Financial Constraints, Firms' Investments and Performance of Manufacturing Sector of Pakistan: A Cross Industry Analysis

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This study aims to examine the impact of financial constraints on firms' investments across different industries of manufacturing sector of Pakistan. The main objective is to investigate whether investment-cash flows sensitivity varies across financially constrained and unconstrained industries and to explore how it effects the overall performance of manufacturing sector. For this purpose, textile, chemical, engineering and sugar and allied industries are studied to perform a cross industry analysis to explore either sensitivity of firms' investment to internal finance varies across different industries. This study uses panel data and applied Generalised Methods of Moments (GMM) for estimation. Empirical results indicate that firms' financial decisions have influencing role in determining their investment activities and each industry behaves differently according to Financial conditions. Firms need to maintain their financial health to avoid any shock to internal finance that impact their investment spending. Moreover, investment opportunities are present for all industries except Engineering industry. The investments of Sugar and allied and Textile industry are constrained by internal finance as investment-cash flow sensitivity is positive for these industries. While Engineering and Chemical industries are explored to be facing no obstacles regarding finance accumulation for investments. It is apparent that textile industry is engaged in dealing with the financial constraints whether internally or externally. The observed conclusions confirmed that the growth of manufacturing sector and industrial development is affixed with the performance of major contributing industries hence, such policies should be implemented that enhance overall performance of industries.

1. INTRODUCTION

Firms' Financial decisions have influencing role in determining their investment activities. To perform investment activities firms' usually have three main sources of financing i.e. internal financing that includes retained earnings and external financing which includes debt and equity financing. Firms' need finance to grow either by

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generating it internally or to have access to external sources of finance accordingly their financial policy [Bhagat, *et al*. (2005)]. But in general, there comes a situation for firms which are not internally constrained where only internally generated funds i.e. cash flows are not enough to finance in investments which seem to be valuable in future. Thus, these firms need external sources of finance to increase their investments level by investing in profitable opportunities.

Imperfections in Capital market lead to information asymmetries between lender and borrower as lender do not have fully information about borrower firms' investment projects thus these firms are charged with higher risk premium for external financing by lenders, Bond and Meghir (1994) and Kaplan and Zingales (1997) and Fazzari, *et al.* (1998). In case when internal funds are insufficient to meet their expenses due to these market imperfections, consequently financial constraints come in to existence in financial markets Guariglia (2008).[1] Thus, firms are called internally financially constrained when they have to rely initially upon internal funds or financial constraints can either be defined as the barriers that refrain firms to employ funds for their investments. Whereas firms are said to be externally constrained for the reason that firms find external financing costly. Firms which do not have access to external funds become financially constrained so these firms keep check upon their cash flows to progress further. Whereas, firms that have access to financial markets are financially unconstrained firms and normally use mixed pattern of financing. At first Cash flows have considerable part in determining investment behavior of both constrained and unconstrained firms because initially firms are dependent upon their internal funds for investment activities so firms are initially to be called constrained when they do not have access funds. The probability of financial constraints in firms rises with the higher debt and decreases with the higher capital stock [Kirchesch (2004)].[2] External finance premium depends on the level of debt and as well as capital stock of the firm. Thus, a higher level of debt will increase external finance premium and a superior capital stock will decrease this premium. The provision of finance from external sources i.e. banks and capital markets depends upon firms' specific characteristics like assets base, risks involved, financial strength and performance due to the risk averse nature of financial institutions.

Concerning all the mechanisms discussed above, Literature in case of Pakistan is limited to explore the internal financial constraints among firms and their sensitivity towards firms' investment.

1.1. Manufacturing Sector of Pakistan

This paper focused on studying investment behaviour of Manufacturing sector, as manufacturing sector plays an important role for economic growth and development of Pakistan since it has significant share in Gross Domestic Product (hereafter GDP). In fiscal year 2013-2014 Manufacturing sector is recorded as contributing 13.5 percent in GDP and labour force working in this sector is recorded as 14.1 percent in Pakistan.[3] Manufacturing sector mainly consist textile sector as an important contributor. It accounts

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[1]Guariglia (2008) states that firms' dependent upon internal funds to finance their investments are internally financially constrained as these firms have to rely on internal funds to employ in investment activities and vice versa.

[2]Kirchesch (2004) Financial risks, Bankruptcy probabilities and Investment behavior of Enterprises.

[3]Pakistan Economic Survey 2013-2014.

8 percent of GDP, employing 40 percent and accounts 55 percent of Pakistan's exports.[4] These figures clearly indicate that the growth of Pakistan's manufacturing sector is affixed with the performance of cotton sector hence special policies are regarding facilitation to cotton sector has been the focus of government. The textile synthetic industry is essentially important as it produces several valuable products like swimsuits and garments with a combination of synthetic fibre with cotton. Chemical sector has an essential role in overall growth. It mainly produces pesticides and fertilisers for fulfilling the needs of agriculture sector and produces dyes and medicines as well. Chemical sector is capital intensive in nature and often Pakistan relies on imported chemicals to meet the needs of agriculture sector and industry. Similarly Engineering sector also have significant role in the economic growth. This industry encounters the problem of absence of technical man power and its growth is not satisfactory in Pakistan. Engineering sector faced negative growth of 21.4 percent during the period 2013 to 2014.[5] As a sub sector, Chemical industry contributed about 6.71 percent to the manufacturing sector during July-March.[6] Pakistan's sugar industry is the sixth largest sugar producer in the world. There are 86 sugar mills in Pakistan which employ 1.20 million people and contribute about 22 billion to government revenue. Sugar industry contributed about 10.88 percent in overall growth of manufacturing sector of Pakistan.[7]

By reviewing the facts and figures regarding presented above, the importance of manufacture sector cannot be ignored in economic growth of Pakistan. Therefore, this study investigates the impact of internal financial constraints on investment behaviour of textile cotton, textile synthetic, chemical, engineering and sugar industries. This research is essential for the reason that financial constraints have important role in affecting firms' investments. In context to Pakistan's case, as manufacturing sector is under concerned so this study will give intimation that how much investments of different sectors of manufacturing are affected by internal financial constraints. This study will benefit policy makers to review the financial policy of constrained firms showing higher intensity of constraints in order to make them secure from becoming prone towards financial distress in future. Additionally, it will give a way forward to the policy-makers to review their policy regarding lending behaviour to not to formulate a policy that aggravates the constraints. Furthermore, this study will benefit the manufacturing sector to identify that how much these firms are risky to be in financial constrained and hence they can review their policy accordingly to make them financially stable and healthy. Finally, cross-industry analysis will benefit manufacturing sector in a sense that it will be known which industry is more dependent upon internal funds and is deeply affected by the ups and downs in internally generated funds due to the constraints it is facing externally.

Concerning all the discussion presented above, the objectives of this study can be stated as;

(a) To study whether firms' investments initially depend upon internal finance.
(b) Investment behaviour of financially constrained and unconstrained firms is diverse across industries.

[4]Pakistan Economic Survey 2013-2014.
[5]Pakistan Economic Survey 2013-2014.
[6]Pakistan Economic Survey 2013-2014.
[7]Pakistan Economic Survey 2013-2014.

(c) To observe the determinants of investment behaviour of manufacturing sector firms.

(d) To identify whether Investment-Cash flow sensitivity varies across financially constrained and unconstrained firms.

The remainder of our study is structured as; Section 2 reviews the existing literature, whereas Sections 3, 4 and 5 discusses methodology and data, estimation results and conclusion and policy implications respectively.

2. LITERATURE REVIEW

Significant literature is present regarding financial constraints and investments. Modigliani and Miller (1958) stated that there exist perfect capital markets and external funds are perfect substitute of internal finance thus they stated that firms' financial decisions are irrelevant in determining their investment behaviour.[8] However, Fazzari, *et al.* (1988), Whited (1992), Bond and Meghir (1994) and Kaplan and Zingales (1997) investigated investment behaviour for empirical evidence of financial constraints and developed the equilibrium model by incorporating market frictions in business cycle fluctuations. Their studies clearly support that frictions are present in capital market signifying that internal and external capital are not perfect substitutes. In review of Pakistan's case, financial market is not perfect which leads to finance becoming the foremost obstacle in firms' investment level [Ahmad and Hamid (2011)]. This realism clearly supports the phenomenon presented by previous studies. Hence Firms mostly prefer to employ internal financing initially for investment activities.

There exists financial hierarchy which states that internally arranged funds are cheaper than external financing,[9] Bond and Meghir (1994). Their study examined the sensitivity of investment to availability of internally generated funds using hierarchy of finance model. Results indicated that firms' current investment level depends upon their investments in previous years and lagged cash flows. Standard neoclassical Euler model is valid in describing investment behaviour of unrestricted firms but do not supports the case of restricted firms. Results implied that lagged investment, sales and low debt ratio have positive effect on investments. Bishop, *et al.* (2004) adopted the methodology of Bond and Meghir (1994). There results recommend that lack of foreign ownership lead firms to be dependent on internal funds hence small firms are financially constrained by having limited access to external funds. On the other hand, foreign ownership firms face ease in investment activities for their growth for the reason that these firms have more access to external finance. The relationship between firms' investments and their financial status has been explored by Johansen (1994) who advocated that increase in debt ratio is responsible for costly external financing. They adopted Bond and Meghir (1994) methodology and found that there holds positive relation between firm's debt ratio and its capital return. This indicates that firms with higher debt ratio bear costly external financing therefore these firms rely mainly on internal funds for their investment activities and thus become financially constrained. In recent work, Ruano (2006) applied

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[8] Modigliani and Miller (1958) irrelevance theorem.
[9] Bond and Meghir (1994) hierarchy of finance assumption states that internally generated funds are preferred over   external resources.

Bond and Meghir (1994) methodology and used the split sample approach by distributing firms in deciles by their lagged cash flow to current investment ratio on the basis of assumption that probability of financial constraints decreases with the augment in this ratio. Findings indicate that firms in upper deciles are unrestricted as their cash flow to investment ratio is positive whereas firms in initial deciles imply that their investment dynamics are determined with the availability of internal funds and hence these firms are financially restricted. These results supported Bond and Meghir (1994) which is valid for describing investment behaviour of firms in absence of financial constraints.

Market friction problems not only lead to disturb the ability of firms to obtain external funds but also their investment behaviour. The said argument has been clearly supported by Whited (1992) in his study. The standard Euler investment model is altered by inclusion of binding debt constraint effect which improved Euler equation model by taking in to account investment and capital stock of firms. Findings imply that firm's investment can be undoubtedly assessed with its ability to access for external financing.

To explore the literature on financial constraints and their influence on investment behaviour of enterprises, Kirshecsh (2004) established a connection between investment decisions and firms' financial risk in his study. They included bankruptcy risks in neoclassical model of investment by altering profit maximising computation on the basis that future expected revenues will be weighted with firms' probability of survival. Findings confirm that survival probability measured from bankruptcy prediction model is genuine in linking between firm's investment and its financial risk. Findings suggest that higher debt to capital ratio indicates that the firms face obstacles in capital markets regarding external financing and hence become financially constrained.

To explore whether the financial constraints are present in Malaysian market affecting firms' behaviour findings of Ismail, *et al*. (2010) rejected the neoclassical investment theory which assumed perfect capital market where only factor prices and technology determine the capital stock of firms by implying that financial constraints are present in Malaysian markets which hinder firms from accessing external financing. Results confirmed that investment activities of firms are greatly affected by their cash flows or retained earnings.

By reviewing in context to Pakistan's case, the impact of internal and external constraints has been studied by Azam and Shah (2011) to assess their influence on investment choice of Pakistani firms. Empirical analysis showed that there exists positive relationship among firm's size and its investment whereas an inverse relationship holds among firm's age and its investment. Besides these results they found that dividend payout behaviour of firms has negative effect on investment too. This shows that if a firm grows old or pay high dividends consequently it will reduce its investment level.

Similarly, financial constraints are present in Brazilian firms as evidenced by the study of Crisóstomo, *et al.* (2012). Firm size explored to be having influencing effect on investments of Brazilian firms. Crisóstomo, *et al.* (2012) observed that small sized firms are more responsive towards progression of internal funds and hence are constrained by internal finance as compared to unconstrained firms. Similar are the results of Ismail, *et al**. (2010) for Malaysian firms. Their study stated that presence of financial constraints in Malaysian capital markets creates hurdles for firms in attaining external finance thus internal finance is of considerable importance for these firm. Their results showed that

large sized firms are not financially constrained while severity of constraints is present in case of small sized firms. In literature, the lag of investment to capital ratio is found to be positively effecting current investment to capital ratio as confirmed by the studies of Kirchesch (2004), Ismail, *et al*. (2010), Bond and Meghir (1994) and Ruano (2006). While it is found negative in studies of Terra (2002), Cava (2005), Guariglia (2008) and Butzen, *et al*. (2001).

Bulk of empirical studies exists highlighting the existence of financial constraints that potentially limit the capability of firms to grow overtime by becoming barrier in their investment behaviour. The initiative empirical study in context to financial constraints was done by Fazzari, Hubbard, and Peterson (1988) to observe whether financial constraints justify the sensitivity of investment to cash flows. Empirical results indicated that external funds are not perfect substitutes of internal financing and there exists hierarchy of finance in which firms have cost advantage of internal financing over external financing. Investments of constrained firms are more sensitive towards cash flows as compared to unconstrained firms hence, these firms have to rely more on internally generated firms. Consequently, investment cash flow sensitivity of firms increases with the level of financial constraints.

Similar argument is presented by Chapman, *et al*. (1996) by studying role of cash flow as a determining factor of investment in fixed assets at firm level for Australian firms. Their results pointed out firms reveal larger cash flow sensitivity when are financially constrained and lower sensitivity when are unconstrained. Moreover, sales also have valuable role in case of unconstrained firms.

Contrary to the argument presented above, the investment cash flows sensitivity among firms does not monotonically increases with the increase in financial constraints according to the study of Kaplan and Zingales (1997) which supported that the investment cash flow sensitivities do not indicate support for presence of financing constraints. They studied the importance of financial constraints in determining firm's investments and applied the Euler equation approach developed by Bond and Meghir (1994) based on regressing current investment on preceding investment and its square, sales, cash flows, debt square. Their findings conflict with those of Fazzari, *et al.* (1988) by proposing that least financially constrained firms reveal greater investment cash flow sensitivity than those of unconstrained firms and there exists positive correlation among degree of financial constraints and investment cash flow sensitivities.

Similar work to observe firm's financial status and its impact on their investment behaviour has been done by Cleary (1999) by distributing firms in different groups' accordingly financial variables. Firms' financial status is measured through multiple discriminant analysis for predicting bankruptcy which allows reclassification of firms' accordingly different periods reflecting that firms' financial constraint level changes overtime. The empirical results are perfectly consistent with the opinion of Kaplan and Zingales (1997) signifying that investment decisions of firms with high creditworthiness according to prevailing financial measures are particularly sensitive towards internal funds availability to as that of the firms with low creditworthiness. Observed results clearly state that internal finance is the leading source of financing for firms and firms increase their investments with the availability of cash flows.

The findings that investment cash flow sensitivities do not hold in the case of financing constraints of the study of Kaplan and Zingales (1997) were criticised by Fazzari, *et al*. (2000) who suggest that there is monotonicity in investment cash flow sensitivity with respect to financing constraints. Their results contradict on two bases i.e. there may me lack of heterogeneity in the sample secondly, they claim that the firms taken in Kaplan and Zingales (1997) are financially distressed instead of financially constrained and unconstrained firms are in fact constrained. Fazzari, *et al*. (2000) also criticised Cleary (1999) on the same grounds that found relatively low sensitivity for partially constrained firms but not distressed firms. They still undoubtedly argue that investment sensitivities increase with the degree of financial constraints. In respond to the criticism of Fazzari, *et al*. (2000) valid explanation has been presented by Kaplan and Zingales (2000) provided theoretical and empirical evidence that differential sensitivity is not a suitable measure of financing constraints. In their argument there is no such monotonicity in the relationship between degree of financing constraints and investment sensitivities.

Firms' Asset tangibility positively impacts the investment-Cash flow sensitivity as far as financially constrained firms are concerned. Almieda and Campello (2007) provided such evidence in their study by analysing constrained and unconstrained firms accordingly their higher or lower asset tangibility. They observed that sensitivity of investment towards cash flows increases with firms' assets tangibility but this result is absent in case of firms' with higher assets tangibility. Investment cash flow sensitivity is found to be having positive effect on group and ungrouped firms. George, *et al*. (2010) observed the data set of business group firms and found that investment cash flow sensitivity is relatively more in grouped firms than that of the ungrouped firms.

3. METODOLOY, DATA, VARIABLES AND ESTIMATION TECHNIQUE

3.1. Methodology

The theoretical justification of investment models state that firms' finance by using internal finance i.e. cash flows due to imperfect capital markets. In literature cash flow has been used as a proxy to capture internal finance hence firms' cash flow is the only source of finance for their investments which when increases the investment spending of firms' increases and vise verse. This observable fact signifies that if there is increase in cash flows there should be significant increase in firms' investment spending. So, it can clearly be said that the more the firms rely on internal finance the more sensitive they are towards the cash flows for their investments. The above explained phenomenon is represented by the following equation;

$$\left(\frac{I}{K}\right) \approx \left(\frac{Cash\ Flow}{K}\right) \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \ (3.1)$$

Thus, here the hypothesis is if the coefficient of cash flow variable is more sensitive to investment than firms are financially constrained and financially unconstrained if otherwise. This study follows the Standard Euler equation investment model of Bond and Meghir (1994).[10] Bond and Meghir (1994) applied Euler equation

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[10] Bond and Meghir (1994) Dynamic investment models and firm's financial policy.

investment model for and adopted the argument that their Euler equation approach is unjustifiable to show the case of constrained firms.[11] This methodology has been adopted by significant researches in literature as discussed in literature review. Methodology equation takes the following form;

$$\left(\frac{I}{K}\right)_{it} = \beta_1\left(\frac{I}{K}\right)_{it-1} + \beta_2\left(\frac{I}{K}\right)^2_{it-1} + \beta_3\left(\frac{C}{K}\right)_{it-1} + \beta_4\left(\frac{Y}{K}\right)_{it-1} + \beta_5\left(\frac{B}{K}\right)^2_{it-1} + d_t + \eta_i + \varepsilon_{it} \quad (3.2)$$

Where $(I/K)_t$, $(I/K)_{t-1}$, $(I/K)^2_{t-1}$, $(C/K)_{t-1}$, $(Y/K)_{t-1}$ and $(B/K)^2_{t-1}$ refers to current investment to capital ratio, lagged investment to capital ratio, square of lagged investment to capital ratio, lagged Cash flows to capital ratio, lagged sales to capital ratio and square of lagged debt to capital ratio.

3.2. Data and Variables

This study used panel data for estimation analysis which covered the time span of total 39 years ranging from 1974 to 2012. Sample is selected on the basis that firms which are to be included for the study should be listed in stock exchange for at least twenty years. Data on manufacturing sector are collected from "Financial Statement Analysis of the joint stock Companies (Non-Financial) listed at Pakistan Stock Exchange" prepared by State Bank of Pakistan. For cross-industry analysis five industries are taken for the time period 1974 to 2012 comprising of Textile-Cotton, Textile-Synthetic, Engineering, Cement and Sugar and Allied industries. For estimation, this study took financial variables i.e. firms' Investments, Capital Stock, Cash Flows, Sales and Debt.[12]

3.3. Estimation Technique

This study applied Generalised Methods of Moments (GMM) technique for estimation.[13] GMM is used to deal with the problem of endogeneity which arises during estimation due to the inclusion of lag of dependent variables as regressors and individual effects in the model. In this view, the Arellano and Bond (1991) GMM technique is followed. The model used in this study includes variables like investment that are taken in squared and lagged form hence there might be the possibility that issue of endogeneity will arise. The GMM method has plus point in estimating the panel data as it is capable of overcoming unobserved affect and dealing with explanatory variable endogeneity. Moreover, J-Statistics,[14] second order serial correlation *(m2)*[15] and Wald 1 test are used

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[11]This methodology has adopted by Kaplan and Zingales (1997) and Sonia Ruano (2006). Moreover, Kirchesch (2004) employed modified Euler equation model in his study by incorporating bankruptcy risk prediction in Euler equation model of investment.

[12] Details of variable construction is given in Annexure.

[13] One and Two step GMM technique.

[14] It is also referred to as Sargan or Hensen Test. It follows chi-square distribution under the null hypothesis and is used when instruments are more than parameters to check the validity of over identified instruments.

[15] In order to verify that the error term is not serially correlated beyond second order *m*2 test is included as test of first and second order serial correlation. The value of *m*2 test if less than 3 states that residuals are not correlated.

to check the validity of instruments, residuals serial correlation and joint significant of regressors respectively.

4. ESTIMATION AND ESTIMATION RESULTS

For empirical estimation, this study followed methodology of Bond and Meghir (1994) and applied GMM technique separately on data of each industry separately. We took sample of 206 textile-cotton, 32 textile-synthetic, 37 chemicals, 45 engineering and 36 sugar and allied firms for our empirical analysis.

Table 1

Financial Constraints and Firms' Investments; Industrial Analysis

	Dependent Variable: $\left(\frac{I}{K}\right)_{it}$				
	Coefficients				
Explanatory Variables	Textile-Cotton Industry	Textile-Synthetic Industry	Chemical Industry	Engineering Industry	Sugar and Allied Industry
$\left(\frac{I}{K}\right)_{i,t-1}$	−0.8732 (0.0371)***	−0.7114 (0.0169)***	−0.7647 (0.0211)***	−1.2164 (0.0951)***	−0.4478 (0.1202)***
$\left(\frac{I}{K}\right)^2_{i,t-1}$	−0.0003 (0.00001)***	−0.0380 (0.0013)***	−0.0007 (0.0001)***	−0.0412 (0.0013)***	0.0049 (0.0008)***
$\left(\frac{C}{K}\right)_{i,t-1}$	0.0770 (0.0093)***	0.0340 (0.0073)***	−1.1183 (0.0569)***	−0.0253 (0.0215)	0.8007 (0.3156)**
$\left(\frac{Y}{K}\right)_{i,t-1}$	0.0208 (0.0092)**	0.0041 (0.0020)**	0.0824 (0.0069)***	−0.1920 (0.0110)***	0.1918 (0.0937)**
$\left(\frac{B}{K}\right)^2_{i,t-1}$	−0.0001 (0.00006)***	0.00004 (0.0001)	−0.0002 (0.0001)***	−0.0006 (0.0001)***	0.0024 (0.0059)
m2 (Statistics Value)	0.0027	1.8267	2.0093	1.2129	0.0011
Wald 1(p value)	0.0000	0.0000	0.0000	0.0000	0.0000
Sargan (p value)	0.6320	0.0572	0.8978	0.8272	0.8998

Note:
(1) GMM estimates.
(2) Standard errors are in parenthesis. Constant and Time dummies included (not reported).
(3) *m2* is the second order serial correlation based on residuals under the null of no serial correlation.
(4) Wald 1 test is for joint significance of regressors.
(5) Sargan test is for instruments validity under the null that instrument is valid.
(6) Statistical significance at 5 percent and 10 percent is denoted by ** and * respectively.

4.1. Results Interpretation and Industrial Analysis

4.1.1. *Financial Constraints and Firms' Investments; Textile Cotton Industry*

Results indicate that lagged cash flow is an important determinant of Investment in case of textile cotton sector. Figures show that lagged cash flow is positive and significant at all significance levels pointing out that 1 percent increase in lagged cash flows to capital ratio leads to 0.07 percent increase in the current investment. This shows that Textile cotton firms are dependent upon internal finance for their investments or in other words these firms are constrained by internally generated funds because these firms find external financing costly. The impact of lagged sales is explored to be positive and significant at 1 percent and 5 percent significance levels. The figure indicates that sales are of vital importance for firms' investments as 1 percent increase in past years sales to capital ratio boosts current investment of textile industry by 0.02 percent. This is the clear

indication of presence of investment opportunities for textile cotton firms and that this sector assembles capital when expects its demand to rise in the future. These results are consistent with the idea that Firms of textile sector are FC as their investment is responsive towards availability of internal finance which is proxied by both cash flows and sales in this case. This is may be due to the reason that Pakistan's exports increased to 16 percent from year 2010 to 2012.[16] With the increase in market demand of textile sector products, it's financing needs also increases since the firms have to bear material cost. Consequently, this sector faces financial constraints and relies mostly on internal finance.

4.1.2. *Financial Constraints and Firm's Investments; Textile Synthetic Industry*

The effect of lagged cash flows is found to be positive and significant at all significance levels indicating that firms of textile synthetic sector are constrained by internal finance. Results of investment model show that 1 percent increase in past year's internal funds increases the investment spending of textile synthetic industry by 0.03 percent. This exhibits that cash flows of previous period are important determinant of current investment spending in case of synthetic industry. The impact of sales to capital ratio in previous period is discovered to be positive and significant at 1 percent and 5 percent which confirms that sales accelerator process works for textile synthetic industry. It is observed that 1 percent increase in the lagged sales to capital ratio improves current investments of firms by 0.004 percent. This clearly is the indication that investment opportunities are present for textile synthetic sector firms of Pakistan.

In general, textile synthetic firms face the problem in getting external finance while these firms are financially stable internally. This is because this sector is at growing stage and in need of more finance for investment but it exhausts all its internal funds in investment.

4.1.3. *Financial Constraints and Firms Investments; Chemical Industry*

In results, the outcome of lagged dependent variable and its square is found to be negative and significant at all levels of significance specifying the adjustment cost which firms bear to move from one level to the next level of investment similar to the findings of Love (2003) and Terra (2002). Negative sign with the coefficient indicates that lagged investment is negatively correlated to current investment over successive periods.[17] Moreover, there is no spillover effect of previous year investment on current investment which shows that investment is not a smooth process[18] for chemical industry. The effect of lagged cash flows to capital ratio is explored to be negative and significant at 1 percent, 5 percent and 10 percent significance levels showing that current year investment spending of chemical sector is negatively affected by previous year cash flows. This is the apparent signal that chemical sector firms are not dependent upon internally generated funds for their investments and arrange finance from external sources to fulfil their investment needs. Sales are observed to be important determinant of investments of chemical industry since it is found to be positive and significant at all significance levels. Figures shows that if there is 1 percent increase in lagged sales to

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[16] See for details Economic Survey of Pakistan (2012-2013).

[17] La Cava (2005) "Financial Constraints, User Cost of Capital and Corporate Investment in Australia."

[18] See for reference Butzen, *et al*. (2001).

capital ratio it will increase current year investment by 0.08 percent which is the indication of presence of investment opportunities for chemical industry.

4.1.4. *Financial Constraints and Firms Investments; Engineering Industry*

By reviewing results of engineering industry, the impact of lagged cash flows to capital is found negative and insignificant which shows that current investment of engineering industry is unassociated with internal funds and are dependent upon external finance for investment needs. The effect of lagged sales to capital ratio is found negative and significant at 1 percent, 5 percent and 10 percent significance levels which suggest that firms current investment is negatively related to past year's sales. This shows that cash flows and sales are not important determinant of current investment spending of firms as far as engineering industry of Pakistan is concerned. The negative sign with cash flows and sales indicate that engineering sector firms are internally financially unhealthy due to zero cash flow sensitivity towards internal finance and cut down their investment level even if there is increase in sales because of financial instability condition. This is may be due to the fact that engineering sector faced negative growth in past few years and consequently affected the firms of this sector adversely. The effect of lagged dependent variable and its square is negative and significant showing less smooth investment process over time [Butzen, *et al.* (2001)].

4.1.5. *Financial Constraints and Firms Investments; Sugar and Allied Industry*

The impact of lagged cash flows to capital ratio is discovered to be positive and significant at 1 percent and 5 percent which shows that sugar sector faces tight external financial constraints. Figure reveals that 1 percent increase in previous year internal finance increases the current investment spending of firms by 0.8 percent. This is the indication that firms of sugar industry are positively sensitive to internal finance due to unavailability of external funds. This is due to the reason that there is need of more amount of finance for installation of machinery if these firms plan to expand their production process in order to grow overtime and therefore need substantial amount of finance for their investment needs. Lagged sales to capital ratio is found positive and significant at 1 percent and 5 percent significance levels which shows that sales are essentially important for investment of these firms. Figure suggests that 1 percent increase in lagged sales to capital ratio increases the current investment of sugar industry by 0.19 percent. The positive figure states that there is presence of investment opportunities as far as sugar industry is concerned. Furthermore, diagnostic tests indicate that instruments used are valid and this study do not face the problem of second order serial correlation among residuals as represented by $m2$. The instruments used are valid as tested by sargan test. Wald 1 test is significant which shows explanatory variables are jointly significant.

Overall, industrial analysis is done on the basis of long run effects for cotton, synthetic, chemical, engineering and sugar industries. Analysis illustrate that investment spending of textile-cotton, textile-synthetic and sugar industries are constrained by internal finance. Results confirm that internal financial constraints are present in these industries. The sensitivity to investment to cash flows is positive and large for internally financially constrained firms as consistent with Fazzari, *et al.* (1988). Results regarding

sales suggest that there is presence of investment opportunities in manufacturing sector of Pakistan except for the case of engineering industry. Additionally, results are in view that external financial constraints have strong impact when internal constraints are absent.

5. CONCLUSIONS AND POLICY IMPLICATIONS

Our study focused to assess the role of internal finance in determining firms' investment behaviour when financial constraints are present. Empirical results regarding investment behaviour of firms across different industries showed that each industry behaves differently according to their preferences and for most important 'Financial conditions'. Hence, this study accepts the hypothesis that investment behaviour of manufacturing sector is diverse across different industries. The investments of Sugar and allied, Textile-Synthetic and Textile-Cotton are observed to be constrained by internal finance as investment-cash flow sensitivity is positive for these industries. While Engineering and Chemical industries are explored to be facing no obstacles regarding accumulation of finance for their investment activities. By reviewing all results, the hypothesis regarding financial hierarchy that firms' investment initially depends upon internal finance and that firms prefer internal finance over external finance is accepted by this study as far as FC firms are concerned. Empirical results accepted the hypothesis that FC and FUC firms have different investment patterns. Investment-Cash flow sensitivity varies across constrained and unconstrained firms is accepted by the study. Results confirmed that there exists positive investment-Cash flow sensitivity in case of constrained firms and vice versa.

Overall the study concludes that Financial constraints have significant impact on investment behaviour of manufacturing sector firms of Pakistan. It is apparent that our economic growth and industrial strength is significantly dependent upon internal financial health of industries. Hence, this study recommends policy makers to review the policy regarding lending behaviour so that intensity of financial constraints could be decreased that negatively impact firms' investments and to formulate such policies that improve financial health of firms in general. Financial constraints are present in manufacturing sector of Pakistan as these firms are initially dependent upon internally generated funds. So, firms need to maintain their financial health to avoid any shock to internal finance that impact their investment spending. It is often observed that when firms face scarcity in funds availability they do become prone to financial distress condition. Therefore, these firms need to check their debts, business activities and review their R&D expenditures so as to protect them from severity.

ANNEXURE

1. VARIABLES DESCRIPTION OF THE MODEL

Following is the construction and definition of the variables which are included in the dynamic investment model of Bond and Meghir (1994);

1.1. Investment (I)

Investment is obtained by deducting current year expenditure on fixed assets from the previous year's expenditure on fixed assets plus depreciation. Where depreciation includes annual wear and tear of the capital. Specified formula is presented below;

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

1.2. Capital Stock (K)

Capital stock is calculated as expenditure on fixed assets less depreciation.

K= Expenditure on fixed assets – Depreciation

Here expenditure on fixed assets has been calculated using 'fixed assets at cost' taken from firms' financial statement analysis.

1.3. Cash Flows (C)

Cash flows explain unevenness of internal finance as it is used as a proxy for measuring financial constraints. Cash flows are calculated as;

CF = Retention in business + Depreciation

1.4. Sales (S)

Sales correspond to revenue generate by firms' as every firm's ultimate goal is to maximise the sales to become profitable. It is obvious that if sales are higher firms demand to invest in profitable opportunities increases.

1.5. Debt (B)

Debt includes the sum of current as well as noncurrent liabilities. Higher the value of debt suggests firm have aggressive nature towards the use of debt.

D = Current liabilities + noncurrent liabilities

2. PANEL UNIT ROOT TEST

Panel data may have the problem of unit root which leads to inefficient and biased results. Due to large number of observations and time periods the problem of unit root may occur. From Panel unit root tests, it is clear that all variables taken for the investment model are stationary and do not came across the problem of unit root as specified by the p-value. Both tests conclude the same results that variables are stationary.

Table 1

Panel Unit Root Test

Variables	LLC T-Stat	p-value	IPS T-Stat	p-value	Conclusion
$\left(\frac{I}{K}\right)_{it}$	−9.4183	0.0000	−66.0014	0.0000	Stationary
$\left(\frac{C}{K}\right)_{it-1}$	−190.856	0.0000	−42.3959	0.0000	Stationary
$\left(\frac{Y}{K}\right)_{it-1}$	−18.5516	0.0000	−16.4441	0.0000	Stationary
$\left(\frac{B}{K}\right)_{it-1}$	−7.1858	0.0000	−15.5378	0.0000	Stationary

Note:
- LLC denotes Levin, Lin and Chu panel unit root test whereas IPS refers to Im, Pesaran and Shin panel unit root test.
- LLC assumes the common unit root process while IPS states individual unit root process.
- I/K, C/K, Y/K and B/K refer to *investment to capital*, *Cash flow to capital*, *sales to capital* and *debt to capital* ratios respectively.

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