that constrained firms have to improve the productivity in order to stay in the market, this also refers to the role of financial pressure on firms' performance highlighted by Nickell and Nicolitsas(1999) and Musso and Schiavo (2008).

On the other hand, it could also be regarded the evidence to show the severe misallocation of financial capital by politically connected firms in Pakistan. [49] It may be an evidence of the misuse of easy access of external funds of privileged firms in Pakistani firms. Weak legal system, less accountability in the end of managers and high corruption rate could justify the bad performance of these firms.

[49] Cull et al.(2015) finds that Chinese large non-state firms with weak government connections, likely the engine for innovation in China, are especially financially constrained, due perhaps to the formidable hold that their state rivals have on financial resources in China. On the other hand, it is well-known that Chinese non-state firms have much better TFP than state-owned firms as shown in the literature. Their empirical results suggest that government connections play an important role in explaining Chinese firms' financing conditions, and provide further evidence on the nature of the misallocation of credit by China's dominant state-owned banks.

Table4.6: Firm performance and political connections

Dependent Variables =	ROA		Tobin's Q		TFP	
	WW index 1	Leverage 2	WW index 3	Leverage 4	WW index 5	Leverage 6
Polcon dummy	-0.0414**	-0.0396***	-0.108**	-0.0811***	-0.0220*	-0.0345***
	(0.0205)	(0.0139)	(0.0441)	(0.0221)	(0.0131)	(0.0120)
WW index$_{t-1}$	0.0702***		0.157***		0.0384***	
	(0.0182)		(0.0396)		(0.0127)	
Leverage$_{t-1}$		0.576***		0.876***		0.508***
		(0.160)		(0.222)		(0.130)
Capitalinten$_{t-1}$	0.222***	0.00324	0.503***	-0.0115	0.295***	0.180***
	(0.0672)	(0.0340)	(0.149)	(0.0527)	(0.0476)	(0.0260)
Size$_{t-1}$	0.160***	0.0403***	0.356***	0.0617***	0.166***	0.110***
	(0.0313)	(0.0148)	(0.0683)	(0.0212)	(0.0245)	(0.00938)
Foreigndum	0.0827*	0.0517***	0.189*	0.106***	0.0252	0.0176
	(0.0457)	(0.0182)	(0.0996)	(0.0326)	(0.0268)	(0.0161)
Darbin-Hausman test(p-value)	0.00	0.00	0.00	0.00	0.00	0.00
F-statistics	19.23	6.29	27.98	6.29	44.35	10.94
(p-value)	0.00	0.012	0.00	0.0122	0.00	0.001
Observations	1,498	1,503	1,498	1,503	1,498	1,503

Notes: Standard errors in brackets. * Significant at 10%, ** significant at 5%, *** significant at 1%. Darbin-Hausman test is a test to determine whether endogenous regressors in the model are in fact exogenous. This is a test with a null of variables are exogenous. if the test statistics are significant then the variable being tested must be treated as endogenous. For the validity of the instruments, whether instruments are weak or strong, we use F-test. This is a test with the null of instruments are weak. If F-test is not significant then instruments have no significant explanatory power.

5.4 The effects of political connections on a firm's performance across firms with different levels of financial constraint

Our next test scrutinizes variations in the effects of political connectedness on firms' performance across different degrees of financial constraints. We argue that political connections decrease the frictions and information asymmetry of connected firms and reduce the cost of external finance for those firms[50]. In turn, these firms become less financially constrained. Whether these less financially constrained politically connected firms affect firms' performance differently? In the previous section, we found strong evidences that politically connected firms are performing poorly as compared to stand alone firms. In particular, to see whether the negative relationship between political connected firms and firms' performance varies across different level of financial constraints, we look at the interaction term (PCdummy *FC) in equation 4. We estimate equation 4 by 2SLS estimator, the results are provided in table 4.7.

Columns 1 and 2 of table 4.7, report the results of estimation equation 4 when using Return on Assets (ROA) as measure of firm performance. Our measure of financial constraint is WW index for column 1 and Leverage ratio for column 2. Regarding the variable of interest, our key interaction term (PC dummy*FC) appear with significant and positive sign when our measure of financial constraint is WW index. It suggests that firm's financial status stimulates positive impact on firms return on assets. The possible explanation of higher WWindex (higher the financial constraints) and higher performance can be the result of financial pressure on firm's performance or the misallocation of the financial resources as

[50] As we find politically connected firms are financially less constraints in previous section

explained in the previous section. The interaction term is insignificant when we use leverage ratio as a measure of financial constraints in empirical specification.

To the further validation of our results, equation 4 is re estimated with other measure of firms' performance (Tobin's q). It gives insignificant coefficients of interaction term with both measures of financial constraints in columns 4 and 5. We re estimate equation 4 with our third measure of financial constraints (TFP) and give the results in columns 5 and 6. We find significant and positive coefficient of interaction term with WW Index, but insignificant coefficient of interaction term with Leverage ratio.

The coefficient on the interaction term (PC*FC) shows the way in which the link between political connections and firm's performance differ across the firm's financial status. The positive sign of interaction term with measures of performance (ROA and TFP) show that higher level of firm's financial constraints are positively correlated with the performance of politically connected firms. We can associate these results with the argument of financial pressure on firms performance given by Nickell and Nicolitsas(1999).

The dummy of political connection remains significant and negative with WW index only. In most of the specifications in table 4.7, capital intensiveness, size of the firms and foreign status dummy are positively associated to firm's performance, showing a positive relationship between these controlled variables and firms' performance.

Overall, the effects of financial status remains significant and positive even after controlling the joint effect of political connections and financial status. It shows that the relationship

between firm's financial status and performance is quite strong in Pakistani listed firms. Similar to previous section, we find positive relationship between level of financial constraints and firm's performance. The possible explanations of this correlation lie in pressure of firm's financial status on firms' performance and swift transforming of financial capital into productivity.

Table 4.7: Political connections, financial constraints, and performance

Dependent variables =	ROA		q		lntfp	
	WW Index	Leverage	WW Index	Leverage	WW Index	Leverage
	(1)	(2)	(4)	(5)	(7)	(8)
Polcon dummy	-0.0863***	-0.150	-0.168***	-0.123	-0.0849***	0.0625
	(0.0203)	(0.0993)	(0.0481)	(0.169)	(0.0168)	(0.104)
$WWIndex_{t-1}$	0.0503***		0.131***		0.0105	
	(0.0148)		(0.0337)		(0.0131)	
$Leverage_{t-1}$		0.446**		0.870***		0.671***
		(0.214)		(0.326)		(0.174)
Polcon*FC	0.0541**	0.287	0.0715	0.133	0.0757***	-0.217
	(0.0269)	(0.234)	(0.0578)	(0.402)	(0.0245)	(0.237)
$Capitalinten_{t-1}$	0.190***	-0.0364	0.461***	-0.0382	0.251***	0.199***
	(0.0601)	(0.0431)	(0.135)	(0.0677)	(0.0573)	(0.0301)
$Size_{t-1}$	0.156***	0.0257*	0.351***	0.0486**	0.161***	0.111***
	(0.0258)	(0.0144)	(0.0587)	(0.0215)	(0.0254)	(0.00943)
Foreigndum	0.0881**	0.0488***	0.196**	0.0972***	0.0329	0.00829
	(0.0390)	(0.0176)	(0.0882)	(0.0329)	(0.0304)	(0.0168)
Darbin-Hausman test(p-value)	0.00	0.00	0.00	0.00	0.00	0.00
Observation	1,498	1,497	1,498	1,497	1,498	1,497

Notes: Standard errors in brackets. * Significant at 10%, ** significant at 5%, *** significant at 1%. Darbin-Hausman test is a test to determine whether endogenous regressors in the model are in fact exogenous. This is a test with a null of variables are exogenous. if the test statistics are significant then the variable being tested must be treated as endogenous.

6. Conclusion

This study investigates the effects of political connections on a firm's financial condition and corporate performance. In an attempt to test the related hypotheses, firm-level data from Pakistani listed firms is used over the period 2006–2015. This study first addresses whether politically connected firms are different from non-connected firms, particularly in terms of finance. While using two different measures of political connections, formal and informal political connections of the firms, we find that firms with formal connections are vividly different from stand-alone firms, not only in terms of finance but also in productivity. The informal political connections, however, do not bring financial advantages to firms in terms of our financial measures.

This paper then addresses the question whether a firm's political connections influence a firm's level of financial constraint. Our results show that formal political connections have a positive influence on a firm's level of financial constraint; it means politically connected firms are found less financially constrained. We also find that balance sheets of politically connected firms show high leverage rate and low liquidity ratio. We do not find any significant evidence for the case of informal political connections; therefore, we conclude that formal political connections (via board of directors to participate in elections) are more appropriate to see the effects of a relationship-based system on the economy in Pakistan.

This chapter further checks the effects of formal political connection on the level of corporate performance. We find robust evidences that firms with formal political connections are performing worse than non-connected firms. This provides the evidence of mismanagement

of firms resources and existence of agency cost in Pakistani listed firms. In addition, we also check the effects of political connections on firms' performance across different levels of financial constraints. We find some evidences to support our hypothesis that effects of political connections on firms' ROA and Total Factor Productivity (TFP) vary across different level of financial constraints. However, we find strong evidence that firm's financial status is significantly affecting firm's performance in all specifications.

In summary, our results give support to the view that crony capitalism exists in Pakistan, even though managers of connected firms are utilising these privileges to their personal gains and subsequently these firms perform bad. These results also cast doubt on the efficiency of Pakistani government reforms to tackle corrupt politicians. These results further draw the attention of policy makers to form such policies which can help to obtain the advantages of a relationship-based system when a firm's performance relies on a firm's financial condition and political connections.

Chapter 5: Conclusions

This chapter summarizes the results of this research and gives some new ideas for future research. The following section briefly paraphrases the main purpose of this study. This will be followed by the main results of our three empirical studies. The final section discusses the policy implications from our results and suggests some future research avenues.

1. Summary of Main Findings

1.2 Financial constraints of Pakistani listed firms

The first empirical chapter checks the presence of financial constraints in Pakistani listed non-financial firms. Our results based on the full sample show that Pakistani listed non-financial firms are financially constrained. It highlights the presence of information asymmetry in capital markets which makes external funds expensive. We then check whether size of the firms; group affiliation of the firms and dividend policy of the firms cause lending bias in Pakistan. Our results find that listed large firms have easy access to external finance, and they are less financially constrained in comparison with small firms. We further find that group-affiliation does not make a difference in term of financial status of the affiliated firms[51]. Dividend paying firms are financially less constrained as these have an easy access to external finance. These results are consistent with the findings of previous studies, that large and dividend-paying firms are less financially constrained. However, our results for the group-affiliated firms are not consistent with the previous studies.

[51] In our fourth chapter of the thesis, we also find that informal political connections of the firms (measured by the group affiliation of the firms) do not bring privileged treatments in term of financial advantages.

Next we check whether latest measures of financial constraints (KZ index, WW index, HP index, Assets tangibility) are applicable for the case of developing country. When we sort firms into quartiles by these measures, we find that all the accounting variables of WW index and HP index move according to the prediction of these indices for Pakistani firms. For instance, we find that least constrained firms have lower leverage ratio, higher dividend ratio, higher cash flow, higher firm growth, lower industry growth, and higher total assets in Pakistan (WW index predicts the same for least constrained firms). Similarly, we find that least constrained firms are larger in size and older in age for Pakistani listed firms (HP index predicts the same for least constrained firms). However, KZ index is not fully applicable for Pakistani firms as one of the five variables (Tobin's q) behaves differently. This negates the functioning of KZ index for the case of Pakistani listed firms. We find that the most constrained firms have low cash flow, high leverage ratio, low dividend ratio, low q value, and low cash, as compared to most constrained firms (KZ index predicts lower q for least constrained firms). The low cash flow of least constrained firms is conditional to high growth opportunities in the original KZ index. We also sort firms according to another latest measure of financial constraints; Assets Tangibility. Having higher tangible assets means, firms are financially less constrained. We find a negative relationship between the indices and Assets tangibility. As firms with high assets tangibility (less financially constrained) have also high value of all three indices (more financially constrained). We find positive relationship between leverage ratio and assets tangibility as both moves in the same direction. We further find negative relationship between Liquidity ratio and assets tangibility. This exercise shows the lack of correlation between different measures of financial constraints for Pakistani firms.

We further evaluate whether these latest measures of financial constraints are valid for the case of Pakistani firms by estimating regression. We find cash flow, total debt, age, and cash holdings as consistently significant elements to a firm's financially constrained status with the predicted signs. Tobin's q and industry sales growth appear insignificant, while size and assets tangibility appear significant but with negative signs. We argue that negative signs of assets tangibility and total assets could due to our criterion of division of firms (which is liquidity ratio). We have previously seen that liquidity and assets tangibility of firms are negatively correlated. However, this practice gives complete confidence on some sorting variables; such as cash flow, debt, age and cash holdings which remain significant in all specifications. We can further conclude that WW index is performing well with maximum number of significant components in our sample firms. It shows that WW index, as summation of different financial ratios, is valid to use for the case of Pakistani firms. Moreover, these sorting variables i.e. cash flow, age, assets tangibility and debt are also valid to use individually as measures of financial constraints.

1.2 Export decision and financial constraints

In chapter 3, we study the relationship of financial constraint and export decision of the firms in Pakistan. Using a panel of listed firms between 2006 and 2014, we estimate the role of financial status on export decisions of the firms.

The results indicate that exporters are different from non-exporters in terms of level of financial constraints. It means exporters are not only different from non-exporters in terms of age, size, quality of labour, and productivity, but also in the level of financial constraints. We

find exporters are less financially constrained by using WW index and assets tangibility as measures of financial constraints. We find less financially constrained firms are more inclined to export as compared to non-exporters. It points to the fact that exporters have to bear some additional expenses to meet the requirement of the international export market. Consequently, the less financially constrained firms would be more capable of facing these challenges as compared to the more financially constrained firms. We also check the link between leverage ratio and export decision of the firm and link between liquidity ratio and export decision of the firm. We find that exporters are highly leveraged; it shows that exporters are borrowing heavily. We do not find any significant role of the position of liquidity of the firm in export decision.

Moreover, when we check whether export starters become financially different from non-exporters before entering the export market, we find that starters become financially less constraints only in terms of assets tangibility for one or two years before entering the export market. We further check for the ex-post effects of export on the financial condition of the firms. None of our measures of financial status give a significant result, showing no financial advantage of export to firms in a span of three years post-export.

1.3 Political connections, financial constraints, and performance of the firms

In chapter 4, we see the effects of political connections on a firm's financial status and performance. Using a panel of Pakistani listed firms between 2006 and 2015, we first see whether politically connected and politically non-connected firms are different in terms of finance and productivity. Our results categorically show that firms with formal political

connections are different from politically non-connected firms in terms of finance and productivity (a measure of a firm's performance). We then see the effects of political connections on a firm's level of financial constraints. By using formal and informal measures of political connections, we find that connected firms – defined as if its directors participate in an election – are less financially constrained (in terms of WW index and assets tangibility) but more levered and less liquid. We further find that political connections via formal relationships are far stronger to get financial advantages from government than informal relationships in Pakistan. The results give overall support to the preferential treatment of connected firms via formal relations among Pakistani firms. Next, we check the effects of political connections on a firm's level of performance. The results suggest that political connections are negatively influencing a firm's ROA, investment opportunities, and level of productivity. These results support the existing evidence of managerial inefficiencies and rent extraction of affiliated politicians for personal motives.

From the above analysis, it can be seen that there is a direct relationship between a firm's political connections and financial constraints and a firm's political connections and performance. We further check the effect of political connections on a firm's performance across different levels of financial constraints. We find significant and positive coefficients of interaction term when using WW index as a measure of financial constraints. These results remain robust while using two different measures of a firm's performance (ROA and lntfp). We do not find significant coefficients of interaction term when using Leverage ratio as a measure of financial status. On the basis of these results we cannot firmly argue that the effects of political connections on firms' performance vary across different level of financial constraints. However, some results show that higher level of financial constraints is positively influencing politically connected firms' performance.

2. Policy Implications

The empirical study of this thesis suggests that listed firms in Pakistan are relying on internal sources of funds. Even though these listed firms are big companies in the country, they are still financially constrained; therefore, it is substantially important for Pakistan to develop its financial markets to facilitate the financial demand of the firms. Failure to do so, will further slowdown the process of economic growth that the economy has been encountering for almost the last two decades. Financially constrained listed firms further highlight the underdeveloped stock markets in Pakistan. These stock markets are not fully equipped to fulfil the financial demands of listed firms. It further shows that because of strict borrowing conditions and transparency requirements, listed firms might rely more on internal firms. Moreover, our results indicate a strong lending bias on the basis of size and dividend payments. The results indicate that capital market imperfections lead to binding financial constraints on investment. Therefore, it is crucial that policy makers should form some policies of the banking sector to reduce the lending bias in capital markets.

Second, our study shows the role of financial status for the decision to export. Given the importance of export sector to the development of the economy and deteriorating export level in Pakistan, policy makers should plan reorganization of financial markets to reduce the capital market imperfections. This may reduce the level of financial constraints of prospective exporters, and encourage them to compete at international level.

Third, our study confirms a superior position of politically connected firms in terms of getting preferential treatment from governments and banks. Our results lend support to the

crony capitalism view that Pakistani firms benefit from the political connections. Our analysis emphasises the significance of political connectedness an important determinant of financial policy that cannot be overlooked. We highlight that political connections are acting like a tool of agency problem by deteriorating a firm's performance. These preferential treatments could be used in enhancing a firm's performance if managers would be held strictly accountable to their actions. Policy makers can play an important role in this regard by introducing strict laws of accountability. Further more, firms can use these re

3. Suggestions for Future Research

The effects of financial constraints on a firm's behaviour are an important topic for researchers. This section of the topic intends to provide some suggestions for future researchers to extend our research.

First, due to data unavailability, our study could only rely on quantitative information to categorise firms into financial status to check the validity of well-known measures of financial constraints. The division of firms on qualitative information alongside quantitative information of firms for partitioning firms in to financial status can be a good idea for further extending this research. Moreover, building a new index on the significant financial variables for developing countries that may pass all the robustness tests will be important contribution.

Second, our research on the relationship between financial constraints and the extensive margin of trade gives an idea for future researchers to also check the effects of financial constraints on intensive margins of trade for Pakistan.

Third, we use time-invariant dummy of political connections to see the effect of political connections on financial constraints and performance. Time-variant dummy of political connections can help to see the pre- and post-effects of these political connections on financial status and level of performance of the firms. Moreover, our measure of informal political connections looks weak, so any other measure to check informal relations of directors of firms with government may give a clearer picture.

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