IMPACT OF FINANCIAL FACTORS ON CORPORATE INVESTMENT

(A Case of Manufacturing Firms Listed on Karachi Stock Exchange)

By

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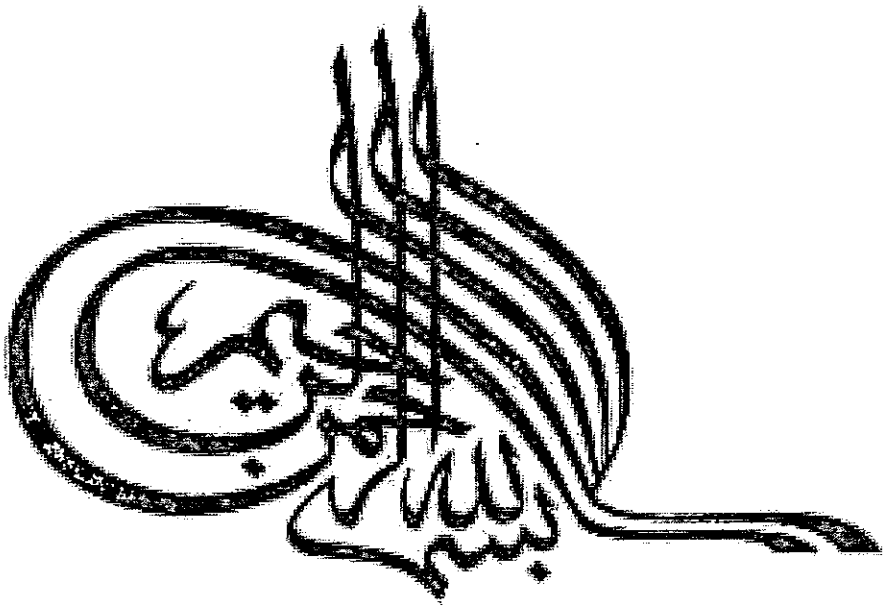

In the name of Allah, the
Beneficent and the most Merciful

RECITATION

In the name of Allah, the Beneficent and the most Merciful
Read: in the name of the Lord, who createth
createth man from a clot
Read: and thy Lord is the most bounteous, who teacheth by the pen
teacheth man which he knew not

Al-Quran
Surah Al-Alaq (XCVI)

DEDICATION

I dedicate this acquiescent endeavor,
the rejoinder of my fortitude and erudition,

to my ***Parents***

whose Heartfelt Prayers always travel with me
in every fraction of life

ACKNOWLEDGEMENTS

All praise and appreciation are to Almighty Allah who bestowed the humanity with knowledge and wisdom and granted him vigilance on earth. All the respect, honour and countless salutation are upon our beloved Prophet Muhammad (Peace be upon Him) for enlightening with the essence of faith in Allah and guiding the humanity, the true path of life.

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(Khurram Shehzad)

CERTIFICATE

It is to certify that thesis titled "Impact of Financial Factors on Corporate Investment: A Case of Manufacturing Firms Listed on Karachi Stock Exchange" submitted by **Khurram Shehzad** (Registration No. 121-SE/MPHD/F-06) has been accepted, towards partial fulfillment of the requirements for the award of degree of Master of Philosophy in Economics, as an evidence of the candidate's ability to do independent research.

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Abstract

Manufacturing is the third largest sector of the economy of Pakistan that contributes 18.5% to the Gross Domestic Product (2009-10). Since investment is a volatile component of GDP, changing patterns of investment by manufacturing firms in fixed assets may drastically change the aggregate levels of supply and demand. In the present study, we analyzed the impact of various financial factors on the investment behaviour of manufacturing firms in Pakistan. A panel of 209 firms listed on Karachi Stock Exchange over a period 2002-2008 was considered for estimation. We find evidence in favour of the proposition that financial factors are important determinants of capital expenditures. In addition to many internal factors, the ratio of Tobin's Q has also significant effects on the capital expenditure decisions. Moreover, the degree of sensitivity of investment to these factors is not alike for all types of firms. Those with lesser investing opportunities are more responsive to changes in the financial factors as compared to their counterparts enjoying wider scope. The findings of the study imply the potential role of monetary and fiscal policies in altering investment decisions of the firms. It demands special attention of the policy makers while introducing such policies, particularly when the interest rate or the tax rates are to be changed.

Keywords: Corporate Investment, Financial Factors, Karachi Stock Exchange, Pakistan

Chapter 1

Introduction

Despite the increasing role of macroeconomics in formulation of policies at country level, the importance of microeconomics stands for its own reasons. Conclusions derived from macro level studies could be more useful and effective if these are backed by the behavioural explanations at micro level. For example, researchers are not only interested in knowing the variables that may affect investment as a whole but they are also curious to know the economic reasoning behind investment decisions at firms' level. They may seek for the answers to questions like; (1) What financial/internal factors can possibly influence the investment decisions of the firms? (2) How and to what extent the investment decisions are affected by the opportunities open to the firms? and (3) whether these financial variables are equally significant to all types of firms? The present study is intended to answer such questions by taking into consideration the data from Pakistani firms.

1.1 Financial Factors and Business Finance-Baseline

Modigliani and Miller (1958) are believed to be the pioneers in setting business finance on modern track, by introducing capital structure irrelevance theory. The theory states that the market value of the firms is not affected by its capital structure. They explain their proposition by assuming that a firm has a particular stream of future cash flows and

such inflows are to be distributed among various investors in the business assets, no matter what proportion is assigned to the debt or equity.

Many researchers got activated in response to the Modigliani-Miller (MM) irrelevance theory and tried to seek evidence for or against. However, the theory is not found to hold in many circumstances, particularly in environments with different tax structures, information asymmetries, agency and bankruptcy costs etc. The presence of these and so many other factors in the real world of business lead to invalidity of the theory and explains as to why capital structure is important for financing decisions.

Despite these shortcomings, it can be argued that under the perfect capital market[1] assumption, there is very limited role of internal funds in determining the level of corporate investment. The firms have no difficulty in attracting external funds as long as they have viable projects such that the expected marginal return of a project is higher than the cost of capital i.e. the rate of interest. As a result there are no financial constraints on a firm having value-increasing projects. Further that the marginal costs of external and internal funds are equal. This assumption of perfect capital market leaves no question of varying costs of funds generated by different sources. Hence it becomes immaterial whether the investment is financed by equity shares or debt or internally generated cash flows, and in this scenario the impact of financial factors like cash flow, leverage etc. cannot be supported on theoretical grounds.

[1] A market, where agents are free to borrow and lend at the same market rate of interest for all loans of the same maturity, and the rates of interest adjust to match the plans of borrowers and lenders. Agents never expose themselves deliberately to the risk of default, and with perfect foresight, no default would ever occur (Hammond P. J. (1991)).

The potential role of these financial factors in making investment decisions comes to the surface when the assumption of perfect capital market is abandoned due to the fact that certain capital markets are subject to certain imperfections. This evolves the idea of different costs attributed to different sources of funding which is supported by a variety of reasons. Two reasons are however more dominating. First, the informational asymmetries, that is when managers have better information about a firm than the potential equity or debt holders. As a result, the potential financiers are unable to appraise the strengths and weaknesses of the firms accurately and thereby to avail opportunities. If this is the case, then the rate at which creditors are willing to lend will be inclusive of some premium, and the firms will find the debt expensive as compared with the cost of perfectly informed market. This is true for the case of new equity issues as well. Second, the firms may face agency costs in acquiring external funds. These are the costs that can be attributed to the conflicts between managers, shareholders and creditors (Harris and Raviv 1991). The debt holders may foresee the managers' behaviour of investing in riskier projects in order to meet higher returns. Such behaviour amplifies the debt holders risk and they will incorporate this cost while negotiating debt contracts. As a consequence the external finance becomes expensive when compared with internal funds. The two reasons form the foundation for the proposition that financial factors may have an influence over the corporate investment decisions.

This phenomenon of priorities of some sources of funding over the others is introduced by Myers (1984) when he explains that the firms take a trade-off between the savings (due from the tax benefits) and the costs of bankruptcy (the costs associated with higher

probability of bankruptcy due to increased volume of debts). This financing behaviour of the firms is named as pecking order theory, where internal funds are preferred over the external debt, whereas resort to debt is favored as against the equity financing. Fazzari S.M. et al. (1988) also talk about this priority by the firms and call it the "Financing Hierarchy". The underlying reason for this phenomenon is the cost advantage associated with the source ranked high in the financing hierarchy.

Hence the association of informational asymmetries and agency costs with the structure of firm's balance sheet highlights the role of various financial factors in making investment decisions. The internally generated cash flows of the firms for example, directly provide an alternative to expensive external sources of finance. The costs of acquiring external funds may also boost up as the ratio of debt to equity increases, thus leverage is expected to have negative impact on investment. Stocks of other liquid assets may also affect the investment decisions since higher value of these assets implies higher collateralizeable securities, thereby reducing pressures on financing costs.

We find variety of studies in the literature that focus on disaggregated subgroups in order to examine the intensity of such relationships of internal financial factors with investment decisions (Fazzari et al. (1988), Devereux and Schiantarelli (1989), Mills et al. (1994), Yuan and Motohashi (2008)). The studies focus on size of the firms, age, type of the industry, retention ratios, size of leverage and investment opportunities etc.

1.2 Background and Rationale of the Study

Although the manufacturing sector in Pakistan contributes about 18.5% to the total GDP[2], its importance cannot be undermined for reasons that (1) major part of the business expenditures in fixed assets (plant and machinery) accrues to the manufacturing sector (2) since fixed assets are the durable goods and variations in gross fixed capital formation have long term impacts on the economy (3) these expenditures create demand for the producer goods and hence lead to significant shifts in the aggregate levels of employment directly as well as indirectly (4) investment being a volatile component of GDP may drastically change the aggregate levels of supply and demand.

Keeping in view the importance of investment in manufacturing sector there is dire need to conduct a comprehensive study that may help understand the behaviour of investment at firm level in Pakistan. As far as corporate sector is concerned, we find some valuable contributions in Pakistan revolving around the subjects of corporate governance, stock price volatility and working capital requirements etc. For example, Shah and Hijazi (2004) explore the determinants of capital structure of firms listed on Karachi Stock Exchange (KSE), Javed and Iqbal (2006) study the relationship between the quality of corporate governance and firm performance, Nazir and Afza (2008) focus on working capital requirements taking into consideration the companies listed on KSE and Jasir Ilyas (2008) attempt to explore the determinants of capital structure of listed companies in Pakistan. However, the impact of financial factors on investment is generally ignored

[2] The manufacturing sector is the third largest sector of the economy of Pakistan and contributes 18.5% to the GDP (Economic Survey of Pakistan 2009-10).

and therefore this area demands attention of the researchers. We assume this responsibility and attempt to explore the role of these variables that might help policymakers to have some insights into the matter and to devise appropriate policies for the purpose.

1.3 Objectives of the Study

Keeping in view the theoretical as well as empirical importance of financial factors in determining investment decisions at firms' level, we are interested in testing their significance for Pakistan. Our objectives include:

- To investigate whether the investment behaviour of the firms' managers is driven by the market valuation of the manufacturing firms listed on Karachi Stock Exchange,

- To examine whether the internal financial factors play any role in the long run investment decisions of these firms,

- To determine how the role of these factors, if any, varies across firms with higher investing opportunities and the firms with lower opportunities to invest.

1.4 Organization and Set up

The study proceeds in the following manner. The relevant literature is discussed in chapter II. In the third chapter of theoretical background, a brief discussion on various theories of investment is given. Chapter IV explains the model used for analysis along

with the definitions of variables and the sources wherefrom the requisite data are collected. In the fifth chapter, results of the empirical analysis are discussed. This is followed by the conclusions of the study and policy implications in chapter six. Appendix and references are given at the end of the document.

Chapter 2

Literature Review

The literature is crowded with studies that are designed to find the determinants of firms' investment decisions. These studies are diversified in terms of the economies concerned, the models adopted and the estimation techniques. Some of these studies along with their findings are summarized below.

2.1 Literature-The World Over

Fazzari et al. (1988) use a large panel data comprising US manufacturing firms for a period 1969-1984. They study the effect of financing constraints on investment using Q-Theory and accelerator models of investment. Using fixed effects approach for their analysis, they find that in each case investment by firms exhausting whole of their internal finance is more responsive to variations in cash flow than that of mature, high dividend firms.

Devereux M. and Schiantarelli F. (1989) investigate the relationship between financial factors and investment for UK firms. They use a variant of q-model for the panel data over a period 1972-1986 and conclude that cash flow is significantly associated with investment. However, it is more important for large firms than for small firms and also for newer firms. They also report an evidence of negative impact of stock of debt on investment whereas stock measures of liquidity do not play any significant role.

Schiantarelli, F. et al. (1992) conduct a study on Ecuadorian firms and observe the impact of financial reforms initiated by the government, to enhance capital accumulation during 1980's. They use firm level data of 420 manufacturing concerns for a period 1983-1988. In order to have an insight of the issue they make a division of the firms into small and large firms, and old and young firms. The bifurcation of small or large firms is based on capital stock whereas the young or old firms are categorized according to the age of the firm. Thus out of 420 sample firms 91 are classified as large (remaining 329 as small) and 223 as old firms (remaining 197 as young). The study concludes that the market imperfections are important for the younger and smaller firms, whereas older and larger firms are not affected by such imperfections. In addition, the scenario of financial constraints stands still even after the financial reforms and no evidence is found in relaxing constraints for the smaller and younger firms.

Mills et al. (1994) study the influence of financial factors on corporate investment taking into account company data from Australian Stock Exchange, for 66 non-financial companies covering period 1982-1992. Employing a variant of q-model of investment, they discover that the firm's investment is affected by the structure of its balance sheet and the availability of adequate internal sources of funds. Further, that these financial factors like cash flows, stock of liquid financial assets and stock of outstanding debt etc. are more important for the small, highly leveraged and high retaining firms.

Lang L. et al. (1996) look at the relation between leverage and growth over a span of 20 years starting from 1970. They use a sample of large size US industrial firms and

consider various measures of growth including ratio of net investment to the book value of fixed assets and the growth rate of employment. They report a strong negative relation between the two variables (leverage and growth) irrespective of the firm size. They also conclude that negative relation holds only for firms having low ratio of Tobin's q, thus implying that leverage does not reduce growth for firms with good investment opportunities, whereas it does reduce for the firms which do not perceive to have sufficient growth opportunities.

Bierlen R. and Featherstone A. M. (1998) try to explain the role of financial factors on farm machinery investors, at different stages of business cycles. Employing US data from 1976-1992 and an extended q-model of investment they find that the relationship between investment and cash flow were stronger for the high-debt and young-operator farms during downturns in the business cycle. Moreover, debt level has stronger constraint effect as compared to asset size and operator age.

Audretsch D.B. and Elston J.A. (2000) observe the investment behaviour of the German firms with respect to the liquidity constraints. Taking into account the data from 1970 to 1986, they classify the firms according to size and arrive at some interesting results. They find that the firms of larger size and those of small size are not as much constrained by liquidity as medium size firms. They infer that the lesser degree of liquidity constraints to smaller firms may be due to effective operations of specialized financial institutions in Germany, which is not much impressive with regard to the medium sized firms.

Bond et al. (2003) construct company panel data sets for manufacturing firms in Belgium, France, Germany and the UK for the period 1978-1989. They estimate two types of investment functions, an error correction model and an Euler-equation specification, in order to investigate the role played by the financial factors in each country. They also report significant role of cash flow and profits on investment; however this role is more significant in the UK as compared to rest of three countries which suggests that the market-oriented financial system of the UK does not perform as good as it does in other countries of the continent.

Mickiewicz T. et. al. (2004) conduct a study on Estonian manufacturing firms covering data over 1995-1999. They observe the investment behaviour of the firms by dividing them on the basis of size and the nationality of investors. The results show that the smaller firms are more financially constrained and have limited access to the external means of financing. On the other, firms that have foreign investors in their ownership structure are less financially constrained as compared to their domestically owned counterparts.

Koo J. and Maeng K. (2005), attempt to investigate the effect of financial liberalization on firms' investment in Korea. They adopt both the Q-model and the Euler model to study the relationship and use GMM technique for estimation purposes. For an unbalanced panel dataset of 371 manufacturing firms they conclude that cash flow effects on investment decrease with financial markets liberalizations, i.e. financial liberalization

helps firms in easy access to external finance. Further, the small firms are at a greater advantage in harvesting such benefits from liberalization.

Prabhakaran V.R (2005), taking into account the financial sector deregulation program in India, tests whether financial liberalization has any significant impact on fixed investment decisions. He uses firm level data of the manufacturing sector and covers a period 1973-2002. For the purpose of analysis, he constructs a financial liberalization index in the neoclassical theoretic framework and concludes that the internal factors like past investment practice, demand factors and internal liquidity play more prominent role in investment decisions as compared to the variables of financial liberalization policy.

Cleary S. (2005), uses a company level unbalanced panel data from seven developed economies viz. U.S, U.K, Canada, Australia, France, Germany and Japan. In order to control for other macroeconomic factor, he selects data from 1987-1997 during which the rates of real GDP growth and inflation remained more or less stable. Only non-financial firms are selected and outliers controlled by assigning the cut off values. He categorizes the firms as constrained or unconstrained by means of various measures, i.e., financial health, dividend behaviour and firm size. Using fixed effects technique, he finds that the sensitivity of investment to internal funds is considerably less for the firms categorized as financially constrained as compared to their counterpart-the unconstrained firms.

Although the results are reinforcing for all types of divisions, however, the evidence is even stronger when firms are categorized according to the financial health. The study suggests that the reluctance of unhealthy firms to invest more when larger internal funds

are available is due to the fact that such firms tend to build up a financial slack and retire their debts rather than invest in the business.

Aivaziana V. A. et al. (2005), explore the impact of financial leverage on the firms' investment decisions using panel data for Canadian companies for the period 1982 to 1999. Their findings are consistent with literature that leverage is negatively related with investment decisions and this relationship is stronger for the firms with lower values of Q, i.e. firms with lesser opportunities of growth. These results are found robust for various measures of leverage as also for alternative econometric methodologies.

Fuss C. and Vermeulen P. (2006) attempt to explore the effect of association with multiple banks on the investment decisions of the firms, in times when there are acute shortages of cash flows. They take a sample of non-financial Belgian firms of medium and large sizes, for a period of six years ranging from 1997 to 2002. Their study suggests that multiple bank relationships do not financially relax a firm during unfavorable cash flow shocks, as compared to the firms having relationships with a single bank. During periods of shocks, the probability of getting additional loan from a single bank is sensitive to the firms' size and the ratio of debt to total assets, but it is not the case with multiple bank relationships. So the firms squeeze their investment during financial constraints. However, the firms able to arrange loans from non-bank creditors make lower cuts in their investment expenditures.

Love I. and Zicchino L. (2006) use firm-level panel data from 36 countries across the world. They divide the firms into two samples-'high' financial development and 'low'

financial development-on the basis of intensity of financial development in their respective countries, and analyze the difference in impulse responses for both the samples using VAR approach. Their results show that the availability of internal funds is more important in explaining investment in countries with less developed financial systems. To be more specific, the impact of positive shocks to cash flow on investment is significantly higher in countries where the level of financial development is low as compared to countries where financial development is high.

Marchica M.T. and R. Mura (2007) test the hypothesis that financial flexibility can enhance investment ability. They work on data regarding non-financial firms in UK for the period 1991-2001. Employing q-model of investment, they conclude that financially flexible firms significantly increase their capital expenditure once they undergo leverage conservatism for a period of three years. In addition, this investment is financed by the issue of new debt, which enables firms to get closer to their target leverage.

Hernando I., and Carrascal C.M. (2007) employ an error correction model to assess the role of various financial variables on the real decisions of firms in Spain. They choose a sample of 7547 non-financial firms, unquoted as well as quoted on stock exchange, and process data for 1985 to 2001. Various financial variables are used as proxies for the financial health of the firm and the impact of financial condition of a firm on fixed investment decisions and the employment decisions is analyzed. The results support the hypothesis that the real decisions are influenced by the financial health of the firm, and

that the intensity of this relationship varies with degree of financial pressure faced by a particular firm.

Odit M.P. and Chittoo H.B. (2008) take a panel data of 27 Mauritian firms listed on stock exchange to explore whether financial leverage has any impact over the investment decisions of listed firms. They employ a data set of 15 years from 1990 to 2004.

For the purpose of their analysis they bifurcate the data into two groups on the basis of growth rates using price earnings ratio as the classification criterion. Their findings suggest that the relationship between the two variables is negative, but it is only significant for the firms with low growth rates.

Rousseau P.L. and Kim J.H. (2008) use firm level panel data for 418 Korean manufacturing firms spanning a period 1992–2001 to look at the investment behaviour of these firms. They specifically attempt to measure the effect of financial factors on investment before and after the East Asian financial crisis of 1997. Utilizing augmented Q model of investment and GMM estimator, they find that investment of small firms become more sensitive to the Tobin's Q whereas the investment by chaebol firms become more important to the internal cash balances after crises. It is concluded that the role of quality of potential projects has increased after crises, in the Korean economy.

Guariglia A. (2008) uses large panel data of UK firms, generally unquoted and belonging to wide range of industrial sectors, covering the period 1993-2003. He uses error correction specification and first difference GMM estimator to test sensitivity of

investment to cash flow taking into account internal and external financial constraints. The study concludes that as the degree of external financial constraints increases, the sensitivity of investment to cash flow intensifies. Further the investment-to-cash flow sensitivity is utmost for the firms facing external financial constraints and where larger internal funds are available.

Adelegan O.J. and Ariyo A. (2008), conduct a study on Nigerian manufacturing firms to see the effect of imperfections in the capital markets on investment decisions of corporate managers. They employ a sample of 85 firms listed on the Nigerian Stock Exchange for the period 1984 to 2000. The study finds that the investment decisions of Nigerian firms are significantly affected by the financial factors.

Bokpin G. A. and Joseph M. O. (2009) conduct a study to find determinants of corporate investment decisions. They take into account three broad-based determinants, that is, firm level variables, financial market and macroeconomic factors. The study adopts a dynamic panel data model and uses data from 34 emerging market firms covering the period 1992-2007. The study finds mixed results as far as the impact of macroeconomic factors and financial market development on corporate investment decisions is concerned. However, firm level factors such as past investment, profitability, firm size, growth opportunities available to firms and free cash flow have significant role in shaping these decisions.

Kristofik P. (2009) investigates the investment behaviour of Slovak firms in two regimes, one with financial market imperfections and the other when reforms were introduced in the banking sector. He uses a sample of more than one thousand non-financial firms from

the period 1996 to 2005. A cut line is made at 2000, considering the banking sector reforms inaugurated in 1999 with a view to enhance availability of funds to the investors. Thus, the impact of financial variables is examined in periods 1996-2000 and 2001-2005. The results suggest that the effectiveness of credit process enhances after 2000.

Jiming L. et al. (2010) examines the investment behaviour of 60 Chinese listed companies over the period 2006-2008. They divide the firms into various groups according to growth opportunities (low, high and mid-growth opportunities) and the type of ownership. The results of multiple regressions show that debt financing negatively affects the investment for the low and high growth firms, however, the relationship is stronger for the firms with low-growth opportunities. The mid-growth opportunities firms are found to have better risk management and the investment for these firms increases with higher leverage.

The investment behaviour is also influenced by the type of ownership. In case of state enterprises, the investments are positively related with debt financing whereas a negative relationship is observed for non-state-owned enterprises.

2.2 Literature on Pakistan

Literature on Pakistan can be divided with reference to research in two areas. The work focusing the area of investment in general and the studies concentrating on the corporate sector. Here, we discuss some of the studies from both of these areas to highlight the gap that our study intends to fill.

2.2.1 Research Focusing General Investment Behaviour

Nishat M. and Aqeel A. (2004), taking a longer time series data from 1961-2003, conduct a study to investigate the factors responsible for growth of foreign direct investment. They incorporate a variety of variables from fiscal, trade and financial sector. The behaviour of these variables is considered both in the long and short run, by applying cointegration and error-correction techniques for estimation. The results reveal that tariff rate, exchange rate, credit to private sector, and tax rate significantly explain the dependant variable.

Majeed M.T. and Khan S. (2008) in their study attempt to find the determinants of private investment and whether there is an offsetting or reinforcing relationship between the private and public investment in Pakistan. Taking a time series data from 1970-2006 and applying OLS technique for estimation, they find that private investment in Pakistan is affected by several macroeconomic factors including private sector output, net capital inflows, past capital stocks, total investable resources and real interest rate. As far as the relationship of public-private investment is concerned, it is found to be in the nature of substitutability and public investment most often crowds outs the private investment.

The work of Awan M.Z. et al (2011) focuses foreign direct investment (FDI) with an aim to highlight its determining factors. They, however, confine their analysis to the commodity producing sector of Pakistan (comprising mainly the sector of agriculture, manufacturing, textile, construction, food and beverages, oil and gas, and power). The Government of Pakistan has introduced a conducive environment for foreign investors in

the form of tax exemptions and 100% equity investment etc. The time series data for their analysis consists of 52 quarters from 1996 to 2008 and they employ Co-integration and Error Correction Model techniques for estimation. They conclude that FDI is mainly determined by the GDP, sector growth rates, Per Capita Income, Degree of Trade Openness, Foreign Exchange Reserves and Gross Fixed Capital Formation. The positive signs on all of these explanatory variables are found to be statistically significant.

2.2.2 Research Focusing the Corporate Sector Behaviour

Shah and Hijazi (2004) take a sample of 445 non-financial firms listed on KSE and explore the factors that potentially affect the capital structure of firms. They process data over the years 1997-2001. They use four factors as independent variables, namely, asset tangibility, size, growth and profitability and evaluate their effect on leverage through pooled regression analysis. Their findings reveal that tangibility of assets and size of the firm are positively related with leverage, whereas, profitability and growth have negative impact on leverage.

Galindo A. et al (2005) conduct a study on developing countries to analyze whether investment funds allocation efficiency is improved with financial liberalization. They use firm level data and take a sample from twelve developing countries comprising Pakistan, India, Indonesia, Malaysia, Korea, Taiwan, Chile, Philippines, Mexico, Brazil, Argentina and Thailand. The study specifically includes those countries in the sample that have introduced various financial reforms in the preceding years. They develop an index of the

efficiency and conclude that the efficiency of investment funds improves with financial liberalization.

Hijazi and Tariq (2006) narrow down the sample frame and take into account only cement sector to find the determinants of capital structure. They take firms listed on Karachi Stock Exchange and the data covers a period 1997-2001. The findings of the pooled regression analysis conclude that tangibility and growth positively affect the leverage whereas the impact of profitability is negative. However, the size of the firm is not found to be statistically significant for the capital structure of these firms.

Javed A. Y. and Iqbal R. (2007) test the hypothesis if the performance of firms is explained by the degree of goodness in the corporate governance. Their sample comprises fifty firms listed on Karachi Stock Exchange representing non-financial sector. The Tobin's Q is used as a proxy for performance whereas four indices for corporate governance are constructed-the overall composite index and three subordinated indices taking into consideration the Composition of Board, Disclosures & Transparency and Shareholding & Ownership. The model is estimated by GMM in order to handle the potential problem of endogeneity. The results of the analysis divulge that the overall corporate governance significantly affects the performance of the firms, however, the effect of all its components is not significant, particularly the impact of disclosure and transparency index is not clear. This outcome leads to the proposition that transparency standards cannot cope with the issues of poor management and low production.

Nazir and Afza (2008) select 132 manufacturing firms, belonging to different industries, listed on Karachi Stock Exchange and try to explore determinants of working capital requirements. They use Ordinary Least Squares (OLS) model to test the effect of various internal and external factors using data from 2004 to 2007. The explanatory variables include leverage, firm's growth, size of the firm, return on assets, firm's operating cycle and Tobin's q. In addition, an industry specific dummy is also introduced along with real GDP growth rate which proxies the level of economic activity in the country.

Their study ends up with a finding that leverage, return on assets, firm's operating cycle and Tobin's q all explain the working capital requirements significantly and also this requirement varies with the type of industry to which a firm belongs.

Rafiq, M. et al. (2008) conduct a study on firms belonging to the chemical sector only. The study attempts to explore the factors that explain the capital structure of the firms listed on Karachi Stock Exchange over the period 1997-2001. A pooled regression analysis of the study finds that growth, profitability, firm size, income variation and non-debt tax shield significantly explain the capital structure of the sample firms. However, tangibility of assets is not found to be significant in determining capital structure of the firms. Where all other variables have positive impact on leverage, profitability negatively affects the leverage which reinforces the pecking order theory that the firms first utilize profits and then resort to external debt.

Mahmud et al. (2009), for their sample chose three Asian countries at different stages of development namely Pakistan, Malaysia and Japan and test whether the capital structure

of firms is influenced by the macroeconomic factors. They use three different measures of leverage, that is, total debt to equity ratio, long-term debt to total capitalization ratio and total debt to total assets ratio. The study finds that these factors play determining role in the capital structure decisions of Malaysia and Japan, and that higher economic growth stimulates higher levels of debt. The most significant role, however, is that of the prime lending rate for the two courtiers. The scenario of Pakistan is different from the other two countries and the authors suggest that Pakistani firms are debt-trapped due to inefficiencies together with high levels of debts.

Ahmed H. and Javid A. (2009) take into account dividend payout policy of the firms to explore the factors responsible for the variations therein. A large amount of data comprising 320 non-financial firms listed on Karachi Stock Exchange is processed for a period of 2001-2006. The conclusion of the study suggests that the dividend behaviour (calculated as dividend per share) is influenced by the lagged value of the change in dividend per share and the current change in the earnings per share. However, in economic terms the sensitivity to the latter is more important. They employ different estimation techniques like GMM, Pooled, Fixed Effects Model and Random Effects Model and the results are found to be robust in all cases.

Afza T. and Mirza H.H. (2010) try to investigate the reasons behind declining dividend practices of the firms listed on Karachi Stock Exchange. The ordinary least squares method is applied to data from a hundred companies for a period of three years ending 2007. The study finds that firms in which larger share of ownership is held by the

managers and individuals, tend to pass on less as dividend to shareholders. The finding implies that managers prefer to hold cash and to distribute dividend at their own discretion and the individual investors also favour capital gains as compared to revenue gains in the form of dividends. The study also concludes that operating cash flow and profitability affect the payout behaviour of the firms positively whereas the size and leverage affect it negatively stating that the firms of larger size and having high gearing are reluctant in paying cash dividends.

Shah Z.A. et al. (2011) conduct a study to analyze the effect of ownership structure (an important constituent of corporate governance) on the dividend payout behaviour of companies listed at Karachi Stock Exchange. Ownership structure is described in terms of proportion of shares held by the Board of Directors. In addition to ownership structure, some other features (size, return on equity and leverage) are also introduced as control variables so as to have a more reliable picture of the relationships involved. The results show that in case of the firms where ownership is centered to the Board of Directors, cash dividends are likely to be paid regularly.

Asif A. et al. (2011) examine the impact of financial leverage on the dividend policy, taking into account the firms listed on Karachi Stock Exchange. The panel data consists of 403 firms and a time series component of seven years from 2002 to 2008. The dividend per share is used as regressand and the leverage calculated in terms of debt ratio is used as explanatory variable. The control variables include dividend yield and changes in earnings of the firm. They use fixed and random effects models in the analysis. The

results enunciate that the leverage negatively affects the payout behaviour of the firm whereas the impact of dividend yield is positive. The results are significant for both techniques of estimation.

The work of Yasser Q. R. (2011) is also an attempt to study the linkage between performance of the firms and governance practices. He constructs a corporate governance scoring index comprising forty elements from four areas i.e. rights of the shareholders, transparency and disclosure, composition of the Board of Directors and the equity structure. An equal weight is assigned to each area and then the extent to which this index is linked with the performance of the firms is evaluated. The study is, however, confined to the communication sector of Pakistan and the data for 10 cross sectional units for the year 2009 is utilized for analysis. The descriptive results find evidence in favour of the null hypothesis that better governance practices are directed towards better performance of the firms.

2.3 Concluding Remarks

It is evident from the conclusions of studies discussed above that financial factors have important role in determining investment decisions at corporate level, no matter which model is employed or what technique is used. However, their importance may vary with size of the firm, its dividend payout behaviour and/or its age etc. This variability in the degree of importance of these factors leaves the scope to examine the impact of financial variables on the investment behaviour of the firms, by dissecting the entire sample into subgroups on the basis of important features of the firms. The present study is an attempt

of investigation in that direction, which might provide further insights in the behaviour of firms.

Chapter 3

Theoretical Background

3.1 Models of investment

Models of investment can be classified with reference to the relative significance attached by these models to certain variables as determinants of investment. The important determinants according to Chirinko (1993) are price variables (including interest rates and tax rates), the quantity variables (like liquidity and output) and the autonomous shocks (for example the technology shocks). Some of these models are discussed as under:

3.1.1 Accelerator Model

Accelerator theory is stressed by researchers of the earlier time who discuss the importance of demand, while explaining the causes of business cycles. The work of Clark (1917), for example, is worth mentioning in this regard who, in explaining the business cycles, accentuates this approach.

The accelerator model suggests that the investment level is determined by the expected volume of future production. The link between the two is the desired capital stock. Investment depends upon the desired capital stock which in turn is determined by the expected level of output. From a mathematical point of view, this relationship is expressed as follows:

$$\frac{I}{K} = a + b\left(\frac{Y}{K}\right)$$

Where, 'a' is the intercept, 'b= gv' is the slope and Y represents the expected volume of production[3].

3.1.2 Cash Flow Model

The impact of cash flow on investment was extensively studied in the 1950s and 1960s. The cash flow model accentuates that internal funds have dominant role in determining fixed investment as compared to external funds. The cash flow model can be depicted in the following manner:

$$\frac{I}{K} = a + b\left(\frac{CF}{K}\right)$$

CF is the cash-flow realized by the firm.

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[3] Given the production function (Leontief Type)

$Y = min\left(\frac{K}{v}, \frac{L}{\mu}\right)$

$\Rightarrow Y = \frac{K}{v}$ *if labour supply is elastic,*

where v is the incremental capital output ratio (ICOR), or the accelerator coefficient

$v = \frac{dK/dt}{dY/dt} \ldots\ldots ICOR$

It can easily be related to the growth rate

$v = \frac{dK/K}{dY/Y} \cdot \frac{K}{Y} = \frac{I/K}{g} \cdot \frac{K}{Y}$ *or* $\frac{I}{K} = (gv)\frac{Y}{K}$

This can be written in the linear form as, $\frac{I}{K} = a + b\left(\frac{Y}{K}\right)$

The idea behind the above construct is that availability of funds is always scarce and hence the limitation of internal funds may constrain the investment expenditures of a firm. Cash flow theory also impliedly advocates the thought of financing hierarchy, according to which a firm prefers internal finance over the external debt, which in turn is preferred over issue of new equity.

Some other theories frequently employed these days for analysis of firms can also be traced back to the cash flow model having close relationship to the latter. For example, managerial and information theoretic models envisage the dependence of investment on cash flows.

The Information theoretic model takes into account the informational asymmetries, where the insiders are better informed regarding the problems and prospects of a firm as compared to the outsiders, resulting into the conclusion that internal and external finance are imperfect substitutes of each other. The Managerial model on the other hand highlights the observation that managers prefer internal finance over the external one because the discretionary power can more easily be employed in respect of internally generated funds.

Managerial theory is somewhat older than the information theoretic approach. It was initiated by Marris (1963) and later modeled and tested by many researchers. The information theoretic approach was propounded by Akerlof (1970) when he first discussed the market for lemons and explained that markets could face a break down as a result of information asymmetries. Stiglitz and Weiss (1981) and Myers and Majluff

(1984) further explained that information asymmetries may potentially lead to credit rationing.

3.1.3 Tobin's Q-Model

The idea that investment may be affected by the market value of the firm's assets was floated first by Keynes (1936). However, the formal Q-theory of investment is associated with the work of Brainard and Tobin (1968) and Tobin (1969). The theory emphasized on q-ratio as determinant of investment and contradicted the previous models that were output oriented. The q-ratio means the market value of a firm in relation to the replacement cost of its assets. The underlying idea of this model is that equity market reflects the investment opportunities open to a firm and that the value maximizing managers would make additions to the capital stock until the q-ratio is greater than unity, that is, the marginal additions to a firm's market value surpasses the replacement cost of capital stock.

The Q-model can be written in the following form:

$$\frac{I}{K} = a + bQ$$

Where, I is the level of gross investment, K is the capital stock and Q is the Tobin's ratio.

3.1.4 Neoclassical Model

Jorgensen (1963) invoked the neoclassical model and proposed that it is the cost of capital that primarily determines the level of investment and that the decisions of a firm regarding real investment are held separate from financial decisions. The theory is in line with the Modigliani-Miller (1958) theorems. The neoclassical model, however, is criticized on grounds that it starts from hypothesis that are not in line with reality. For instance, the model considers that investment is reversible which means that a firm can convert its fixed capital into liquidities any time it wishes. But in fact, only a fraction of money once invested in real capital can be recovered through liquidation or disinvestment process, and this also cannot be done immediately, particularly when it is an unprofitable venture.

3.2 Composite Models

The common issue to all the basic models employing only one candidate as explanatory variable is the inability of a single variable to explain the investment behaviour of the firms. As such, a variety of composite models emerged subsequently with several explanatory variables in the empirical equations. This is to recognize indirectly the complexity of investment process. Hence the composite models (sometimes referred to as multifactorial models) also incorporate financial variables like profits, debt and liquid assets etc. to demonstrate the importance of these factors in determining investment behaviour of the firms. Some of these models are discussed below:

i. Bischoff (1971) extends the standard neoclassical model of Jorgenson by suggesting that investment is more a function of changes in output than the cost of capital. This model is also known as neoclassical-accelerator model or modified neoclassical model.

ii. Eisner (1978) introduces the accelerator-profit model stating that investment expenditure is determined by the expected output and the expected profitability of investment. Thus the volume of sales, current as well as past, and the profits of a firm, current as well as past can well be considered as determinants of gross capital expenditures. Profits as explanatory variable also indicate the imperfections in the capital markets in a sense that greater tendency of firms to invest more in periods of high profits means greater degree of imperfections in the capital markets and vice versa.

iii. Fazzari et al. (1988) employ another composite model by including q ratio into the cash flow model. They incorporate q-ratio as a proxy variable for the investment demand and attempt to measure the investment-cash flow sensitivity for firms with different degrees of financial constraints.

iv. Devereux and Schiantarelli (1989), and Mills et al (1994) also use q-cash models in their analysis of determinants of corporate investment. They further included stock of liquid assets and stock of debt in their empirical equations to explore the role of these variables in explaining investment.

Hence, the composite models of investment are better, in terms of their explanatory power, than the basic or unifactorial models, since they incorporate other important

variables to explain the investment. Some of the multifactorial models, in their numeric terms, are expressed in Appendix A.

3.3 The Search for a Superior Model

Many researchers have attempted to test the appropriateness of different models for explanation of investment behaviour. For example, Jorgensen and Siebert (1968), taking into account a sample of fifteen manufacturing firms of large size and covering a fifteen year period of 1949-1963, find the neoclassical model to be the superior over other competing models.

Elliott (1973) re-estimates the models tested by Jorgensen and Siebert (1968), using a larger sample of 184 firms and covering a period of seventeen years starting from 1947 to 1963, however, he arrives at different results. His study suggests that cash flow model is better than other models in case of cross-sectional analysis, whereas the accelerator model has pre-eminence in case of time-series regressions.

Samuel C. (1996), in his study, uses a sample of U.S. manufacturing firms to rank the competing models of investment employing nineteen years data ending 1990. His study proposes that the neoclassical model is superior in time series estimates while the cash flow model is ranked on top in case of cross sectional analysis.

It is evident from the above discussion that the focus of neoclassical models are the price variables only, whereas the accelerator and cash models emphasize the quantity variables

and the Q-models consider the autonomous shocks. As far as composite models are concerned, the impact of more than one type of variables is taken into account.

3.4 Selection Criteria of the Behavioural Model

Stock exchange is a place where firms can issue new shares and the shareholders can trade their existing shares in order to realize capital gains. The important role of the stock market and the value it assigns to shares of different firms is evident from engagement of a large number of stockholders in the market. The idea that investment decisions ought to be affected by the ratio of the market value of firm's assets to the replacement cost of capital has been floated by Brainard and Tobin (1968) and a bunch of literature subsequently revolved around this ratio in explaining investment behaviour.

Many studies thereafter tried to explore whether Q has any determining role for the firms' investment decisions. Some of the studies suggest that market perceptions are not taken into account by the managers of the firms while taking decisions relating to real economic activities, as these perceptions are merely a sideshow and the real decisions are based on fundamentals (Bosworth et al. (1975), Blanchard et al. (1993)). Blanchard et al. (1993), for example, conclude that although Q and investment move together side by side thus signifying an association between the two. However, this relationship gets weaker whenever the managers own valuations differ from those made by the market. They argue that if the firm issues shares when Q is greater than unity and in fact the firm lacks investment opportunities, the only alternative is to make risk free lending e.g., buy treasury bills. However, the managers may not be interested in doing so, because such

hand, if the stock market affects real economic activity, then the investors' sentiments that affect stock prices could also indirectly affect real activity.

Chapter 4

Analytical Framework and Data Description

4.1 The Model

Keeping in view the discussion in Chapter-3, none of the models can be ranked as superior in absolute terms. This is because different results are arrived at by different studies, depending on the nature of data and the sample characteristics (Jorgensen and Siebert (1968), Elliott (1973), Samuel, C. (1996)). Composite models, however, are preferred over the simple models due to their better explanatory power. For the purpose of our analysis we use a variant of q-cash model by incorporating the stock of liquid assets, the sales volume and the stock of debt as additional explanatory variables besides the cash flow and q-ratio. The econometric model[4] that we will estimate is given below:

$$\left[\frac{I}{K}\right]_{it} = \alpha + \beta_1 Q_{it} + \beta_2 \left[\frac{CF}{K}\right]_{it} + \beta_3 \left[\frac{LA}{K}\right]_{it} + \beta_4 \left[\frac{Db}{K}\right]_{it} + \beta_5 \left[\frac{SR}{K}\right]_{it} + u_{it}$$

Where,

I = Investment in fixed assets,

Q = Tobin's q,

[4] This model has also been used by Mills *et al.* (1994) where the model was originally suggested by Devereux M. and Schiantarelli F. (1989).

CF = Cash Flow,

SR = Sales Revenues

Db = Stock of Debt

LA = Stock of Liquid Assets

K = Capital Stock.

4.2 Methodology

We use a large panel dataset on 209 cross sections which comprised public limited companies listed on the Karachi Stock Exchange for an overall period of seven years (2002-2008). The panel is balanced as the information on all the variables is collected across the time frame under study. Panel data analysis is getting popular because of many advantages as compared to time series and cross sectional data individually.

In order to cope with the potential problem of heteroskedasticity, we take all variables in the form of ratio. In financial research, two types of panel estimator approaches are generally employed for analysis: fixed effects models and random effects models.

The estimating technique that we intend to employ is not chosen arbitrarily and in order to avoid any mis-specification we employ Hausman Specification Test (1978) to select the appropriate technique out of fixed effects and random effects approaches. We use software packages of Eviews and MS Excel for the purpose of our analysis.

4.3 Description of the Variables and Data Sources

Company data is taken from "Balance Sheet Analysis of Joint Stock Companies-Listed on the Karachi Stock Exchange" published by State Bank of Pakistan. The share prices are obtained from the websites of Karachi Stock Exchange and Business Recorder. The sample includes only manufacturing firms representing six major sectors of the economy, i.e. Textile, Chemical & Pharmaceuticals, Engineering, Sugar & Allied, Paper & Board and Cement. We have not included the non-manufacturing sectors (financial sector and the service sector) in our study because the fixed investment patterns of such firms are of peculiar nature and not comparable with those of manufacturing concerns.

Table 4.1: Sectors Included in the Sample

S.No.	Sectors	Number of Firms
1	Textile	129
2	Chemical & Pharmaceuticals	22
3	Engineering	7
4	Sugar & Allied	29
5	Paper & Board	7
6	Cement	15
	Total Firms	209

Only those firms are included in the sample for which data are available on all the variables through the sample period from 2002 to 2008. A brief description of the variables is given below:

4.3.1 Investment

For the purpose of this study, Investment means investment in fixed assets. Various researchers have taken investment in plant and machinery only. However, due to insufficient information, we have taken investment in fixed assets. This measure of invesment is consistent with the studies by Koo and Maeng (2005) and Marchica M.T. et al. (2007). The variable is measured as follows:

$(\text{Investment})_t$ = (Value of Fixed Assets after accumulated depreciation)$_t$-(Value of Fixed Assets after accumulated depreciation)$_{t-1}$+ $(\text{Depreciation on Fixed Assets})_t$

Investment is standardized by the beginning of the year capital stock.

4.3.2 Tobin's Q

As a standard formula, Q is measured as the ratio of market value of a firm to the replacement cost of its assets. However, in literature, we find various methods for the computation of market value as well as the replacement cost of the assets. An appealing method for the construction of Q is the one proposed by Lindenberg and Ross (1981), which is frequently used by researchers.

According to the methodology suggested by Lindenberg and Ross (1981), the market value of a firm equals the sum of market value of stock (common as well as preferred), the market value of long term debt and the book value of short term debt. The denominator in the formula of Q is arrived by subtracting historical value of fixed assets (plant and machinery) and historical value of inventory from the total assets whereas

adding up the replacement costs of the two subtracting terms. The replacement cost of fixed assets, of a firm, for each year is calculated by making an upward adjustment in the previous year's replacement cost on account of growth of capital goods prices and deflating it by the rates of real depreciation and the technological change. Replacement cost in the first year of observation is assumed to be equivalent to the book value of the assets. Adjustments to the value of inventories are also made with regard to price changes. However, such adjustments are made only where firms follow LIFO (last in first out) or Average method of costing inventory. No adjustment is made for inventories recorded on FIFO (first in first out) method.

In a number of subsequent studies, this formula is modified with regard to two factors, namely, technological change and the depreciation rate. Some studies consider technological change factor equal to zero and the others use a flat depreciation rate - mostly 5% per annum-on fixed assets. (Smirlock, Gilligan and Marshall, 1984; Lang, Stult and Walkling, 1989, 1991; Lang and Stult, 1994)

The variations found in the literature regarding measurement of Q imply certain potential problems in each method. Lewellen W.G. and Badrinath S.G. (1997) give comparison of various methodologies employed for the measurement of Q and discuss the shortcomings associated with each of these methods. They attempt to prove that most of the methods employed are exposed to a downward bias with respect to the value of variable and finally propose a new method for the construction of Q. In contrast to the method proposed by Lindenberg and Ross (1981), they suggest that the fixed assets at book value

are not appropriate proxy for the replacement cost of these assets in the first year of observation. Therefore data on investment expenditures in the previous years should be collected and a fair estimate of the replacement cost can be arrived by backward adding up of investment expenditures such that the sum equals the current value of gross fixed assets. Then relevant adjustments can be employed on account of price changes, technological changes and depreciation to such series of investment expenditures. In this way, a reasonable estimate of replacement cost of the fixed assets can be arrived at.

In short, there is no consensus among the accountants/researchers regarding the measurement of replacement cost, and in turn, Q leaves a room for discretion as to what method be employed for its computation. Chung and Pruitt (1994), for example, developed *'Approximate Q'* which is subsequently utilized by Aivazian V.A. *et al.* (2005) as well. Some other researchers use Market to Book ratio (market value of shares divided by the book value of shares) as a substitute for Tobin's q (Cleary (2005)).

We, therefore, contend to use total assets at book value (expressed as capital stock) as a proxy for replacement cost of firms' assets due to non-availability of detailed data. This proxy is employed by various researchers in their studies on developing economies. For example, Koo and Maeng (2005), Javed and Iqbal (2007), Nazir and Afza (2008) etc. use the same variable representing the replacement cost. Thus, for the purpose of this study:

Q = The Sum of book value of total debt plus market value of equity divided by the capital stock of the firm.

4.3.3 Cash Flow

Cash flow represents net profits after tax during the year adjusted for depreciation (being non-cash item added back). Symbolically,

Cash Flow = Net Profit (After Tax) + Depreciation on Fixed Assets (For The Year)

Cash flow is normalized with capital stock at the beginning of the year.

4.3.4 Sales Revenues

Sales mean total sales during the period, that is, the sum of both components of sales, local as well as exports. Sales variable is normalized with capital stock at the beginning of the year.

4.3.5 Stock of Debt

Stock of debt means the outstanding debt at the beginning of the year. It is the sum of current and total fixed liabilities. Total fixed leabilities include preference shares, debentures and other fixed liabilities i.e. loans from banks, loans from non-bank financial institutions, loans from specialized institutions etc. and the current liabilities consist of short term loans, sundry creditors, advances from customers, banks overdrafts etc. Stock of debt is also normalized with capital stock at the beginning of the year.

4.3.6 Stock of Liquid Assets

Stock of Liquid Assets is calculated by deducting current liabilities and inventory from the value of current assets. This variable is also normalized with capital stock at the beginning of the year.

4.3.7 Capital Stock

Capital stock in the model is represented by the book value of total assets at the beginning of the year. All variables in the model, with the exception of Q, are normalized by this variable.

Chapter 5

Empirical Results

We explore the role of various financial factors in explaining the investment behaviour of the authorities (managers) at firms' level. In addition to pinpointing the factors having some statistical significance in this regard, we also highlight their economic importance in decision making. The estimated results shown below, give a comprehensive picture of the concerned relationship.

The model that is used for estimation is reproduced below.

$$\left[\frac{I}{K}\right]_{it} = \alpha + \beta_1 Q_{it} + \beta_2 \left[\frac{CF}{K}\right]_{it} + \beta_3 \left[\frac{LA}{K}\right]_{it} + \beta_4 \left[\frac{Db}{K}\right]_{it} + \beta_5 \left[\frac{SR}{K}\right]_{it} + u_{it}$$

However, before we proceed towards regression analysis, the choice of better technique is essential. We take advantage of the Hausman Specification Test (1978) for this purpose, which is briefly explained as under.

5.1 Hausman Specification Test

Hausman (1978) proposed a test to facilitate the choice of an appropriate technique from among the two competing approaches namely the fixed effects and the random effects. The test is meant to see if the difference between the fixed effect and the random effect estimators is significant or otherwise. Under the null hypothesis, the difference is not

substantial, and the estimators of fixed effect, though consistent, are inefficient, and thus the random effect specification is a better choice. However, under the alternative hypothesis, the random effect model yields inconsistent results and the fixed effects approach is preferable. The test statistic proposed by Hausman (1978) is as follows:

$$H = \left(\hat{\beta}^{FE} - \hat{\beta}^{RE}\right)' \left[Var\left(\hat{\beta}^{FE}\right) - Var\left(\hat{\beta}^{RE}\right)\right]^{-1} \left(\hat{\beta}^{FE} - \hat{\beta}^{RE}\right) \sim \kappa^2(k)$$

We employed the Hausman test to identify the suitable technique. The estimated value is given by (0.000000001024) which is well below the tabulated value of (11.07) at five percent level of significance, thus signifying very little evidence against the null hypothesis. Hence the Hausman test recommends random effects model to be employed in order to obtain consistent and efficient estimates.

5.2 Overall Analysis

Table 5.1 presents the estimates of the model, which includes Q, Cash Flow, Stock of Debt, Stock of Liquid Assets and Sales as explanatory variables. The results cover a total period of seven years starting from 2002 to 2008, whereas one observation for each cross-section is consumed in the construction of dependent variable which need the difference in net fixed assets of two successive years. Thus the six years data for 209 cross-sections (firms) give us a total of 1254 observations for analysis. These results are obtained by estimating the model using random effect specification as discussed above.

Table 5.1				
Total Sample (Dependent Variable=Investment in Fixed Assets/Capital Stock)				
Independent Variables and Summary Statistics	**Coefficient**	**Standard Error**	**t-Statistic**	**Prob.**
Constant	0.0909	0.0014	63.8912	0.0000
Q	0.0152	0.0010	14.6574	0.0000
Cash Flow/Capital Stock	0.0195	0.0018	10.8169	0.0000
Stock of Liquid Assets/Capital Stock	0.0484	0.0020	24.4498	0.0000
Stock of Debt/Capital Stock	-0.0334	0.0021	-16.1291	0.0000
Sales/Capital Stock	0.0471	0.0007	71.0142	0.0000
F-statistic	2498.793			
Prob(F-statistic)	0.0000			
Observations	1254			

The results are shown in Table 5.1. The signs of estimated coefficients of Q, cash flow and sales provide evidence in favour of the standard models of corporate investment, for example the Q-model, Cash Flow model and Accelerator model. The signs on all these variables are positive and significant at 1% level. In addition, the coefficient of Stock of liquid assets is also positive, while the coefficient of Stock of debt (leverage) has the expected negative sign and both of these estimators are significant at 1% level.

The estimated positive coefficient of Q supports the findings of Devereux and Schiantarelli (1989), Mills *et al.* (1994), Odit and Chittoo (2005), Aivaziana *et al.* (2005),

Koo and Maeng (2005), Cleary (2005), Rousseau and Kim (2008). This implies that the investment decisions of the managers are affected by the markets valuations. Although the quantum is very small which indicates that one percent change in Q brings about a change of 0.0152 percent in the fixed capital expenditures, in the same direction (positive impact).

The coefficient of Cash Flow has a positive sign, supporting the underlying theory. The results suggest that one percent increase in cash flows boost up investment in fixed assets by about 0.0195 percent. The positive coefficient of cash flow is consistent with findings of prior studies based on empirical data like Fazzari *et al.* (1988), Devereux and Schiantarelli (1989), Lang *et al.* (1996), Aivaziana *et al.* (2005), Koo and Maeng (2005), Cleary (2005), Rousseau and Kim (2008). The Stock of Liquid Assets has also a positive coefficient that is in line with the results of Mills *et al.* (1994), Odit and Chittoo (2005) and bears a magnitude of 0.0484. The Stock of Debt, which is often referred to in the literature as leverage, has the expected negative sign (-0.0334) indicating that the managers will curtail capital expenditures, as the stock of debt rises. The earlier studies including Devereux and Schiantarelli (1989), Mills *et al.* (1994), Lang *et al.* (1996), Odit and Chittoo (2005), Aivaziana *et al.* (2005), Yuan and Motohashi (2008) also reached similar findings. We also find an evidence in favour of accelerator theory, as represented by inclusion of the Sales term in the model. Our results testify the previous works of Mills *et al.* (1994), Lang *et al.* (1996), Aivaziana *et al.* (2005), Koo and Maeng (2005), Odit and Chittoo (2005), Guariglia (2008).

Notwithstanding, the statistical significance of all the estimators at one percent level, the economic significance varies for each of the regressors. The Stock of liquid assets followed by Sales bear the largest quantitative importance to their credit. The variables of stock of debt, cash flow and Q come next respectively.

The significant role of these financial variables divulges the prevalence of imperfections in the capital markets and implies that internal and external finances are not the perfect substitutes of each other and the costs associated with the external means of financing are far larger than internal sources.

5.3 Group Analysis

Although the overall results give an evidence in favour of a priori, a further investigation into the group analysis is worthwhile. We seggregate the data into two halves according to the investment opportunities available to the firms.[5] In the first step we calculate average Q for each cross section over the sample period which gives us 209 values of average Q. Then we divide the data into two groups on the basis of medianal value of average Q calculated in the first step[6]. Thus the first group comprises the firms with larger value of average Q in the parent sample, that is, the firms having higher opportunities to invest (hereafter referred to as larger firms), and the second group

[5] Mills, K. et al. (1994) and Yuan, Y. and Motohashi K. (2008), in their studies, used the same criteria for conducting the sectional analysis of the overall data.

[6] The number of firms is an odd figure, so the two groups are not of exactly equal size. As a matter of discretion, the firm having medianal value of Q can be put into any group, and we have categorized it as smaller firm.

consists of the firms with smaller value of average Q in the full sample, that is, firms with lower opportunities to invest (hereafter referred to as smaller firms). The estimation results are not surprising and the impact of the financial variables on investment behaviour in the two groups is as per the expectations.

Table 5.2 gives the results of larger firms. The results show that the estimators of all the explanatory variables are significant at 1% level, with the exception of cash flow, which is significant at 10% level. These results reinforce the findings of previous regression covering the whole sample.

Table 5.2

Firms with Large Q (Dependent Variable=Investment in Fixed Assets/Capital Stock)

Independent Variables and Summary Statistics	Coefficient	Standard Error	t-Statistic	Prob.
Constant	0.0879	0.0030	28.8592	0.0000
Q	0.0285	0.0018	15.4758	0.0000
Cash Flow/Capital Stock	0.0061	0.0033	1.8394	0.0659
Stock of Liquid Assets/Capital Stock	0.0636	0.0035	18.0654	0.0000
Stock of Debt/Capital Stock	-0.0307	0.0035	-8.7808	0.0000
Sales/Capital Stock	0.0280	0.0014	20.6127	0.0000
F-statistic	611.3635			
Prob(F-statistic)	0.0000			
Obervations	624			

The next step is to estimate the equation using data on the smaller firms, which do not have access to well recognized investment opportunities. Table 5.3 presents the results of regression analysis for such firms. Most of the coefficients of independent variables are bearing the expected signs and prove to be statistically significant at 1% level. The only exception is the stock of liquid assets which does not seem to be affecting the investment behaviour even at 10% level of significance.

Table 5.3

Firms with Small Q (Dependent Variable=Investment in Fixed Assets/Capital Stock)

Independent Variables and Summary Statistics	Coefficient	Standard Error	t-Statistic	Prob.
Constant	-0.0633	0.0048	-13.2667	0.0000
Q	0.2511	0.0073	34.3063	0.0000
Cash Flow/Capital Stock	0.1000	0.0042	23.7966	0.0000
Stock of Liquid Assets/Capital Stock	-0.0030	0.0049	-0.6226	0.5336
Stock of Debt/Capital Stock	-0.1258	0.0081	-15.5108	0.0000
Sales/Capital Stock	0.0648	0.0013	48.6305	0.0000
F-statistic	1290.1910			
Prob(F-statistic)	0.0000			
Observations	630			

After conducting separate analysis for the larger and the smaller firms, it would be useful to compare the results of the two groups. Table 5.4 gives a comparison of the results arrived at in the sub-samples.

Table 5.4		
Comparative Analysis of Firms (Larger Firms Vs. Smaller Firms)		
Independent Variables and Summary Statistics	**Coefficient** (Firms with Large Avg. Q)	**Coefficient** (Firms with Small Avg. Q)
Constant	0.0879	-0.0633
Q	0.0285	0.2511
Cash Flow/Capital Stock	0.0061	0.1000
Stock of Liquid Assets/Capital Stock	-0.0636	-0.0030
Stock of Debt/Capital Stock	-0.0307	-0.1258
Sales/Capital Stock	0.0280	0.0648
Average Total Assets	Rs.3375.19 million	Rs.2279.30 million
Average Share Capital	Rs.447.30 million	Rs.176.66 million
Average Market Capitalization	Rs.2708.70 million	Rs.472.32 million

The determining power of the financial variables is not same for all the firms. The smaller firms with lesser growth opportunities are largly influenced by these factors as compared to the firms which are large, well established and credited with higher opportunities to grow. These results replicate the findings of Fazzari *et al.* (1988), Mills *et al.* (1994) and, Yuan and Motohashi (2008). The coefficient of Q is 0.2511 for the smaller firms, which is much larger when compared with the value of 0.0285 for the larger firms. The degree of sensitivity of capital expenditures to cash flow is also different for the two groups. The relevant coefficent is not only statistically more important for the smaller firms but also the economic significance is different. A one percent increase in cash flows can bring about a potential increase of 0.10 percent in

investment expenditures of the smaller firms, whereas the corresponding change in case of larger firms is minimal, that is, 0.0061. The Stock of liquid assets is, however, not very important in explaining investment behaviour of the smaller firms as more to offer as collaterizeable securities worth nothing to the lenders when there is shortage of growth opportunities. However, the term does matter for the larger firms enjoying better creditability. The role of sales is also dominating the behaviour of smaller firms and the managers concerned have to arrange properly their capital spending in line with the damand for their products. For smaller firms, larger demand stimulates investment more than it does in case of larger firms.

In addition to above, it is worth noting that the larger firms are not only larger with respect to the growth and investment opportunities but these are also moving ahead of the smaller firms in term of total assets, share capital and the market capitalization. Last three rows of the Table 5.4 illustrate that the average total assets of the larger firms' sample is Rs.3,375 million, while the value stands at Rs.2,279 million only in the corresponding column for the smaller firms. Same is the case with average paid up capital and the average market capitalization of the firms. These values are Rs.176 million and Rs.472 million respectively for the smaller firms which are falling much short as compared to the respective values of Rs.447 million and Rs.2,708 million for the larger firms.

The above results of the disaggregated groups corroborate the idea that the effect of financial variables on various types of firms is different with respect to its intensity and severity. Smaller, immature, low growing firms are more responsive to financial factors

than the firms which are larger, mature and acquainted to higher investment opportunities.

Chapter 6

Conclusions

6.1 Summary of Findings

In this study we investigated the impact of various financial factors on the investment behaviour of manufacturing firms listed on Karachi Stock Exchange. The random effect approach was used for the purpose of estimation, after verification through the Hausman Specification Test (1978). A large dataset comprising 209 cross-sectional units was employed for an overall period of seven years. We also split the overall sample into two classes, on the basis of investment opportunities available to the firms (proxied by the value of Tobin's q) and carried out separate analysis. A composite investment model was employed for regression analysis, where investment in fixed asset was explained by Tobin's q, cash flow, stock of liquid assets, leverage and sales. For the purpose of our analysis we took into account the incremental investments made by firms in the fixed assets, that is, the additions made to the existing capital stock of the firm. The analysis, however, was confined to the manufacturing firms only, belonging to six major sectors of the economy.

The results of this study were found consistent with previous works of similar nature. In particular, the financial factors proved to be significant determinants of corporate investment in Pakistan. The sensitivity of dependant variable to q-value, implies that the firms investment patterns change positively once the firms have ample avenues open for

investment. High geared firms are reluctant to invest because of the fact that the cost of borrowing increases with an increase in total debt and thus the projects with comparatively smaller expected returns are to be turned down. Cash flows are relatively cheaper source of funding, hence this strategy works in a mechanism opposite to that of leverage. The fact that more discretionary powers are available to the management in respect of cash flows and that comparatively low costs are associated therewith, shifts many projects to the viability region. Larger stock of liquid assets acts as collateral for generating external funds and thus play a positive role in taking investment decisions (for larger firms only). A positive effect of sales on investment reinforces the accelerator theory of demand driven investment behaviour.

Although these variables play an important role in explaining investment behaviour of firms, however, the degree of sensitivity of capital expenditures to these factors varies from one group to another when the two groups are divided on the basis of investing opportunities. Smaller firms are more responsive to changes in the financial factors as compared to their counterparts (larger firms).

6.2 Policy Implications

The findings of the study advocates two propositions. First, that there are certain types of imperfections in the capital markets of Pakistan, which makes it possible for the balance sheet structure to affect investment decisions by the managers regarding capital expenditures. Second, that the monetary and fiscal policies, by affecting various variables of the firms' balance sheets, have potential to disrupt the capital formation level in Pakistan. Thus better results can be obtained in stimulating capital formation in Pakistan by incorporating rational measures into monetary and fiscal policies as discussed below.

The imperfections in the capital markets of Pakistan may amplify the macroeconomic effect of shocks to the firms cash flows and sales etc. This asks government to introduce favourable financial reforms with a view to reducing imperfections in the capital market thereby ensuring easy access of the firms to cheaper external finance.

As far as the impact of monetary policy is concerned, it may affect investment indirectly, through the interest rate and the credit channel. A change in interest rate directly changes the costs associated with the debt and it also alters the rate at which the investment projects are discounted. On the other hand, the firms may suffer an additional cost in the form of strict terms for credit as a consequence of higher interest rate, particularly, in the scenario of imperfect capital markets.[7] This phenomenon, known as the credit channel, also results in chopping down investment particularly for the firms of smaller size. Thus special attention should be given to this aspect while introducing changes in the

[7] See for details Chatelain J.B. *et al.* (2003).

prevailing monetary policy, particularly when the interest rates are likely to be enhanced as it may encounter firms with the problem of cuts in their capital expenditures.

Fiscal policy, can also shape up investment, in an indirect way, through changes in the tax rates. If the profits of the firms are taxed at higher rates, fewer internal funds would be available for investment. Taxing the profits at higher rates also squeezes the quantum of resources that are used as collaterals, thereby resulting into contraction in capital formation. Thus, changes in the fiscal policies should be prudently introduced and corporate profits should be taxed at lower rates. Smaller firms, which are confronted to higher degree of constraints, may be given relaxation in tax rates so as to encourage investment.

Appendix A: Multifactorial Models

Some of the frequently used multifactorial models in their mathematical expressions are given below.

Q-Cash-Flow Model:

This model argues that investments carried out by the company vary according to two important variables: Q-ratio and the cash-flow. In its mathematical form the model looks like the following.

$$\left(\frac{I}{K}\right)_{it} = a + bQ_{it} + c\left(\frac{CF}{K}\right)_{it}$$

A modified version of the Q-cash-flow model was suggested by Aggarwal R. and Zong S. (2003). It can be shown as under.

$$\left(\frac{I}{K}\right)_{it} = a + b\left(\frac{M}{B}\right)_{it} + c\left(\frac{CF}{K}\right)_{it}$$

Where M stands for the market price of the company's stock, and B depicts the book value of the stocks. In this model, the ratio M/B shows the growth opportunities available to a company. The greater is the market value of the firm's stocks, the greater is the investment craving of the company.

Cash-Accelerator Model:

With the introduction of cash variable into the accelerator's model, we get a cash-accelerator model of investment that shows the effect of financial variables on the level of firms' investments. Numerically we can express the model as follows:

$$\left(\frac{I}{K}\right)_{it} = a + b\left(\frac{S}{K}\right)_{it} + c\left(\frac{CF}{K}\right)_{it}$$

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