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Firm Characteristics and Cash-Cash Flow Sensitivity of the Manufacturing Sector of Pakistan

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Abstract

This paper investigates the sensitivity of corporate cash holdings to cash inflows (CFSC). The study also aims to investigate the differential effects of CFSC across financially-constrained and unconstrained-firms and across firms having high and low-Tobin's Q. The study uses GMM model on unbalanced firm-level data of all manufacturing firms listed at the Pakistan Stock Exchange over the period 2000-2014. The results show that financially-constrained firms are more likely to hold extra cash out of their cash inflows than their unconstrained counterparts. Further, the sensitivity of cash holdings to cash inflows is more in growing firms than other firms.

Keywords: *Cash flow sensitivity, Cash, Tobin's Q, Constrained firms, GMM*

1. Introduction

Why do firms prefer to hold cash in their balance sheets? Why are the cash holding pattern of developed and developing countries different? Why financially-constrained firms are more conscience of their liquidity? How does the value of cash differ across firms? What do firm-specific factors determine the cash flow sensitivity of cash? These are the major questions which attracted the attention of academia, researchers, firm managers, and policymakers to understand the cash holding behavior of corporate firms. Indeed, over the last three decades, the dynamics of corporate cash holdings has achieved a great deal of attention in both the theoretical and empirical aspects.

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Over the last few decades, many researchers have conducted research on empirical cash holdings and its determinants (Opler, Pinkowitz, Stulz & Williamson, 1999; Saddour, 2006; Ferrerira & Vilela, 2004), valuation of liquid assets (Denis & Sibilkov, 2009; Pinkowitz & Williamson, 2006; Faulkender & Wang, 2006; Shah & Shah, 2016), cash holding and financial constraints, cash flow and investment sensitivity (Fazzari, Hubbard, Petersen, Blinder, & Poterba, 1988; D'Espallier, Vandemaele & Peeters, 2008) and finally, CFSC (Almeida, Campello & Weisbach, 2004; López-Gracia & Sogorb-Mira, 2015).

The sensitivity of retained cash[3] to cash flows is one of the emerging issues of corporate finance. The first paper that introduced CFSC in the literature was Almeida et al., (2004). Almeida et al. (2004) developed a new approach in the finance literature. They developed an empirical equation to estimate the CFSC. They also classified financially-constrained and unconstrained firms. According to them, they overcome the previous problem in the literature that the model for financially-constrained firms has not allowed any discrepancy due to future growth opportunities. As well as, their theoretical model argues that the cash holdings of financially-constrained firms depend on neither on cash generated from operations nor on future growth prospect.

Cash holdings become important particularly when other financial sources are insufficient to satisfy a firm's financing needs. Capital market frictions increase the cost of external funds as compared to retained earnings (Greenwald, Stiglitz & Weiss, 1984). The value of cash that has been held by the firm will take importance when there are investment opportunities and the firm faces financing constraints. Supporting this view, a number of studies show that financially-constrained firms hold more cash in their reserves, while financially-unconstrained firms do not follow any systematic approach to hold cash for unforeseen events. Almeida et al. (2004) and López-Gracia and Sogorb-Mira (2015) provide evidence that financially-constrained and unconstrained firms use different policies because constrained firms face problems to access capital through external sources and thus they save more cash, while financially-unconstrained firms do not.

[3] *Retained cash, cash held, and reserve cash are used interchangeably.*

Given the importance of the CFSC in policy discussions of the manufacturing firms, this paper investigates the link between the cash held by firms and their cash flows generated from operations of Pakistani firms. Specifically, the study has the following objectives (i) to examine the sensitivity of cash holdings (CFSC) to cash inflows for Pakistani non-financial firms. (ii) to study whether the CFSC differs for financially-constrained and unconstrained firms. (iii) to examine the influence of growth options on CFSC relationship and (iv) to study whether the determinants of positive and negative cash-cash flow sensitivity differ.

This study contributes to the literature in two ways. First, it empirically tests the determinants of cash holdings' sensitivity to cash inflows in Pakistani listed non-financial firms for the period of 2000 to 2014. For this, this study categorizes the sample firms into financially-constrained and financially unconstrained firms and firms having high-growth and low-growth opportunities. For categorizing firms as a financially-constrained and unconstrained, the researchers use Whited-Wu index. Second, this study's framework to examine the sensitivity of cash and cash flows significantly differs from the existing studies. We found an accumulative correlation between cash and cash flows, and then examined how firm-specific factors are related with this correlation. This approach enables us to identify the factors that are positively and negatively related to CFSC. It should be noted that unlike us, most of the previous studies have just observed the impact of cash flows on cash holdings by considering cash flows as an independent variable and cash holding as a dependent variable in their regression analysis.

Another worth noting aspect in this study is that it sorts out the negative and positive correlation between retained cash and cash flows[4] of firms and then examine whether the negative and positive CFSC differ for firms having different firm characteristics. Empirical evidence on the determinants of the cash-cash flows sensitivity is not only important for firm managers but also for investors, researchers and academia to fully understand the links between cash holdings and cash flows.

The remainder of the paper proceeds as follows, Section 2 introduces theoretical and empirical review. Section 3 covers the empirical models, data, and

[4] *Correlation between cash and cash flow has interchangeably used for cash flow sensitivity of cash*

methodology. Empirical results and conclusion remarks are explained in section 4 of the paper.

2. Theoretical and Empirical Review

2.1 The trade-off theory

The Myers (1977) proposed Trade-Off theory. In his theory, he suggests that firms make optimal levels of cash by comparing costs and benefits of held cash in their accounts.

There are several Classic models in finance, for example, Keynes (1937), and Miller and Orr (1966), build up an important demand model for liquid cash. Keynes (1937) was the first who primarily expressed the major advantage of having the cash by firms in their accounts. According to him firms having cash in their accounts enables them to accept net present value projects when they arise in the capital market. Moreover, if firms fail to retain cash, the likelihood of incurring financial distress turn out to be high and resultantly they can't meet their obligatory debt payments (Faulkender & Wang, 2006).

Another way to explain the importance of cash holding is through precautionary cash motives. With accordance to precautionary motives, firms reserve cash to safeguard themselves against adverse shocks faced by cash flows of the firm. Thus, it avoids the costs associated with liquidity constraints.

However, the costs of having outside finance or the additional cost associated with the cost of shortfalls would differ in accordance with different firm characteristics. For instance, unconstrained firms incur minimal cash while taking funds from external environment as compared to their counterpart financial constrained firms. Corporate firms, facing such a high cost might, retain huge cash reserves. Otherwise, the outside financing limitations would force the firm to sacrifice the positive net present value projects.

2.2 The pecking order theory

The Pecking Order theory of Myers and Majluf (1984) explains the classification and ranking of the main resources of finance that can be used by any

firm to finance their operational as well as other activities. The firms first utilize their internally generated funds or retained earnings, then they finance their capital needs by debt, and finally they issue equity. This theory suggests that firms for no any reason retain cash in their balance sheets as a targeted cash level, while as an alternative; cash has been used as a buffer between cash holdings and investment requirements. Consequently, when firm operating cash flows are enough to fulfill the required level of cash, they use that money for investment purpose, repay debt and again accumulate cash. But if the internally generated funds are insufficient to fulfill the desired level of investment, firms make use the collected cash holdings, and if required, will issue debt and finally, firm use equity as the last source of finance[5].

2.3 Determinants of cash-cash flow sensitivity

2.3.1. The sensitivity of cash holdings to cash flows

Cash holdings are liquid assets held by firms in their balance sheet as a reserve and on the other side cash flows are the source of finance generating from the operations of firms. Cash flows are the inflows of cash recorded in the income statement of a firm. Cash flows are the ready sources of liquidity and replace with cash to finance the investment opportunities[6]. The Pecking Order theory of corporate finance also explains that firms first prefer to utilize their internally generated funds before floating shares in the capital market. Keeping in view the above discussions, it is expected that firms producing large cash flows are expected to maintain more cash level. Among most of the studies that supports this prediction are tested on US market (Myers & Majluf, 1984; Opler et al., 1999) tested this hypothesis on British market (Ozkan & Ozkan, 2004), and empirical result obtained for European Monetary Union (EMU) countries (Ferreira & Vilela, 2004). Thus, the researchers expect a positive relationship between reserved cash and cash flows.

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[5]*See the work of Ferreria and Vilela (2004), Saddour (2006), Han and Qui (2007), and Al-Amameh (2015).*

[6] *Kim et al., (1998) declared the negative relationship between cash and cash flows, as they believe that cash flows stand as a supplementary source of liquidity for the firm so that it can substitute cash. For more details on how cash flows are important for investment purpose see the work of Kim et al., (1998).*

In an environment where the operational cash inflows of firms are high, firms prefer to use internally generated cash to finance net present value projects, cash is also used to pay dividends, to repay debt obligations and finally to retained as a reserve. For instance, D'Espallier et al. (2008) confirm that cash holding is highly related to cash flows. The sensitivity of cash and cash flow value for all firms of manufacturing Belgium small and medium enterprises found 0.13. Their sample consists of five-year sample data from the period 2000 to 2004.

Therefore, one may possibly expect the cash holdings will increase with cash flows levels.

Hypothesis 1: Cash holdings are highly sensitive to cash flows.

2.3.2. Financially constrained and unconstrained firms

Financially-constrained firms are those firms having inability to manage financial funds while making investment. It includes financial frictions like credit constraints, incapability to issue equity, and dependency on financial institutions. Constrained firms can alleviate the unfavorable impact of financial constraints by retaining greater cash in their balance sheet (Almeida et al., 2004; Faulkender & Wang, 2006). CFSC is significantly higher for high cash constrained firms than for low cash constrained firms Denise and Sibilkov (2009). So, constrained firms reserve more cash from generated cash flows as compared to unconstrained firms. Almeida et al. (2004) paper shows approximately 5-6% cash retained on an each additional cash flows, on the other hand unconstrained firms do nothing (see, Table III of Almeida et al., 2004).

Hypothesis 2: Financially-constrained firms display significant positive CFSC

2.3.3 Growth opportunities

The corporations with greater growth investment opportunities have to guarantee the ability to finance available positive net present value projects. Certainly, these types of firms can experience two situations: either they will face in existent of outside funds or costly external funding accessibility. In such

circumstances, these firms have to give up some of their profitable investment projects.

On the other hand, when firms retain enough amount of cash in their accounts they able to undertake all the net present value projects available to them. Due to high investments, firms can make more cash inflows from their retained cash. As a result, they hoard large amount of cash from their large amount of cash inflows. Furthermore, firms having access to high growth opportunities incurred high cost of external funds because they have to utilize all net present value projects moves to external financing environment. So these types of firms hoard large cash as a reserve to overcome lack of finance in near future.

Similarly, the Trade-off theory assists the firms with healthier investment prospects have higher cost of finance, for the reason that the positive net present value of these investments opportunities disappear, when firms face bankruptcy. So that, those firms with greater and healthier investment prospects tends to reserve cash more in their accounts to avoid monetary distress. Hence, the expected association between growth opportunities (market value to book value of asset or Tobin's Q)[7] and reserved cash tends to be positive. Therefore, it is possibly to find positive association between cash and the investment growths.

As shown by López-Gracia and Sogorb-Mira (2015) high-growth firms record positive coefficients and retained high cash from their cash inflows. On the other hand, low growth firms have less estimated coefficients. These results support the Almeida et al., (2004) estimation, that high growth firms (financially-constrained firms) pursue the policies of greater retention of cash, (Han & Qiu, 2007; Riddick & Whited, 2009; Denis & Sibilkov, 2009). Furthermore, Tobin's Q could also affect the cash policy of firm. It is mainly significant for financially-constrained firms as they suffer from obtaining liquid asset or simply cash and making the projected investments, in near future,

The high and significant sensitivity of financially unconstrained firms reveal the high investment growth of this cluster of firms. Whereas, financially-constrained firms retain liquid asset to hedge the volatility in their cash inflows,

[7] *Note that growth opportunities, Tobin's Q, and market value to book value of asset are all interchangeably used in our study.*

financially unconstrained firms may possibly reserve cash to improve expecting upcoming investments. For example, the sensitivity of cash and cash flow estimates reveal that the base line model estimation of López-Gracia and Sogorb-Mira (2015) reported 0.0027 (0.472), −0.0114 (0.222) for unconstrained and constrained firms respectively.[8]

In various empirical studies like, Harris and Raviv (1990), Opler et al. (1999), López-Gracia and Sogorb-Mira (2015), Shleifer and Vishny (1992), and Ferreira and Vilela (2004) this association between growth opportunities and reserved cash level has explored. For instance, Myers and Majluf (1984) also indicate that those firms whose value is largely determined by their expected growth prospects have larger information asymmetry. In the absence of symmetric information linking investors and managers, the external financing expected to be more expensive. This asymmetric information also generates the chance of severe agency conflicts related to the debt; as a result, it leads to under investment Myers (1977), in so far as it discourages stakeholders from getting on profitable projects. As in previous theories it has been revealed that, when the cash flows of firm increase, it tends to increase the hoarding of cash. This shows the high CFSC. Thus, the researchers look forward to a positive connection between growth opportunities and reserved cash. It means that firms are expected to accumulate large amount of cash to invest in profitable investments.

Hypothesis 3: The CFSC is higher for firms with high-growth opportunities as compared to low-growth firms.

2.3.4. Firm size

Firm size is another important characteristic of a firm. Miller and Orr (1966) classified firms according to the size of firms and revealed that size of a firm has played vital role in cash management. They recommend that for larger firms economies of scale exists while managing cash. In this way, it would lead the large size firms to hold smaller amount cash as compared to small size firms. Further, it is argued that the fixed cost is not associated with the size of borrowing funds. So, the smaller firms have to incur the same fixed cost on less amount of loan while the larger firms obtained large amount of loans with the same fixed cost as incurred

[8]*See Table 4 of López-Gracia and Sogorb-Mira (2015).*

by small size firms. The fee incurred in obtaining funds is same regardless of large and small size firms. It shows that raising funds by smaller firms more expensive relative to their counterpart larger firm.

In addition, it is commonly accepted that since large size firms are more diversified, expected to have lower chance to face financial distress (Rajan & Zingales, 1995). On the basis of the above discussions and the literature, it is expected that the link between cash and size of firm is negative. It is considering that with the increase in the size of firm the operational cash inflows of the firm will increase. Therefore, firms increase their cash holding with the increase in cash flows. As can be seen from the work of D'Espallier et al. (2008) for the smaller firms, the projected cash flow sensitivity is to some extent higher with a predictable value of 0.15 for the larger firms, expected sensitivity between cash and cash flows is somewhat lower with predictable value of 0.09.

Hypothesis 4: The cash-cash flow sensitivity is high for small firms.

2.3.5. Leverage

Leverage is the total debt to total assets of a firm. It increases the control on the capital market. Thus, firms use debt to capture investment projects from the capital markets. Leverage is a technique to multiply the gains and the losses as a result of operational activities. Most often, the borrowed funds are used for buying assets, with belief that the purchased assets generate more income as compared to its borrowing cost. However, most often it seems that borrowing cost exceeds the income generated from those assets or gradually the price of asset falls, which leads to incurred losses. That is why, high-levered firms are more subject to examine and allow for superior managerial discretion.

Accordingly, high-levered firms are expected to hold more cash. High-levered firms are known as financially unconstrained firms despite of having more debt in their accounts, face lower financing costs. Moreover, it would be possible when there is less volatility in the earning of firms. Faulkender and Petersen (2006) have also obtained results in line with the high-levered firms are financially unconstrained and they can obtain funds without incurring much cost on borrowings. According to them, firms that are financially-constrained incurred high cost on debt obtained in a particular period under consideration and

therefore it could be the reason that why financially-constrained firms prohibit further credit from capital market.

Hypothesis 5: High levered firms have high influence on cash flow sensitivity of cash holding.

2.3.6. Dividend payout to shareholders

Those firms currently paying dividends to their shareholders can increase cash without incurring cost or with minimal cost by reducing the level of dividend payments. In contrast, firms which are not paying dividends to their shareholders, they have to use the capital market to raise fund. Therefore, those firms that are making dividend payments are not expected to reserve more cash in their balance. As a result, the association between cash and dividends would be negative.

On the other hand, cash holding of firm tends to be large when the dividends are extensively paying to the shareholders. In reality, firms which use cash to pay dividends reduce the amount of cash retained for dividend payments. Eventually, they have the choice to cut down the dividend payments in order to overcome the problem of financial distress, when firm faces. Thus, having abundance amount of cash reserves enables firms to stay away from unexpected financial fluctuations. This indicates that there exists a positive association of cash holding and the dividend payouts. This unclear relationship between cash holding and dividend payouts could not determine under the Trade-off theory. It can be seen from the work of D'Espallier et al. (2008) for the firms' not paying dividends, the predictable sensitivity between cash holding and cash flows is higher with expected value of 0.14. Furthermore, for the firms that estimate pay dividends sensitivity between cash holding and cash flows is to some extent lower with probable value of 0.10.

Hypothesis 6: The cash-cash flow sensitivity is high for no dividend paying firms.

2.3.7. Cash flow volatility

Firms with high volatility of cash flow experience shortage of cash. This liquidity constraint leads them to forgo some of their valuable investment projects.

As a result, those firms facing larger cash flow volatility tends to retain large amount of cash as compared to those firms facing less cash flow volatility. This precaution measure of retaining cash enables them to stay away from cost of liquidity constraint. Likewise, the volatility of cash flow has a great significant effect on a firm held amount of financial slack. A firm facing large cash flow volatility tends to hold greater levels of financial slack than their counterpart with low cash flow volatility. It is of immense need to consider firm's financial constraint status while analyzing the impact of cash flow volatility on cash holdings of a firm. The financially unconstrained firm reduces its level of reserved cash in response to less cash flow volatility. On the other hand, the reserved cash of financially-constrained firms are more sensitive to cash flow volatility (Han & Qui, 2007).

Hypothesis 7: The CFSC is higher for more volatile firms.

3. Empirical model, Data, and Methodology

3.1. The empirical model

This study uses two alternative specifications to empirically model the CFSC. To investigate the effect of firm characteristics on the CFSC, in this paper the researchers first estimate a baseline model. The first model in this study, builds correlation between retained cash in balance sheet and cash flows from operations is a function of firm one-period lagged dependent variable, size along with leverage, growth opportunity (Tobin's Q), cash flow volatility, and dividend payouts. It can be written as

$$|r_{i,t}| = \beta_0 + \beta_1|r_{i,t-1}| + \beta_2 SIZ_{i,t-1} + \beta_3 LEV_{i,t-1} + \beta_4 TQ_{i,t-1} + \beta_5 CFV_{i,t-1} + \beta_6 DIV_{i,t-1} + \eta_i + \theta_t + \varepsilon_{it} \quad (1)$$

Where $|r_{it}|$ is the absolute correlation between cash inflows and cash. For absolute correlation between cash-cash flow, in this particular paper researchers calculated accumulated correlation. Like for 2003, the researchers calculated absolute correlation using the data for 2000, 2001, and 2002 and for 2004 the researchers estimated the correlation using the data for 2000, 2001, 2002, and 2003, and so on. Cash holding is defined as the ratio of cash held and marketable securities to book assets. Cash flow is measured as ratio of income before tax plus

depreciation and amortization to total asset. β_0 is intercept and $\beta_1 - \beta_6$ are the coefficients of independent variables. SIZ is size, which is computed as the natural logarithm of total assets. LEV is leverage, is the ratio of the total debts to total assets. TQ is Tobin Q, is the ratio of the market value to the total assets which captures the growth opportunities of the firm. CFV is the cash flow volatility. The volatility of cash flow is captured through coefficient of variation of cash flow for sample firms. DIV is distinct as the dividend payout to shareholders. Last, η_i observes firm specific effects and is assumed to be constant over time and θ_t observe time specific effects. ϵ_{it} is the disturbance term.

Further, we split the model into two models; positive correlation between cash and cash flow model and negative correlation between cash and cash flow model, separately. Equation (2) shows positive correlation between cash and cash flows, and negative correlation between cash and cash flows presented in equation (3). It would be also worthwhile to study whether the extent of positive and negative CFSC differs among firms with different characteristics. It can be written as

$$+_{r_{i,t}} = \beta_0 + \beta_1 +_{\mathrm{r_{i,t-1}}} + \beta_2 SIZ_{i,t-1} + \beta_3 LEV_{i,t-1} + \beta_4 TQ_{i,t-1} + \beta_5 CFV_{i,t-1} + \beta_6 DIV_{i,t-1} + \eta_i + \theta_t + \varepsilon_{it} \quad (2)$$

This model captures positive correlation between retained cash and cash flow.

$$-_{r_{it}} = \beta_0 + \beta_1 -_{\mathrm{r_{i,t-1}}} + \beta_2 SIZ_{i,t-1} + \beta_3 LEV_{i,t-1} + \beta_4 TQ_{i,t-1} + \beta_5 CFV_{i,t-1} + \beta_6 DIV_{i,t-1} + \eta_i + \theta_t + \varepsilon_{it} \quad (3)$$

This model captures negative correlation between retained cash and cash flow.

3.2 Identifying financially constrained firms

3.2.1 Whited and Wu index

The study used WW index, which was proposed by Whited Wu (2006). This study categorized firms as financially-constrained and unconstrained firms on the basis of WW index. Specifically, those firms would be specified as the financial constrained firms whose WW index specifically lies below median value of WW index for full sample in a certain particular period. Similarly, those firms whose

WW index lies above median value of WW index for full sample in a similar year. The WW index described as follows:

$$\mathrm{WWI_{i,t}} = -0.091 \times \mathrm{CF_{i,t}} - 0.062 \times \mathrm{DD_{i,t}} + 0.021 \times \mathrm{LTD_{i,t}} - 0.044 \times \mathrm{SIZ_{i,t}} + 0.112 \times \mathrm{ISG_{i,t}} - 0.035 \times \mathrm{SG_{i,t}} \quad (4)$$

Where, CF denotes the firm cash flows, defined as the ratio of income before tax plus depreciation and amortization divided by book assets. DD is dividend dummy, the researchers assigned 1 dummy for the firm paying dividend and other wise. The researchers assigned 0 for the firm not paying dividend. LTD is the long term debt, is calculated as the ratio of total debts and book assets[9]. ISG is denoted as industry wide total sales growth. It is calculated as first level difference of logarithm of net sales of industry. SIZ Symbol used to denote size of firm. Size of firm measured through natural logarithm of book assets. Lastly, SG denotes sales growth of sample firms, it is considered as first level difference of logarithm of sales of firms.

The first important purpose of this paper is to analyze the effect of firm's cash-cash flow sensitivity on financial constraints of manufacturing Pakistani firms. To attain the purpose of the study after sorting out the firms into financially-constrained and unconstrained firms, the estimation of the model given in equation (1) has made separately for financially-constrained and financial unconstrained firms.

In particular, study used same model of equation (1) as under:

$$|r_{i,t}| = \beta_1 |r_{i,t-1}| + \beta_2 SIZ_{i,t-1} + \beta_3 LEV_{i,t-1} + \beta_4 TQ_{i,t-1} + \beta_5 CFV_{i,t-1} + \beta_6 DIV_{i,t-1} + \eta_i + \theta_t + \varepsilon_{it} \quad (5)$$

All variables of equation (5) are as same as equation (1). By using WW index as a measure of constrained firm, this equation lets us to notice the variations in the response of correlation between cash and cash flows of financially constrained firms and financially unconstrained firms to the determinants of CFSC. If the expected coefficients of financial constrained firms; the firms with restricted access to capital market, is positive, then they are expected to retain

[9] *Note that we use total assets and total book value assets interchangeably.*

more cash in their accounts out of cash flows of firm. As a result they will able to mitigate their financial shortfalls in near future. In the different studies, it has seen in the literature that researchers have framed the similar approach in their empirical frame work (Almeida et al., 2004; Cagalayan & Rahid, 2014; López-Gracia & Sogorb-Mira, 2015).

3.3 Tobin Q and cash-cash flow sensitivities

3.3.1 The model for estimation of high and low-Tobin's Q is as under.

$$|r_{i,t}| = \beta_1|r_{i,t-1}| + \beta_2 SIZ_{i,t-1} + \beta_3 LEV_{i,t-1} + \beta_4 TQ_{i,t-1} + \beta_5 CFV_{i,t-1} + DIV_{i,t-1} + \eta_i + \theta_t + \varepsilon_{it} \quad (6)$$

All variables in above equation are similar as the previous stated models used in this study. The researchers run regression for the model given in equation (6) separately for those firms with high growth opportunities and for those firms with low growth opportunities.

3.4 Estimation method

Abundant studies in the literature have used a number of different estimation methods to measure firm diverse characteristics on the CFSC of manufacturing firms such as, D'Espallier et al., (2008), Silva and Carreira (2010), López-Gracia and Sogorb-Mira (2015), Pál and Ferrando (2010) have used GMM estimator for their analysis. This study also used the two-step system-GMM technique. This methodology was first introduced by Arellano and Bover (1995) and later on this work has been extended by Blundell and Blond (1998)[10]. The researchers estimated regression models, for the whole sample by using system-GMM estimation methodology. The reason behind this selection of methodology is that, it would help this study to effectively overcome the problem of hetroskedasticity and endogeneity of the explanatory variables of this study's data.

Although, the proposed methodology of Arellano and Bond (1991) estimation is placed above all other panel data estimation techniques, this method

[10]*See, Blundell et al. (2001) for more on how system GMM estimator improves the poor performance of the standard GMM estimator.*

lacks in case of quality instruments generation. So, following work of Arellano and Bover (1995), the study overcomes the problem of weak instruments. Instrument validity is checked via Hansen's (1982) J-statistic. According to Arellano and Bover (1995), using first difference of instruments for level equation or/and for equation in difference it should be used lagged-values of the variables in levels as the instruments. When the researchers looked at the importance of Blundell and Bond (1998) the robust two-step system-GMM technique, it has been found that it has the capability to overcome the failure of the restricted data biased.

3.5 Data and the description analysis

The sample of this study consists of all manufacturing sectors of Pakistan listed at Pakistan Stock Exchange. The data was found from the financial statement analysis of nonfinancial firms listed at Pakistan Stock Exchange prepared by SBP. This specific data is prepared by State Bank of Pakistan. This source of data measured because it is issued by a reliable government body and the records of data are more authentic. This study covers the period 2000 to 2014. It includes all those listed firms for which the data are accessible for minimum four following years. Table 1 presents the definitions and abbreviations of the variables that used in the empirical analysis. Overall, this study contains unbalanced dynamic panel data covering 479 firms with a total of 5939 number of observations.

Table 1: Abbreviations and Definitions of Dependent and Independent Variables

Variables	Abbreviations	Definitions
Dependent Variables		
Cash holding	CH	Cash and marketable securities/Total assets
Cash flow	CF	Income before tax + depreciation and amortization/Total assets
Correlation between cash holding and cash flow	R	Measures the correlation in cash or marketable securities as a response to the amount of cash flow generated by the firm
Independent Variables		
Size	SIZ	Natural logarithm of book assets
Leverage	LEV	Total debts/total assets
Cash Flow Volatility	CFV	Each firm's cash flows' coefficient of variation for sample period
Tobin's Q	TQ	Asset's market value/ Total value of assets
Dividend payout ratio	DIV	(Total dividends + Purchased common and preferred stocks/ Total assets
Variables used in building of WW-Index	DD	For firms paying dividends in that year is taken 1 as dummy and 0 otherwise

Dividend Dummy		(Capital Expenditure – Deprecation)/Total assets
Net Investment Sales Growth	Inv SG	First difference level of logarithm of total sales

4. Empirical Results

Table 2 reports the summary statistics for the sample period of 2000-2014. The researchers have presented summary statistics to discover the allocation distinctiveness of the different variables used in our model. Both means and standard deviations are reported.

Table 2: Summary Statistics

Variable	Mean	Std. Dev
SIZ	6.530	2.491
LEV	0.450	0.280
DIV	0.066	0.358
CFV	0.259	6.228
TQ	6.836	16.661
$\|r\|$	0.456	0.287
$-_r$	-0.364	0.283
$+_r$	0.498	0.279

The sampled firms included only manufacturing firms and the sample period is 2000 through 2014. The sample consists of non-financial firms listed at Pakistan Stock Exchange. The data has composed from Balance Sheet Analysis of Non-Financial Firm prepared by State Bank of Pakistan.

The table shows that the average value of firm size, leverage, dividend, cash flow volatility, and Tobin's Q is 6.530, 0.450, 0.066, 0.259, and 6.836, respectively. It clearly observes that on average firm's 45% of assets are through debt and on average only 6.6% of total assets used to pay dividend. On the other hand, the standard deviation of size, leverage, dividend, cash flow volatility, and Tobin's Q is 2.491, 0.280, 0.358, 6.228, and 16.661, respectively. Ultimately this spread out of the data indicates that the sample of the study is consists of both the small and large size firms, high and low levered firms, no dividend paying and dividend paying firms, and high and low growth firms.

In this table the sensitivity between cash to cash flows is calculated through the correlation. The researchers calculated accumulated correlation for the absolute correlation between cash and cash flows ($|r|$). Like for 2003, it has been calculated absolute correlation using the data for 2000, 2001, and 2002. Likewise for 2004, it is estimated the correlation using the data for 2000, 2001, 2002, and 2003, and so on. Further the study sort out the negative ($-_r$) correlation and positive correlations ($+_r$) for different firm characteristics. The mean value of positive correlation is remarkably greater, related to the absolute and negative correlation between cash and cash flow. The average value of positive correlation between cash to cash flows of whole sampled firms is 49.8%. While the average value of absolute correlation between cash holding and cash flow is 45.6%. Furthermore, the negative CFSC indicates that on average it is -36.4% with the standard deviation of 0.28.3. The standard deviation of absolute and positive CFSC is almost same; with the standard deviation of 28.7% and 27.9%, respectively. Table 2 shows that all variables exhibit considerable fluctuations.

4.1 Correlation estimation

A correlation matrix used to explore the dependency between multiple variables at the similar time period. The result contains a table that shows coefficients between each main variable and the others.

Table 3: Correlation Matrix

Variable	$\|r\|$	$-_r$	$+_r$
SIZ	-0.038 (0.006)	0.094 (0.000)	-0.0407 (0.018)
LEV	0.012 (0.398)	-0.053 (0.036)	-0.004 (0.779)
DIV	0.025 (0.072)	-0.089 (0.000)	-0.005 (0.731)
CFV	0.055 (0.000)	-0.035 (0.165)	0.061 (0.000)
TQ	0.022 (0.120)	0.023 (0.359)	0.028 (0.096)

This table presents the pair-wise (Pearson) correlation coefficients between cash-cash flow correlation and independent variables for full sample. The values given in parentheses are p-values to test whether the correlation estimate is

different from zero. The sample consists of non-financial firms listed at Pakistan Stock Exchange. The data are collected from Balance Sheet Analysis of Non-Financial Firm.

Table 3 presents the cash-cash flow sensitivity and its significance levels through the essential variables used for the cash-cash flow sensitivity estimations. It is possible to observe that table 3 clearly depicts correlations are significant for most variables of the all three of models; Model (1), (2), and (3), but this table also shows some insignificant correlations measures in each of the model. In short, correlation estimates offer certain initial evidence regarding the relationship between firm-characteristics and cash-cash flow sensitivity. However, to examine this relationship properly in detailed form, it has been estimated a number of empirical models that may have differential impacts on CFSC are presented.

Table 4: Correlation Mean across Firm Types

Firm Types	$\|r\|$		$-_r$		$+_r$	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
FC firms	0.451	0.295	-0.370	0.297	0.489	0.287
FUC firms	0.460	0.279	-0.358	0.268	0.505	0.272
High-Tobin's Q	0.462	0.292	-0.396	0.290	0.492	0.288
Low-Tobin's Q	0.451	0.283	-0.336	0.274	0.503	0.272

This table presents the pair-wise (Pearson) correlation coefficients. It is across firm-type correlation coefficients between cash-cash flow sensitivity for full sample. The researchers separated the full sample into financially-constrained and unconstrained firm and high and low-Tobin's Q firm. The sample consists of non-financial firms for the period 2000-2014 listed at Pakistan Stock Exchange. The data are collected from Balance Sheet Analysis of Non-Financial Firm.

The correlation estimates presented in Table 4 shows evidence of different response of cash-cash flow sensitivity for both of the categorized firm types. For instance, the correlation mean is higher for financially unconstrained firms as compared to financially-constrained firms with a small difference. The standard deviation from mean is high for financially-constrained firms with 0.295 as compared to financially unconstrained firms with 0.279. Likewise, in case of

negative correlation between cash and cash flow, it displays that on average financially-constrained firms have lesser mean value as compared to financially unconstrained firm, but both of them show the negative correlation (the mean values of 37% and 35%, for financially-constrained firms and financially unconstrained firms, respectively). The standard deviation from mean is high for financially-constrained firms with 0.297 as compared to financially unconstrained firms with 0.268. It shows a good sign for financially unconstrained firms that have lesser scattered data as compared to financially constrained firms. Now if the study considers the positive correlation between cash and cash flow only, the researchers find that financially unconstrained firms have more mean value and less standard deviation as compared to financially constrained firms. This clearly shows that financially unconstrained firms have higher correlation estimates in case of absolute and positive correlation, while the negative correlation shows the opposite picture. The correlation for firm-categories, presented in table, is statistically different from zero.

Furthermore, the study discovers that for high-growth firms, the correlation concerning the Tobin's Q and CFSC is slightly greater then low-Tobin's Q firms. As shown in the table above, high-Tobin's Q average value as 46% while low Tobin's Q as 45%. But the opposite relation has been found by excluding the positive correlation from absolute correlation between cash and cash flow. Standard deviation of high-Tobin's Q firms is more as compared to low-Tobin's Q firms in case of absolute correlation. In case of negative correlation between cash and cash flow, the study finds that the mean value of high-Tobin's Q firms is 39% negatively correlated to the dependent variable. In sum, correlation estimates present some preliminary information about the relationship between firm-characteristics and cash-cash flow sensitivity of financially-constrained and unconstrained firms and low- Tobin's Q and high-Tobin's Q firms. To observe this relationship properly, this study evaluated more than a few empirical models, for firm specific factor effecting cash flow sensitivity of cash are presented.

4.2 Estimation results for all firms

The study begins the regression analysis by estimating the equations (1), (2), and (3) all results are presented in Table 5. The study estimates three of the

equations to consider the differential effects of firms-specific features variables on cash and cash flow sensitive behavior of the firm. Specifically, the study estimates the following models for quantifying the effects of the empirical determinants of corporate CFSC. Table 5 represents the results. The panels B of this table specifically show the special effect of J-test, AR (2) test and F-test. These special effects disclose that the instruments used in model are robust. The results approve the validity of our instruments and it also provides the evidence of robustness of our estimation. When the study observed the results of firm-characteristics and correlation between cash and cash flow, the study discovers that the results are in agreement with the proposed hypothesis, and also support earlier empirical work.

Especially, the study catches the positive estimated coefficient of lagged of absolute correlation between cash holding and cash flow provided that evidence of the persistence of cash-cash flow sensitivity. This suggests that those firms have more absolute correlation between cash and cash flows previously continue to have a larger sensitivity between cash holdings and cash flows. Figures show for the coefficients of one-period lagged value of absolute correlation as 0.066 while for one-period lagged negative and positive correlation between cash and cash flows are -0.063, and -0.076. It clearly shows that overall absolute correlation between cash and cash flow shows a positive impact with a statistically significant level while by splitting the sample, although their coefficients are negative but are significant at better than the 1% level.

Table 5: Estimation Results of the Correlation between Cash Holding and Cash Flow

Panel A: Estimation Results of the Absolute, Negative, and Positive Correlation between Cash and Cash Flows			
Variable	$\|r\|$	$-_r$	$+_r$
$\|r_{t-1}\|$	0.066*** (0.003)	-0.063*** (0.044)	-0.076*** (0.003)
SIZ$_{t-1}$	0.098 (0.191)	-0.016 (0.037)	-0.051 (0.140)
LEV$_{t-1}$	-0.092*** (0.009)	-0.012** (0.006)	0.032** (0.016)
DIV$_{t-1}$	0.035*** (0.130)	-0.037*** (0.131)	-0. 029** (0. 149)
CFV$_{t-1}$	0.069*** (0.007)	-0.095*** (0.018)	0.043*** (0.007)

TQ_{t-1}	0.068** (0.028)	0.026 (0.055)	0.046 (0.048)
Cons	0.116	-0.064	0.105
Panel B: Diagnostic tests			
No. of observations **No of instruments**	4416 160	1573 252	2843 320
F-Statistics **Probability**	450.100 0.000	107.530 0.000	479.140 0.000
AR (2) **Probability**	-1.01 0.314	-2.050 0.041	-0.19 0.846
J Test **Probability**	158.530 0.363	237.680 0.619	313.39 0.483

The base line model and its split-up models are presented in this table (Table 5). This table presents the results for all firms. The study used an unbalanced annual panel data set covering the period from 2000 to 2014. The sample consists of non-financial firms listed at Pakistan Stock Exchange. The data has been collected from Balance Sheet Analysis of Non-Financial Firm. The parenthesis used in the table shows the standard error. *** and ** denotes the significance level at the 1%, and 5% level of significance, respectively.

The results based on the firm size measure shows that absolute correlation between cash and cash flow is seen to be positively related to one period lagged size. This suggests that size of the firms strengthens the sensitivity between cash and cash flows. The coefficient of size[11] is 0.098. These findings are also with the few preceding studies in the literature (Almeida et al., 2004; López-Gracia & Sogorb-Mira, 2015) have also shown the positive relation of size with cash-cash flow sensitivity of firms. Country level analysis has been done by the Khuran, Martin and Pereira (2006), they have shown in their paper on average the size variable coefficient of 0.0251 and the study shows the coefficient of 0.098. Further, the evidence shown in the studies of Almeida et al., (2004), López-Gracia and Sogorb-Mira (2015), have shown in later section[12].

The coefficient of size is also negative, when the researchers run the regression for positive and negative correlation between cash and cash flow

[11] Note that each variable in the model are with one-period lagged value, so that all results are interpreted with respect to one-period lagged-values for all variables in the model.

[12] See the detail from 4.3 section (financial constraint and cash-cash flow sensitivity).

separately. This implies that both the Positive and negative correlation between cash and cash flow decreases, in periods when firms' size increases. Result shows estimated coefficients of -0.016, and -0.05, for negative and positive correlation between cash and cash flows, respectively.

Further, the positive influence of size on sensitivity between cash-cash flows supports the prediction of the packing order theory. Especially, the packing order theory, predicts that firstly firms rely on their generated internally funds, then with debt, and finally with the issuance of new equity. According to our estimation of size measure when the size of the firm increases, it will increase the sensitivity of cash and cash flow. This implies that increasing size cause to increase the level of cash hoarding and this can be possible through cash flows generated by the firm.

The leverage shows estimated coefficients of -0.092, -0.012, and 0.032 for absolute, negative and positive correlation between cash and cash flow, respectively. It explains that with a1unit increase in leverage, the absolute and negative correlation between cash and cash flow decrease with the 0.092 and 0.012 units, respectively. Similarly, 1 unit increase in leverage leads to 0.032 units increase in the positive cash and cash flow sensitivity.

Although several studies have examined the effect of leverage ratio on the cash holding and find a negative relation[13], but this study couldn't find reliable empirical evidence regarding the cash-cash flow sensitivity and leverage ratio. Results are consistent with the proposed hypothesis of the study. As well as, this study results supports the Pecking order theory, predict the negative consequence of leverage.

The researchers find that the dividends exert positive effects on firm's absolute correlation between cash and cash flow. This specifies that cash holding of firms that pays more dividends is relatively more sensitive to cash flow (estimated coefficient is 0.035 and significant at 1% level) as compared to the firms not paying out a dividend. This result confirms the results of a prior empirical

[13] *See for reference the work of Opler et al. (1999), Dittmar and smith (2007), Harford, Li, and Zhao (2008), Uyar and Kuzey (2014), López-Gracia and Sogorb-Mira (2015).*

study of Almeida et al., (2004) have shown the positive relation of CFSC with dividend payouts. When the model has re-estimated for only positive correlation, dividend payouts show a negative relationship. It indicates that the coefficient of dividend payouts is positive and statistically significant for the positive sensitivity of cash to cash flows. Similarly, dividend payouts are a negative relationship with a negative correlation between cash and cash flows. It depicts that while firm increasing their dividend payouts both the negative and the positive correlation between cash and cash flow will fall. That is a1unit increase in the dividend payment of firm leads to decrease 0.037 units and 0.029 units of negative and positive correlation between cash and cash flows, respectively.

In case of the absolute correlation between cash and cash flows, the results for cash flow volatility show that the coefficient of cash flow volatility is positive and statistically significant at 1% significance level. It is also positive and statistically significant when the researchers run the regression for the only positive sensitivity of cash and cash flows. Yet, the cash flow is negatively and significantly related to the negative correlation between cash and cash flow. This implies that the positive correlation between cash and cash flow increases, whereas, the CFSC decreases in periods when firms' cash flows become more volatile. The result shows estimated coefficients of 0.069, 0.043, and -0.095 for absolute, positive and negative CFSC, respectively.

Consistent with the hypothesis developed in our study, the impact of one-period lagged Tobin's Q supports theories, namely Pecking order theory and Trade-off theory. Empirical results display a positive effect of the Tobin's Q on cash and cash flow sensitivity. This finding supports the previous that firms having the market to book value also build excess cash balances and cash flow sensitivity. A potential detail of this is that firm with the greater market to book asset ratio, strengthens the correlation between cash and cash flow. The models showing the positive impact of Tobin's Q, the estimated coefficients show 0.068, 0.026, and 0.046 for absolute, negative and positive correlation between cash and cash flow, respectively.

On the whole, the results for the cash-cash flow sensitivity recommend those two important theories of corporate finance, specifically the Pecking-order theory and the Trade-off theory, are important in clarifying the relationship

between cash flow sensitivity of cash. The results are also consistent with few preceding empirical findings that have been estimated for diverse countries, through the globe (Almeida et al., 2004; López-Gracia & Sogorb-Mira, 2015; Khurana, Martin, & Pereira, 2006).

4.3 Financial constraints and cash-cash flow sensitivity

The results of cash and cash flow sensitivity deal with an important evidence on the role of firms-specific characteristics. The results provide in preceding section direct that firm-characteristic factors determine the cash-cash flow sensitivity. The results of the previous section did not permit us to conclude whether financially-constrained firms are important in clarifying the factors of firm cash and cash flow sensitivity. However, it is very likely that the impact of firm-specific variables on the relationship between cash and cash flow differs through financially-constrained and financially unconstrained firms.

To inspect the effects of firm-specific characteristics causes on firm's cash and cash flow through financially-constrained firms and financially unconstrained firms, the study estimated equation (4). Following the previous empirical literature, in our study the researchers apply, Whited and Wu index constraints measure to identify financially-constrained and financially unconstrained firms. The study used Whited and Wu index measure to guarantee that the outcomes the study offered in this paper are robust.

Table 6 presents the results of WW index measure have used in the study. When the study summarized the results it has noticed that certain specific significant differences in the response of firm's cash and cash flow sensitivity to its determinants across financially-constrained and unconstrained firms. Before debating on our main results, it would be beneficial to do some examinations on the diagnostic tests. Panel B in table reports AR (2) and J-test results. For the validity of the instruments, it has been specifically used in this study's empirical analysis.

In panel B J-test estimations offer the proof of accepting the null hypothesis that the instruments are statistically independent of residuals. The study shows J-test's p-values as 0.313 and 0.630 for financially-constrained and unconstrained firms respectively. Similarly, the study finds AR(2) that p-values of 0.750 and

0.188 for financially-constrained and unconstrained firms, respectively for AR (2) results. These results did not show any major pieces of evidence of the accordance of autocorrelation in tested models. These diagnostic tests deliver the proof that the instruments are valid enough. Similarly, F-Statistics in our model also displays highly significance of p-values for both types of firms.

Table 6: Estimation Results for Financial Constrained & Financial Unconstrained

Panel A: Estimation results for Constrained and Unconstrained firms		
Variable	**Whited-Wu Index Financial Constrained**	**Financial Unconstrained**
Corr_abs$_{t-1}$	0.060*** (0.047)	0.067*** (0.003)
SIZ$_{t-1}$	0.043 (0.032)	0.035 (0.027)
LEV$_{t-1}$	-0.097*** (0.010)	0.017* (0.010)
DIV$_{t-1}$	0.030*** (0.130)	-0.020 (0.047)
CFV$_{t-1}$	0.071*** (0.092)	-0.029 (0.045)
TQ$_{t-1}$	0.081** (0.028)	-0.029 (0.045)
Panel B: Diagnostic tests		
No observation **No of instruments**	2103 159	2294 290
F-Statistics **Probability**	401.600 0.000	62.230 0.000
AR (2) **Probability**	-0.320 0.750	-1.320 0.188
Test **Probability**	159.94 0.313	274.55 0.630

This table presents the results for the empirical determinants of absolute CFSC for financially constrained versus unconstrained firms. The study used the robust two-step system-GMM estimator to estimate the model for the period of 2000-2014. The sample consists of non-financial firms listed at Pakistan Stock Exchange. The data are collected from Balance Sheet Analysis of Non-Financial Firms. The parenthesis used in the table shows the standard error. *** and ** denotes the significance level at the 1%, and 5% level of significance, respectively.

When the study inspects the impact of firm-specific variables on CFSC, the researchers come to the point that the effect of one-period lagged absolute correlation between cash and cash flow is positive and statistical significance for both categories (FC and FUC firms). The estimated coefficient of the one-period lagged of absolute correlation between cash and cash flows shows that the persistent of the CFSC is greater for FC firms then to FUC firms. The estimated coefficient of size suggests that the size of the firm is statistically insignificant related to CFSC regardless whether the firms are financially-constrained or financially unconstrained. This implies that for the both, financially-constrained and unconstrained firms the impact of size on absolute CFSC is positive but their level of magnetite is different. Almeida, et al. (2004) have also stated the positive relation of firm size with CFSC of firms. Almeida, et al. (2004) showing estimated coefficient of size as 0.062 and 0.0099 for financially-constrained and unconstrained firms, respectively. The study shows 0.043 and 0.035, respectively for financially-constrained and unconstrained firm.

The above evidence depicts that financially-constrained firms are more conscience about cash and cash flow behavior as compared to financially unconstrained firm, because of the high sensitivity of coefficient of financially-constrained firms. A potential description for the distinct effect of firm size is that FC firms appear smaller amount of FC when they are large and thus, they are expected to retain less cash reserve from their cash flows. Financially constrained firms may increase their cash holdings from generated cash flows, as they prefer to use their internal financing to fulfill their capital needs.

The estimated coefficient of leverage suggests a negative and statistically significant related to the CFSC for financially-constrained firms. Conversely, the estimated coefficient of leverage suggests that the debt to total assets is positive and statistically significant related to the CFSC for FC firms. In the case of FC firms, the leverage ratio weakened the sensitivity between retained cash and cash inflows, but it is highly significant at 1% level. That is, by a1unitincrease in leverage the sensitivity between cash and cash flow decrease by 0.097 units. Likewise, FUC firms show the estimated coefficient of 0.017. It shows the positive relation exists between the correlation between cash and cash flow and the leverage ratio. The FC firm behavior of our study explains, as far as, the leverage ratio increases, it will strengthen the relationship between cash and cash flow.

Since FUC firm has the ability to collect a debt from external sources without occurring high borrowing costs, they strengthen the sensitivity between cash and cash flow.

When the researchers observe the impact of the dividend payments, the cash flow volatility, and the Tobin's Q on the absolute correlation between cash and cash flow, the researchers find that these firmcharacteristics are also differently related to sensitivity between cash accumulation and cash flows across financially constrained versus financially unconstrained firms. The estimated coefficients of the dividend payments, the cash flow volatility, and the Tobin's Q suggest that the dividend payments, the cash flow volatility, and the Tobin's Q of the firm are positive and statistically significant related to the CFSC for FC firms. But, on the other hand, these firmcharacteristics are negative and insignificant related to the CFSC for FUC firms.

Specifically, the estimates of dividend payments indicate that for FC firms, the CFSC increase with dividend payments. However, CFSC decreases when FUC firms pay more dividends to their shareholders. Yet their effect is statistically insignificant. Concerning the influence of market to book value on cash flow sensitivity of cash, the researchers find important and positive coefficients for FC firms. This suggests that with greater growth opportunity are expected to have a more absolute CFSC. The positive report of CFSC to growth opportunities is efficient as Trade-off theory, as well as the Pecking order theory.

4.4 Estimation results for high-Tobin's Q firms and low-Tobin's Q firms.

In preceding section, the study presents significant evidence of the impacts of different firm characteristics on the absolute correlation between cash-cash flow across FC and FUC firms. There are also different views that the effect of determinants of CFSC differs across high and low-Tobin's Q. To inspect the effects of firm-specific characteristics on firm's cash and cash flow sensitivity through high and low-Tobin's Q, the study estimated equation (6).Tobin's Q used as a proxy to measure the growth of the firm. Firms have classified as the median of Tobin's Q. Table 7 presents the results of high-Tobin's Q (high-growth firms) and low-Tobin's Q (low-growth firms). The sensitivity of cash and cash flow to its determinants across high and low-Tobin's Q is noticeably different.

Before debating on the differential responses across high and low-Tobin's Q firms let's have a view on the diagnostic results reported in Table 7. Panel B reports the F-statistics, the AR (2), and the J-test results. These tests ensure the validity of the instruments, the fitness of model, and the absence of autocorrelation. The study find significant statistics results show for AR (2) as 0.288 and 0.646 for high and low-Tobin's Q, respectively. Similarly, the study finds p-values of J-test for high and low Tobin's-Q is 0.340 and 0.438, respectively. These results ensure that the instruments are valid enough and there is no existence of autocorrelation in a model.

Table 7: Estimation results for High-Tobin's Q Firms & Low-Tobin's Q Firms

Panel A: Estimation results for high-Tobin's Q firms & low-Tobin's Q firms		
Variable	**High Tobin's Q**	**Low Tobin's Q firms**
Corr_abs$_{t-1}$	0.068*** (0.003)	0.063*** (0.004)
SIZ$_{t-1}$	-0.024 (0.453)	-0.050 (0.487)
LEV$_{t-1}$	-0.009*** (0.898)	0.002 (0.020)
DIV$_{t-1}$	0.032** (0.014)	-0.095 (0.4614)
CFV$_{t-1}$	0.047*** (0.156)	-0.063*** (0.203)
TQ$_{t-1}$	0.058** (0.265)	0.042*** (8.110)
Cons	0.133	0.167
Panel B: Diagnostic Tests		
No observation **No of instruments**	2439 187	2421 2991
F-Statistics **Probability**	486.64 0.000	1547.51 0.000
AR (2) **Probability**	-1.060 0.288	-0.46 0.646
J Test **Probability**	187.25 0.340	154.34 0.438

This table presents the results for the empirical determinants of absolute correlation between cash holdings and cash flows for high Tobin's Q and low Tobin's Q firms. The study used the robust two-step system-GMM estimator to

estimate the model. The study used an unbalanced annual panel data set covering the period from 2000 to 2014. The sample consists of non-financial firms listed on Karachi Stock Exchange. The data are collected from Balance Sheet Analysis of Non-Financial Firm. The parenthesis used in the table shows the standard error. *** and ** denotes the significance level at the 1%, and 5% level of significance, respectively.

When the study inspected the impact of firm-specific characteristics on the cash-cash flow sensitivity, the researchers notice different behavior for high-growth and low-growth firms. The result of one-period lagged absolute CFSC is positive and statistically significant for both high and low growth firms but with different magnitudes. For high-growth, the cash-cash flow sensitivity is more persistence with the coefficient of 0.068as compared to low-growth firms. The estimated coefficient of the low-growth firm is 0.068, which shows less persistence of CFSC. López-Gracia and Sogorb-Mira (2015) have CFSC for high and low-Tobin's Q, 0.001 and 0.0003, respectively.

Another firm-specific characteristic which is included in our model is a lag of size. This specific variable shows the negative relationship between CFSC and the size regardless of whether the firms are high of low-Tobin's Q, but the estimated coefficients of low-Tobin's Q is higher as compared to high-Tobin's Q. It depicts that when there is 1 unit increase in size it leads to decrease by 0.024 units in the CFSC of high-growth firms. On the other side, a1unit increase in size leads to 0.050 decreases in the absolute CFSC.

The estimated coefficients of leverage show the significant and inverse relationship to the cash-cash flow sensitivity for high-growth firms. Whereas low-growth firm's coefficient is insignificant and positively related to the absolute correlation between cash-cash flows. In the case of high-growth firms when the leverage ratio increases by 1unit, it decreases the sensitivity level between cash and cash flows. This is because high-growth firms tend to invest in high net present value projects and retained less in their balances from the generated cash flows from operations.

The next two important characteristics of firms named as dividend and cash flow volatility both show highly significant and positive impact on the absolute CFSC for high-Tobin's Q. Conversely, both the variables show a negative

relationship with the absolute CFSC for low-Tobin's Q firms. The estimated coefficients of divided and cash flow volatility for high-growth firms are 0.032 and 0.047 and for low-growth firms are -0.095 and -0.063, respectively.

Finally, the sensitivity of cash holdings to cash inflows is more in growing firms than other firms. The table shows that both have a positive impact on the absolute correlation between cash and cash flow regardless of whether they are high-growth firm or low-growth firms. The estimated coefficients of high-growth firms are large as compared to its counterpart low-growth firms. It appears that high-growth firms create a more strong relation between cash and cash flow of firm when their growth opportunities increase as compared to low growth firms.

The results of the absolute correlation between cash-cash flow of high and low-growth opportunity firms are influenced by firm-specific determinants of cash are consistent with our previous mentioned theories. These empirical results propose that the Trade-off theory is significant in clearing up the CFSC decisions of overall high and low-growth firms.

5. Conclusion

In this study, we investigated sensitivity of corporate cash holdings to cash flows through accumulative correlation and then examined how firm-specific factors are related with this correlation. We also identified factors that are related to the cash and cash flow sensitivity. In order to mitigate the problem of endogeneity and to take into account the dynamic nature of the panel dataset, we utilized the robust two-step system GMM estimator on unbalanced panel dataset of non-financial firms in Pakistan from 2000-2014.

The results suggest that cash-cashflow sensitivity differs for financially-constrained and unconstrained firms. Generally, our results are in line with previous studies that report financially-constrained firms are more likely to save cash out of cash flows than that of their unconstrained-counterparts. The results show that for financially-constrained firms, the sensitivity of cash and cash flows increases with dividend payout ratio, cash flow volatility and market to book value, while it decreases with firm size and the leverage. On the other hand, for financially-unconstrained firms, the sensitivity decreases with dividend payout

ratio, cash flow volatility and market to book value, while it increases with firm size and leverage. Further, the sensitivity of cash holdings to cash inflows is more in growing firms than other firms.

The findings suggest that the trade-off and the pecking order theories play an important role in explaining cash holdings and cash flow sensitivity of Pakistani corporations. The findings of the analysis are of great significance for investors, firm managers, and policymakers.

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