THE EFFECT OF CASHFLOW ON INVESTMENTS IN FIXED ASSETS FOR COMPANIES LISTED AT THE NAIROBI SECURITIES EXCHANGE

By

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DECLARATION

Student's declaration

This research project is my original work and has not been submitted to any institution or university for examination.

Signed…….Date:……

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Supervisor's declaration

This research project has been submitted for examination with my approval as university supervisor.

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DEDICATION

To my late dad whose words of inspiration,

encouragement and value for knowledge and excellence still linger on.

To my mum who is,

my teacher, mentor, role model and above all,

gift from God

To my dear wife and daughter Kate and Claire, and

my siblings, Francis, Susan, Lydia and Nicholas who are,

my best friends, my inspiration and

a blessing from God

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To them all I say thank you and may God, the source of all knowledge bless you most abundantly.

ABSTRACT

The focus of the study was to determine the effect of cash flows on investments in fixed assets for companies listed at the Nairobi Securities Exchange. This was achieved by performing a regression analysis of the various variables considered to have an impact on investments: cash flows, sales growth and Tobin's Q. The study covered the ten year period between 2003 and 2012.

Secondary data on financial position, performance and cash flows was obtained mainly from the published audited financial statements of the companies and handbooks prepared by the Nairobi Securities Exchange between year 2003 and 2012. The market data was obtained from the Nairobi Securities Exchange. A reduced form investment model was used to test the relationship between cash flow and investment. The data was analyzed using Statistical Package for Social Scientists to obtain the regression coefficients over the ten year period while considering the year of observation, the industry group, age of the company, size of the company and the dividend pay-out ratio.

The findings of this study suggest that cash flows have a positive effect on investments. A firm's investment is likely to be affected by cash flows if it is young, small and is in agricultural, manufacturing & allied, construction & allied, automobile & accessories or energy & petroleum industry groups, after controlling for political risks. The relationship does not hold for companies under commercial & services industry group, largely because the nature of business and operations for companies categorized under this industry group are unrelated.

Given that most of the Kenyan firms are young, small and in agricultural, manufacturing & allied, construction & allied, automobile & accessories or energy & petroleum industry groups, relevant authorities should come up with policies aimed at hastening financial systems development in the country. Fully developed financial systems will go a long way in disassociating investments from cash flows and hence encouraging more small firms to take advantage of investment opportunities as they arise. In addition, measures should be put in place ensuring that the actual or perceived political risks in the country are maintained at minimum levels possible to increase the firms' confidence in the country's business environment (including the financial systems).

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ABBREVIATION AND ACRONYMS

CMA	-	Capital Markets Authority
DFIs	-	Development Financial Institutions
EPZ	-	Export Processing Zone
FHP	-	Fazzari, Hubbard, and Petersen
KShs	-	Kenya Shillings
NPV	-	Net-Present-Value
NSE	-	Nairobi Securities Exchange
OECD	-	Organization for Economic Co-operation and Development
Q	-	Tobin's Q
SPSS	-	Statistical Package for the Social Sciences
UK	-	United Kingdom
US	-	United States of America
VAR	-	Vector Auto-Regression

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Investment-cash flow sensitivity has been investigated by many academics over the years, analyzing corporate investment decisions given available cash flow (used as a proxy for internal funds). Investment-cash flow sensitivity is the extent to which investments of a company depend on the available internal funds (Chen & Chen, 2009). This relationship was widely studied in the 1950s and 1960s (Meyer & Kuh, 1957; Kuh, 1963) with cash flow subsequently disappearing from the investment literature until its revival in the 1980s following the development of models of asymmetric information, and an empirical breakthrough in 1988 by Fazzari, Hubbard, and Petersen (FHP).

Fazzari et al., (1988) estimated investment equations as a function of Tobin's Q (Q) and cash flow using firm-level data. They found that cash flow tends to have a bigger effect on the investment of firms more likely to face financial constraints and interpreted this as evidence for the existence of information-driven capital market imperfections. A large literature on the relationship between cash flow and investment followed Fazzari et al.,'s (1988) paper adopting similar techniques (Hubbard, 1998; Bond & Van Reenen, 2002; Carpenter & Guariglia, 2008).

The interpretation of the correlation between cash flow and investment is highly controversial. Some studies argue that it is caused by financial constraints, others by the correlation between cash flow and omitted or mis-measured investment opportunities that are not captured by standard measures, particularly Tobin's Q (Carpenter & Guariglia,

2008). Several attempts have been made at constructing alternative measures of investment opportunities to test whether, once these opportunities are more adequately measured, cash flow still plays a significant effect on firms' investment (Gilchrist & Himmelberg, 1999; Cummins et al., 1999; Erickson & Whited, 2000; Bond & Cummins, 2001; and Bond et al., 2002; Carpenter & Guariglia, 2008). Other researchers have re-examined the evidence in the original Fazzari et al., (1988) paper and have re-interpreted the results, suggesting that higher sensitivities of investment to cash flow cannot be seen as evidence that firms are more financially constrained, and casting a dark cloud over the entire literature (Kaplan & Zingales, 1997).

1.1.1 Cash flow

Cash flow is the movement of money into and out the business and it is the cycle of cash inflows and cash outflows that determines the business solvency and the firm's financial health (Chau & Hirth, 2010). According to the International Accounting Standards Board (2003) the cash flows of an entity are normally reported in the statement of cash flows as the information about the cash flows of an entity is useful in providing users of financial statements with a basis to assess the ability of the entity to generate cash and cash equivalents and the needs of the entity to utilize those cash flows. The economic decisions that are taken by users require an evaluation of the ability of an entity to generate cash and cash equivalents and the timing and certainty of their generation. An entity presents its cash flows from operating, investing and financing activities in a manner which is most appropriate to its business. Chen & Chen (2009) defines cash flow as the sum of the income before extraordinary items plus depreciation and amortization

which is equal to cash from operating activities as presented in the statement of cash flows.

1.1.2 Investment in fixed assets

Investment in fixed assets represents the purchase of an asset or other item of value with an expectation of favourable future returns. Investment in fixed assets includes all those expenditure which are expected to produce benefits to the firm for a period extending one year, and this includes both tangible and intangible assets (Pandey, 1995). Accordingly, investment in fixed assets by an entity is determined as net capital expenditure as presented in the statement of cash flows. Chau & Hirth (2010) notes that computation based on this definition shown satisfying results and empirical significance through the years and as a matter of fact, it has been used by most of the researchers covering the relationship between investment and cash flow.

1.1.3 The relationship between cash flow and investments

The interpretation of the correlation between cash flow and investment is highly controversial. Under the assumption of perfect capital markets, Modigliani and Miller (1958) suggested that financing decisions or capital structure of firms should not have any impact on investment spending since firms are to have equal and unlimited access to investment finance at an exogenously determined cost. Instead, cost of capital given by the market should be the only determinant. In retrospect, the significance of this conclusion was that under these assumptions the importance of liquidity variables such as profits or cash flow disappeared unless they signaled future profitability. However, the empirical findings suggested otherwise by pointing out liquidity variables such as cash flow as significant determinants of fixed investment spending (Meghir & Bond 1994;

Devereux & Schianterelli 1990; Fazzari, Hubbard & Petersen 1988; Hayashi & Inoue 1991; Mairesse, Hall & Mulkay 1999; Carpenter & Guariglia, 2008).

Despite researches from a different perspective on the relationship between cash flow of enterprises and business activities, the basic relationship between cash flow and corporate investment lacks a clear empirical conclusion, which is an important basis for moderating overall grasp of corporate cash and worth researching. The findings of this research study have enriched the existing literature through exploring the underlying aspects for companies listed at Nairobi Securities Exchange (NSE).

1.1.4 Nairobi Securities Exchange

The Nairobi Stock Exchange was set up in 1954 as a voluntary association of stockbrokers with the permission of the London Stock Exchange. In 1991 the Nairobi Stock Exchange was incorporated under the companies Act of Kenya as a company limited by guarantee and without share capital. The Nairobi Stock Exchange Limited changed its name to the Nairobi Securities Exchange Limited in July 2011 to reflect the strategic plan of the NSE to evolve into a full service securities exchange which supports trading, clearing and settlement of equities, debt, derivatives and other associated instruments. In September 2011 the Nairobi Securities Exchange converted from a company limited by guarantee to a company limited by shares and adopted a new Memorandum and Articles of Association reflecting the change. Subsequent development of the market has seen an increase in the number of stockbrokers, introduction of investment banks, establishment of custodial institutions and credit rating agencies and the number of listed companies increasing over time to 60 as at May 2013 (NSE, 2013).

1.2 Research Problem

There are two explanations for investment sensitivity of cash flow focusing on imperfect information. These are inconsistent with both the Modigliani and Miller (1958) irrelevance theorem and the static trade-off theories of financial behavior (Myers & Majluf, 1984).

First, pecking order hypothesis of Myers and Majluf (1984) identifies the adverse selection problem that arises when firm insiders (owners and managers) have better information than the capital markets about the value of their firm. An important implication of adverse selection is that firms with positive-net-present-value (NPV) investment opportunities will forgo profitable projects to avoid the excessive cost of external financing. This implication has been explored in detail by Fazzari, Hubbard, and Petersen (1988) for capital spending (i.e., fixed plant and equipment) and by Himmelberg and Petersen (1994) for research and development spending. These authors show formally that the excess cost of external finance causes some firms to be liquidity-constrained, so that cash flow becomes an important determinant of investment spending. The second explanation, the free cash flow hypothesis (Jensen, 1986)), focuses on the agency issue. Jensen argues that managers can increase their wealth at the expense of shareholders by investing a firm's free cash flow in unprofitable investment opportunities rather than paying out those funds in the form of dividends, debt-financed share repurchases, and the like. Oliner & Rudebusch (1992) and Strong & Meyer (1990) study the role that agency problems play in the cash flow/investment relationship. Their findings are contradictory regarding the importance of cash flow. Oliner & Rudebusch (1992) find little evidence that ownership structure affects the cash flow/investment

relationship. Strong & Meyer (1990) find that stock prices of firms undertaking investment spending with discretionary cash flow experience negative performance.

Given the importance of cash flows and investment spending, it is perhaps surprising that relatively little research evidence has been published on the issue in Kenya with most studies focusing on other factors that affect investments. Matata (1996) found engagement in risky business, corruption and, lack of generous dividend policy as possible causes of poor investment in Kenya. On the other hand, Nyoike (2002) found stability of future cash flows, profitability of the business, level of competition in the industry, stability of future sales, and the level of interest rates in the economy to be the factors influencing managers in their financing capital investment decisions in Kenya.

The contradicting explanations on the relationship between cash flow and investment spending and the relatively little research evidence in Kenya necessitate the need for a clear investigation. This study therefore aimed at filling this gap by answering the following research question: What is the effect of cash flow on investment in fixed assets for companies listed at the Nairobi Securities Exchange?

1.3 Research Objectives

The general objective of the study was to determine the effect of cash flow on investment in fixed assets for companies listed on the NSE.

The study was guided by the following specific objectives:

(i) To determine the measures of investment-cash flow sensitivity (variables) for companies listed at NSE

(ii) To determine the effect of cash flow on the levels of corporate investments of the companies listed on the NSE

1.4 Value of the Study

This study will be important to various stakeholders including the management of companies listed on the NSE, future researchers and academicians, the government and regulatory authorities and the general public.

1.4.1 The Management of NSE Listed Companies

The findings and recommendations of this study will be useful to the management of companies listed on the NSE by enabling them to formulate the correct policies on corporate investments and cash flow management. The management of the companies will also find the findings of this study useful in designing strategic plans to help their businesses gain competitive advantage and be profitable.

1.4.2 Academia

Knowledge seekers in the fields of economics, research methods, management, and development studies will find this research study useful. In particular, this research study will be beneficial to the researchers with interests in cash flow management and investment spending, by serving as a point of reference. In addition, future researchers will be able to formulate further studies based on the recommendations of this study.

1.4.3 Government and Regulatory agencies

Government and regulatory agencies will find the findings and recommendations of this study useful in formulating future cash flow management and investment spending policies and laws that will aid in regulating and operationalization of listed companies.

1.4.4 Members of the Public

The study will benefit the members of the public by helping demystify the operations of the listed companies on the NSE and thereby appreciate the role that cash flow play on investment spending of firms especially those listed on the NSE.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents both theoretical and empirical literature that is related to the corporate investment sensitivity of cash flows. The review is based on the previous research studies, journal articles, books, and other relevant information sources.

2.2 Causes of Investment-Cash Flow Sensitivity

Cash flow is equal to cash receipts minus cash payments over a given period of time; or equivalently, net profit plus amounts charged off for depreciation, depletion, and amortization. In concrete terms, it is the movement of money into and out the business. The cycle of cash inflows and cash outflows determines the business solvency and is commonly used in order to measure the firm's financial health. Investment represents the purchase of an asset or other item of value with an expectation of favorable future returns (Chau & Hirth, 2010).

Over the years, different studies have been carried out in an attempt to shed some light on the controversies surrounding investment-cash flow sensitivity. Although there have been contradicting findings as to the causes, the following are some of the factors identified by various researchers as summarized by Mizen & Vermeulen (2005):

2.2.1 Financial Constraints

According to seminal article by Fazzari, Hubbard & Petersen (1988), the highest sensitivities to cash flow are found for firms categorized as financially constrained, and this is taken to indicate that financial constraints are binding in this case. Many further

studies have followed the same methodology including Chirinko & Schaller (1995), Hubbard et al. (1995), Calomiris &Hubbard (1995), as summarized by Hubbard (1998).

2.2.2 Financial Systems

The financial system of a country dictates how the common problem of asymmetric information will be handled. The idea that the Financial system has an important role to play in economic fluctuations, and investment in particular, is an old one (Gertler, 1988). Market-oriented financial systems where arms-length lenders offer funds through commercial paper, corporate bond and equity markets are more likely to show greater sensitivity to cash flow. Relationship-oriented systems are likely to foster closer and more transparent arrangements that allow them to exercise greater scrutiny over borrowers, and as a result investors will be less sensitive to internal sources of funds. Gertler (1988); Rajan and Zingales (2003).

Bond et al., (2003) offer one of the few comparative studies of the impact of cash flow on investment across several countries with different financial systems. Their results are based on estimates of investment equations for four European countries (Belgium, France, Germany, and the United Kingdom), and provide some evidence for differences between countries that are more market-oriented (United Kingdom) or relationship-oriented (Germany). They show that investment is more sensitive to internal funds (cash flow) for countries where the financial system is relatively market-based, and less sensitive where financial system is more relationship oriented. They however, note that other factors may have an important role to play.

2.2.3 Firm Size

Firm size has been used as an indicator of access to external finance (Gertler & Gilchrist, 1994). In addition small firms are generally younger, with higher levels of firm specific risk, and less collateral, making them less likely to attract external finance. The evidence suggests that small firms are more sensitive to monetary policy tightening than larger firms. Gertler & Gilchrist (1994) document that indicators of monetary tightening such as Romer dates are highly significant explanatory variables in time series estimates of small firms sales, inventory accumulation and short-term debt, in direct contrast to estimates for large firms. Gilchrist & Himmelberg (1999) find excess sensitivity for small firms, and those without a bond rating or commercial paper issue in their sample.

Mizen & Vermeulen (2005) point out that one has to be careful in projecting the results obtained on US data to European firms. In the US studies, the larger firms are quite different from the small firms in that the large firms have access to bond markets and the commercial paper market. The split really selects firms into those that obtain external finance from banks versus those that obtain external finance from the markets. In contrast, in Germany and the UK, bond markets and commercial paper markets are much less developed than in the US implying that a large-small firm sample split is less likely to generate a partition between banks versus market financed firms (Mizen & Vermeulen, 2005).

2.2.4 Industrial Structure

In a study of the regional effects of monetary policy, Carlino & DeFina (1998) show that there are some significant deviations from the average US response to monetary policy changes over the period 1958-1992 at the regional level. They argue that one potential

explanation for the differences in regional response to the federal funds rate is the different industrial composition of the regions. Manufacturing industry intensive states are more sensitive to monetary policy shocks than states with a greater diversity of industries, and states with greater numbers of small firms also are marginally more sensitive (Allayannis & Muzumdar, 2004).

Dedola & Lippi (2004) and Peersman & Smets (2004) have shown that industries with characteristics such as greater investment intensity, openness and more durable goods are more likely to show greater sensitivity to changing monetary policy because their 'cost side is more sensitive to the real cost of capital'. These industries are more interest sensitive than others, enhancing the impact of the interest channel of monetary policy on the output cycle. They also argue that industries that have greater difficulty in accessing financial markets, with higher working capital requirements and greater borrowing capacity (as measured by size and leverage) could be more prone to the broad credit channel effects of monetary transmission. The output response is reported from a structural Vector autoregression (VAR) framework for 20 industries in five OECD countries by Dedola & Lippi (2004) and from a single-equation auto regression of output growth for 74 industries in the euro area countries by Peersman & Smets (2004). Differences in the policy effects by industry are shown to be explained primarily by particular industry characteristics such as durability, openness and capital intensity of production (Mizen & Vermeulen, 2005).

2.2.5 Creditworthiness

Differences in cash flow sensitivities by size and industry classes can ultimately be caused by differences in creditworthiness by firms. Hu and Schiantarelli (1998) find that

firms with weaker balance sheets are more likely constrained. Cleary (1999) establishes that sales growth and profitability, as indicators of creditworthiness, are two most significant explanatory variables in discriminant analysis that can be used to increase or decrease dividends which are considered to reflect the presence or absence of financing constraints.

Clearly (1999) found firms with high financial health to be more sensitive to the available funds than less creditworthy firms. Mizen & Vermeulen (2005) argued that, it is possible that Cleary (1999) results can be explained by firms in financial distress, restricted to use cash flow for investment purposes by debt covenant imposed by bond holders or banks, implying a lower sensitivity of investment to cash flow.

2.3 Capital Budgeting

Capital budgeting (investment) decisions may be defined as the firm's decisions to invest its current funds most efficiently in the long-term assets in anticipation of an expected flow of benefit over a series of years. It is the process of facilitating decisions covering expenditures on long term assets. The capital budgeting decision is an important decision for the firm since the firms' survival and profitability hinges on capital expenditures, especially the major ones. Capital expenditure includes all those expenditure which are expected to produce benefits to the firm for a period exceeding one year, and this includes both tangible and intangible assets (Pandey, 1995). Capital budgeting is a many sided activity which includes; the formulation and articulation of long term goals, searching for new and profitable uses for investment funds, marketing and financial forecasts, the preparation of appropriations and control budgets. It also includes the integration of budgets in the firm's information system, the economic evaluation of

alternative projects and post audit of the performance of past projects (Levy & Sarnat, 1999).

2.4 Capital Structure Puzzle

Capital structure refers to the way a corporation finances its assets through some combination of equity, debt, or hybrid securities (Pandey, 1995). A firm's capital structure is thus the composition or 'structure' of its liabilities.

Over the past several decades, financial economists have worked to transform corporate finance into a more scientific undertaking, with a body of formal theories that can be tested by empirical studies of corporate and stock market behavior. But this brings us to the most important obstacle to developing a definitive theory of capital structure, i.e. designing empirical tests that are powerful enough to provide a basis for choosing among the various theories. What makes the capital structure debate especially intriguing is that the theories lead to such different, and in some ways diametrically opposed, decisions and outcomes (Frank & Goyal, 2000).

For example, Modigliani & Miller (1958, 1961) argue that both capital structure and dividend policy are largely “irrelevant” in the sense that they have no predictable material effects on corporate market values. Another school of thought holds that corporate financing choices reflect an attempt by corporate managers to balance the tax shields of greater debt against potentially large costs of financial distress, including those arising from corporate underinvestment. But if too much debt can destroy value by causing financial distress and underinvestment, others have argued that too little debt, especially

in large, mature companies can lead to over-investment and low returns on capital (Frank & Goyal, 2000).

Myers (1984) argue that corporate managers making financing decisions are concerned primarily about the "signaling" effects of such decisions, i.e. the tendency of stock prices to fall significantly in response to announcements of common stock offerings (which can make such offerings quite expensive for existing shareholders) and to rise in response to leverage-increasing recapitalizations. Myers (1984) has suggested that corporate capital structures are the largely unplanned outcomes of individual financing decisions in which managers follow a financial pecking order—a financing rule in which retained earnings are systematically preferred to outside financing, and debt is preferred to equity when outside funding is required. Accordingly, corporate managers making financing decisions are not really thinking about a long-run target debt – to - equity ratio. Instead, they take the path of least resistance and choose what at the time appears to be the lowest-cost financing vehicle—generally debt—with little thought about the future consequences of these choices. Myers (1984) has referred to this conflict among the different theories as the "capital structure puzzle." The greatest barrier to progress in solving this puzzle, has been the difficulty of coming up with conclusive tests of the competing theories.

2.5 Capital Markets and Investment Financing

Corporate investment can be financed either through internal sources or external finances which include equity and issuance of debt instruments (Allayannis & Muzumdar, 2004).

According to "Capital Structure Irrelevance Model" developed by Miller and Modigliani (1958) – which assumes the absence of taxes, bankruptcy costs, an efficient market and information asymmetry – the value of the company is not affected by how it is financed

regardless of its capital structure or the dividend policy. However, in the real world setting the market is dominated with imperfection, more so incomplete capital model (Rajan & Zingales, 2003). This means that the perfect and complete market conditions assumed by the capital model are constantly violated. In reality, companies pay tax, management have self-interests in company operations and corporations usually go bankrupt. In reality all firms do not have the same access to external financing. Accordingly, there are several capital market imperfections which include cost of financial distress and bankruptcy, taxes, transaction costs, agency problems, cost of under and over investment, and asymmetric information.

Myer and Maljuf (1984) extended the "Lemons" model, first introduced by Akerlof (1970), in order to explain the "Pecking Order" theory, also known as "Financing Hierarchy" theory. In 1970, Akerlof presented the idea that the market includes good firms and "Lemons". However, investors cannot really distinguish which ones are the good firms or the "Lemons" due to a lack of information on the market. Thus, investors pay a premium since their estimation is an average including, in a more or less undistinguishable way, good firms and "Lemons". Myer and Maljuf (1984) went further by developing the concept of information asymmetry. They restrict the "Lemons" model to the case in which the firm's management has information about project returns that is unavailable to investors. Due to the lack of information for investors, every issue is priced assuming the average of the project outcome, which implies that the securities backing good projects are certainly undervalued.

Grossman & Hart (1982), and Jensen (1986) observed a conflict of interest between managers and external investors also referred as "Agency Cost". External investors are

observed to control or at least attempt to control management behavior through the use of audit, compensation system (the most common example being the use of stock option) or budget restriction, in order to align their interest with managers' interest. This behavior generates the existence of direct cost of monitoring management and the loss of profit opportunities since the management flexibility is being reduced. Although debt has a more senior claim to the firm's income than equity, the interests of creditors also might be harmed by management decisions and actions that dissipate firm resources (Van Reenen & Bond, 2002). Moreover, "debt- holders face the risk that management might act on behalf of share-holders to erode the value of existing debt by undertaking excessively risky projects. To protect themselves from these risks, creditors usually demand covenants in order to limit the management behavior" (Calomiris & Hubbard, 1995).

In their study, Oliner & Rudebusch (1992) list the most common transaction costs involved with issuing debt and equity to include: compensation for the dealer placing the issue, registration fees, legal, accounting and printing cost, and taxes. They go further to state that the transaction cost impacts diminish with increases in issue size and empirically prove that transaction costs, using the firm size as a proxy, do not explain the financing hierarchy. Instead, Oliner & Rudebusch (1992) strongly support the information asymmetry and agency costs as the two main explanations of the financing hierarchy and conclude that investment is most closely related to cash flow for firms characterized as young, whose stocks are traded over-the-counter and who show insider trading behavior consistent with privately held information (Carpenter, 1993).

Tobin's Q has been the centre of many debates. It is defined as the ratio between the market value and replacement value of the same physical asset. This ratio has been extensively used in the literature in order to assess the investment opportunity (Hayashi, 1982). On the contrary, other Academics, such as Jensen (1986), advocate sales growth as a proxy for investment demand. The rationale is based on the relationship between sales and market demand. In other words, sales reflect the market demand, and the latter should be a determinant factor of investment decisions. The use of either Tobin's Q or sales growth should not change the results, as shown in the article published by Chen & Chen (2009).

2.6 Empirical Studies

There is substantial literature estimating the possible impact of financial constraints on investment behavior (Devereux & Schiantarelli, 1990). The studies categorize firms in accordance to their possibility to get financially constrained considering the firm's size, capital structure and dividend payout. These characteristics are used to determine whether the firms are likely to be sensitive to the availability of internal funds often measured in terms of cash flow (Hayashi & Inoue, 1995). The firms categorized as financially constrained have been found to have the highest sensitivities to cash flows and as a result this has been considered to mean that financial constraints are binding (Gilchrist & Himmelberg, 1999). Fazarri et al (1988) used the reduced form investment model and observed that investment-cash flow sensitivities are higher among firms with lower dividends while Oliner & Rudebusch (1992) found the sensitivity to be higher among younger firms.

The recent research studies have raised several objections to these findings. Kaplan & Zingales (1997) established that the classification adopted by the previous studies and scholars incorrectly assigned firms. Consequently, they propose the use of more detailed information in financial statements obtainable from annual reports to categorize firms within an identical sample period into three categories 'not financially constrained', 'possibly financially constrained' and financially constrained'. Based on this classification, their findings indicated that the financially constrained firms had the lowest sensitivity of corporate investment to cash flow (Bond & Cummins, 2001).

Cleary (1999) using a larger dataset also found that most firms experiencing financial constraints had the lowest sensitivity of investment to cash flow. Chen & Chen, 2009 found that investment-cash flow sensitivity has decreased in the past decades and has even disappeared in the recent years. The analysis by Allayannis & Mozumdar (2004) indicated that the results of Kaplan & Zingales (1997) are most explained by few influential observations. On the other hand, the findings of Cleary (1999) can be elaborated by using the observations of the firms with negative cash flows. These findings indicate that for companies experiencing financial distress their sensitivity of investment to cash flow can be reduced such that for severely constrained firms the normal relationship documented in the literature is reversed (Van Reenen & Bond, 2002).

The mixed findings reported in the literature are a clear indication that there is need for caution while interpreting the cash flow sensitivity as an indication of financial constraints (Harford, 1999). The fact that the cash flows are used to predict the future profitability or growth in sales means it is in itself limiting. Therefore, Bond & Cummins (2001) proposed a model to be used to check the possibility of cash flow being used to

predict future performance. However, results from previous studies indicate that this is not important problem and can be ignored (Kaplan & Zingales, 1997).

Given the importance of cash flows and investment spending, it is perhaps surprising that relatively little research evidence has been published on the issue in Kenya. Matata (1996) evaluated the possible causes of poor investment in financial institutions in Kenya. The study sought to find out the possible causes of poor investment portfolio of Development Financial Institutions (DFIs). The research identified the following to be possible causes of poor investment: Engagement in risky business, overemphasis of developmental role; oversights by officers during the appraisal process; corruption; undue influence by promoters during appraisal process; weak research department or lack of the same; delays in project realization; impediments in monitoring exercise; failure to identify symptoms of failing projects; inefficient management of the project; unfavorable or adverse government policies and government interferences; insufficient raw materials; stiff competition; and, lack of generous dividend policy.

Ndinya (2000) carried out an empirical evaluation of factors influencing investment in Kenya. The study aimed at determining the factors influencing investment in Kenya's Export Processing Zone (EPZ) as well as the adequacy of the incentives offered by the Kenya Government in retaining investment in the zone. The study concluded that the factors considered important for investment decision differed significantly between active and dormant EPZ companies and that some of the incentives offered by the government of Kenya were found inadequate by the EPZ companies.

Nyoike (2002) carried out a study on the financing of capital investments by quoted companies in Kenya. The principal objective of the study was to identify how capital investments are financed by quoted companies in Kenya in addition to identifying the factors that the management of quoted companies consider while making their financing capital investments decisions. In order to meet these objectives, secondary data was collected from annual published results from 52 firms listed at the Nairobi Stock exchange and the relationship between capital investments and financing variables namely, internally generated funds, new equity capital, long-term debt and short term debt were examined over the 1997 to 2001 period. Primary data was also collected through the use of questionnaires from the financial managers seeking information on how they finance capital investments and the factors that influence the financing of capital investment decisions. The study found that many factors influence managers in the financing of capital investment decisions. Among the most important factors were stability of future cash flows, profitability of the business, level of competition in the industry, stability of future sales, and the level of interest rates in the economy

2.7 Conclusion

Investment-cash flow sensitivity has been investigated by many academics over the years, analyzing corporate investment decisions given available cash flow. Previous empirical findings have reported mixed results about investment- cash flow sensitivity of corporate firms with the interpretation of the correlation between cash flow and investment being highly contradicting.

Due to unavailability of organized firm level data, almost all these empirical studies have been conducted for firms in developed countries. Thus debate might exist whether

investment-cash flow sensitivity differs between developed and developing countries' corporate environment. Given the circumstances, this paper attempts to contribute to the current debate by examining the investment–cash flow sensitivity for companies listed on the NSE.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the methods used in data collection and analysis. The research design, population, sampling procedure and sample size instrumentation, data collection and data analysis are discussed in detail.

3.2 Research Design

A research design according to Kumar (2005) is a plan, structure and strategy of investigation so conceived as to obtain answers to research questions or problems. Chandran (2004) describes research design as an understanding of conditions for collection and analysis of data in a way that combines their relationships with the research to the economy of procedures. The research took a descriptive survey approach aimed at determining the relationship between corporate investment spending and cash-flow sensitivity of companies listed on the NSE. According to Cooper & Schindler (2000), a descriptive study is concerned with finding out the what, where and how of a phenomenon. Descriptive research design was chosen because it would enable the researcher to generalize the findings to a larger population. The findings of the study could therefore be generalized to other firms operating in Kenya.

3.3 Population of the Study

According to Ngechu (2004) a study population is a well-defined or specified set of people, group of things, households, firms, services, elements or events which are being investigated. The population of interest in this study comprised companies listed at the

Nairobi Stock Exchange. There were 60 companies listed at the Nairobi Stock Exchange as of May 2013 (NSE, 2013).

3.4 Sample Design

At times dealing with all the numbers even of the smaller accessible population would involve a tremendous amount of time and resources. It's therefore advisable for the researcher to further select a given number of members from the accessible population (Kothari, 2004). Given the objective of the study however, the researcher used data from all the 60 companies listed on the NSE as it was a survey.

3.5 Data Collection

The study mainly depended on secondary data. The study focused on the listed companies trading data from the NSE and the published audited accounts to determine the relationship between corporate investment spending and cash-flow for companies listed on the NSE. This data was obtained from the NSE and the CMA.

The data set included the available annual observations for the years 2003 to 2012. Firms that did not have complete records on investment, cash flow, Q, and contracted capital expenditure were dropped. Firms with less than 3 years of continuous observations as well as firms operating in the financial services and investment sector were also dropped. To control for the potential influence of outliers, observations characterized by a ratio of investment to capital greater than one, as well as observations in the 1% tails for each of the regression variables were excluded. These types of rules are common in the literature and the researcher employed them to ensure comparability with previous work (Bond et al., 2003; Cummins et al., 1999).

3.6 Data Analysis

A reduced form investment model used by Chen & Chen (2009) and Fazzari et al. (1988) was followed for the data analysis where the relationship between cash flow and investment was tested by estimating the following regression model:

$$\frac{I_{it}}{K_{it-1}} = \alpha_i + \alpha_t + \beta_1 \times Q_{it-1} + \beta_2 \times \frac{\Delta S_{it}}{S_{it-1}} + \beta_3 \times \frac{CF_{it}}{K_{it-1}} + \varepsilon_{it} \qquad \text{Equation (1)}$$

Where:

I - is the firm's investment; *K*, the book value of its non-current assets; Q, Tobin's Q; and CF, the firm's cash flow. The subscript i indexes firms, and t, time, where t =2003-2012. The error term in equation is made up of three components: α_i, which is a firm-specific component; α_t, a time-specific component accounting for possible business cycle effects; and e_{it}, an idiosyncratic component. The researcher controlled for α_t by including time dummies in all the specifications.

The variables were used due to the simplicity of the assumptions, ability to meet the research objective as well as the ability to provide results which are in coherence with previous studies:

i) Investment ($\frac{I_{it}}{K_{it-1}}$):

Investment represents the purchase of an asset or other item of value with an expectation of favourable future returns. Accordingly, investment is determined as net capital expenditure, standardized by the beginning-of-period net fixed capital (Chau & Hirth, 2010). Chau & Hirth (2010) notes that computation based on this definition shown satisfying results and empirical

significance though the years and as a matter of fact, it has been used by most of the researchers covering the relationship between investment and cash flow.

For the purposes of this study, investment is defined as cash used in investing activities, as presented in the statement of cash flows, standardized by the beginning-of-period net standardized by the beginning-of-period non-current assets. This definition is consistent with the approach taken by Chau & Hirth (2010); Chen & Chen (2009) and Cleary et al. (2007).

ii) Tobin's Q (Q_{it-1}):

Tobin's Q is defined as the ratio between the market value and replacement value of the same physical asset. The proponents of Q theory argue that in absence of capital market imperfections, a value maximizing firm will invest as long as the shadow value of additional unit of capital, marginal Q, exceeds unity. Q is therefore considered a good control for the market evaluation of firm's investment opportunity (Chen & Chen, 2009).

The researcher has used previous year's Tobin's Q (i.e Tobin's Q at the beginning of the period) because it is more representative of the market evaluation of firm's investment opportunity for the whole year. Given the data available and consistent with Chen & Chen (2009) and Chau & Hirth (2010), Tobin's Q was calculated as the market value of assets divided by the book value of assets. The market value of assets was taken to be equal to the market value of common equity plus total liability plus preferred stock.

iii) Cash flow ($\frac{CF_{it}}{K_{it-1}}$):

Cash flow is the movement of money into and out of the business. It is the cycle of cash inflows and cash outflows that determines the business solvency and the firm's financial health (Chau & Hirth, 2010). Chen & Chen (2009) defines cash flow as the sum of the income before extraordinary items plus depreciation and amortization standardized by the beginning-of-period net fixed capital. Cleary et al. (2007) defined cash flow as the beginning of-period total current assets, minus beginning-of-period total current liabilities, minus beginning-of-period inventories and then divide the obtained number by beginning-of-period net fixed assets.

The researcher, in this study, consider cash flow as cash from operating activities, as presented in the statement of cash flows, standardized by the beginning-of-period non-current assets. This is consistent with the definition by Chen & Chen (2009).

iv) Sales growth rate ($\frac{\Delta S_{it}}{S_{it-1}}$):

Sales growth rate is defined as the arithmetic growth rate of the total revenue. For the purposes of this study, sales growth rate is calculated as current sales, minus sales from previous period and then dividing the obtained result by sales from the previous period.

v) β_1 and β_2 are the coefficients for Q_{it-1} and $\frac{\Delta S_{it}}{S_{it-1}}$ respectively, whereas, β_3 represents the investment sensitivity to the firm's internal cash flow and this is the principal coefficient the researcher is looking at.

In the model, investment is determined jointly by investment demand and firm's internal cash flow with Tobin's Q and sales growth being used as proxy for the investment demand. Jorgenson's (1968) neoclassical investment model, noted that sales reflect the market demand for a firm's product, which should determine the optimal amount of capital the firm should hold and thus, a profit driven firm should follow its sales figures closely and make its capital investment decisions accordingly. On the other hand, the proponents of Q theory argue that in absence of capital market imperfections, a value maximizing firm will invest as long as the shadow value of additional unit of capital, marginal Q, exceeds unity. Q is therefore considered a good control for the market evaluation of firm's investment opportunity (Chen & Chen, 2009). Accordingly, Tobin's Q and sales growth was considered sufficient to capture all dynamics of investment. Cash flows from operations were used to rule out concerns of endogeneity associated with free cash flow or net liquid assets (in particular a possible negative effect of investment on internal funds).

The above model was estimated for all valid observations and then on observations partitioned by year, industry (NSE categories), dividend pay-out, age and size before concluding whether there is any relationship between cash flow and investment. The rationale for grouping observations by year was to allow firm fixed effects to vary across the years while industry groups and size were considered on the basis that firms of

different sizes and in different industry groups might experience different external credit market environments and have access to different financing alternatives. Dividend pay-out and age were considered based on evidence from prior studies.

3.7 Data Organisation, Presentation and Reliability

The data collected was organized and cleaned of errors made during data collection, coded, keyed into the computer and analysed with the aid of Statistical Package for the Social Sciences (SPSS). The results of analysis were presented and interpreted in the form of descriptive statistics. The findings have been presented in tables. To ensure that data collected during field work is reliable, any data obtained from the companies was collaborated with the information filed with the NSE or the CMA.

CHAPTER FOUR

DATA FINDINGS, ANALYSIS AND PRESENTATION

4.1 Introduction

This chapter presents the information processed from the data collected during the study on the effect of cash flow on investments in fixed assets for companies listed at the NSE. Regression analysis was used. To achieve the objectives of the study and for consistency with previous studies, the researcher focused on all valid observations then partitioned the data by year, industry, age, dividend pay-out and size before concluding whether there is any relationship between cash flow and investment.

4.2 Descriptive Statistics

The raw data obtained composed of observations from 60 companies listed on the Nairobi Stock Exchange (NSE) for the period 2003 to 2012. Firms with the following characteristics were dropped from the raw data:

- Firms that did not have complete records for all variables, specifically: investment, cash flow, Q, and sales;
- Firms with less than 3 years of continuous observations;
- Firms operating in the financial services and investments sectors.

To control for the potential influence of outliers, observations characterized by a ratio of investment to capital greater than one, as well as observations in the 1% tails for each of the regression variables were excluded. As a result, a data sample of an unbalanced panel (different start and end date), of 266 observations for 34 firms from 2004 to 2012 was obtained. The number of observations for each firm varies from 3 to 9 and from 2004 to 2012 as shown in Table 4.1.

Table 4.2 reports the mean, standard deviations, minimum and maximum values for the assets, sales, cash flow and investment (both deflated by its beginning-of-period property, plant and equipment) as well as sales growth and Tobin's Q ratio.

Table 4.1 Summary of valid observations by company

Name of the Company	Valid Observations	Percent	Valid Percent (%)	Cumulative Percent (%)
Kakuzi Ltd	8	3	3	3
Kapchorua Tea Co. Ltd	9	3.4	3.4	6.4
Rea Vipingo Plantations Ltd	9	3.4	3.4	9.8
Sasini Ltd	8	3	3	12.8
Williamson Tea Kenya Ltd	9	3.4	3.4	16.2
A.Baumann & Co Ltd	3	1.1	1.1	17.3
ARM Cement Ltd	9	3.4	3.4	20.7
B.O.C Kenya Ltd	8	3	3	23.7
Bamburi Cement Ltd	9	3.4	3.4	27.1
British American Tobacco Kenya Ltd	9	3.4	3.4	30.5
Car & General (K) Ltd	9	3.4	3.4	33.8
Carbacid Investments Ltd	6	2.3	2.3	36.1
CMC Holdings Ltd	8	3	3	39.1
Crown Paints Kenya Ltd	8	3	3	42.1
E.A.Cables Ltd	9	3.4	3.4	45.5
E.A.Portland Cement Co. Ltd	9	3.4	3.4	48.9
East African Breweries Ltd	9	3.4	3.4	52.3
Eveready East Africa Ltd	6	2.3	2.3	54.5
Express Kenya Ltd	9	3.4	3.4	57.9
KenGen Co. Ltd	6	2.3	2.3	60.2
KenolKobil Ltd	9	3.4	3.4	63.5
Kenya Airways Ltd	9	3.4	3.4	66.9
Kenya Power & Lighting Co Ltd	9	3.4	3.4	70.3
Marshalls (E.A.) Ltd	8	3	3	73.3
Mumias Sugar Co. Ltd	8	3	3	76.3
Nation Media Group Ltd	9	3.4	3.4	79.7
Safaricom Ltd	4	1.5	1.5	81.2
Sameer Africa Ltd	8	3	3	84.2
Scangroup Ltd	6	2.3	2.3	86.5
Standard Group Ltd	8	3	3	89.5
Total Kenya Ltd	8	3	3	92.5
TPS Eastern Africa Ltd	9	3.4	3.4	95.9
Uchumi Supermarket Ltd	3	1.1	1.1	97
Unga Group Ltd	8	3	3	100
Total	**266**	**100**	**100**	

Table 4.2 Descriptive statistics

	AT_{it} KShs '000	S_{it} KShs '000	$\frac{CF_{it}}{K_{it-1}}$	$\frac{I_{it}}{K_{it-1}}$	$\frac{\Delta S_{it}}{S_{it-1}}$	Q_{it-1}
Mean	16,487,588.15	16,429,035.50	0.21	0.16	0.15	2.00
Std. Deviation	28,820,067.73	29,641,972.04	0.49	0.27	0.25	1.05
Minimum	155,232.00	101,431.00	(2.20)	0.02	(0.60)	0.90
Maximum	163,144,873.00	222,440,715.00	5.30	2.50	1.60	6.00
N	266	266	266	266	266	266

Where:

AT_{it} is total assets;

S_{it} is sales;

$\frac{CF_{it}}{K_{it-1}}$ is cash flow deflated by beginning-of-period non-current assets. Cash flow is cash from operating activities, as presented in the statement of cash flows;

$\frac{I_{it}}{K_{it-1}}$ is investment deflated by beginning-of-period non-current assets. Investment is the cash used in investing activities, as presented in the statement of cash flows;

$\frac{\Delta S_{it}}{S_{it-1}}$ is sales growth rate. Sales growth rate is calculated as current sales, minus sales from previous period and then dividing the obtained result by sales from the previous period;

Q_{it-1} is tobin's Q for the previous year. Tobin's Q is calculated as the market value of assets divided by the book value of assets. The market value of assets is taken to be equal to the market value of common equity plus total liability plus preferred stock;

N is number of valid observations; and,

KShs '000 is Kenya shillings (unit of absolute values) rounded off to the nearest one thousand

4.3 Standard Regression Analysis on All Observations

To test the relationship between the variables and based on the data set obtained from the previous section, a standard regression analysis was performed on all observations. The study used the following regression model due to the simplicity of the assumptions, ability to meet the research objective as well as the ability to provide results which are in coherence with previous studies:

$$\frac{I_{it}}{K_{it-1}} = \alpha_i + \alpha_t + \beta_1 \times Q_{it-1} + \beta_2 \times \frac{\Delta S_{it}}{S_{it-1}} + \beta_3 \times \frac{CF_{it}}{K_{it-1}} + \varepsilon_{it} \qquad \text{Equation (1)}$$

Where: *I* - is the firm's investment; *K*, the replacement value of its capital stock; Q, Tobin's Q; and CF, the firm's cash flow. The subscript i indexes firms, and t, time, where t =2003-2012. The error term in the model is made up of three components: α_i, which is a firm-specific component; α_t, a time-specific component accounting for possible business cycle effects; and e_{it}, an idiosyncratic component.

Rajan et al. (2000) noted that it is possible that even after controlling for firm specific effects, observations arising in any single year are not independent (the variance-covariance matrix of the residuals is not diagonal) and, thus the standard errors computed in the usual way are biased downward. To correct this problem, the researcher followed Fama & MacBeth (1973) approach of demeaning the variables to remove the firm fixed effects for the whole period. Rajan et al (2000) summarized demeaning variables as equivalent to:

$\tilde{y}_{it} = y_{it} - \bar{y}_{.t}$, where y_{it} is the dependent variable, and,

$\tilde{x}_{it} = x_{it} - \bar{x}_{.t}$, where x_{it} is the explanatory variable.

Respectively, $\bar{y}_{.t}$ and $\bar{x}_{.t}$ are time means for the variables and from 2003 to 2012.

4.3.1 Results of the Standard Regression Analysis on All Observations

Table 4.3 presents regression results where Investment is the dependent variable while Tobin's Q, Sales Growth, and Cash Flow are the independent variables. The sample contains all observations over the period 2003 -2012. All variables are demeaned by firm to remove the firm fixed effects.

Table 4.3 Regression results

	Unstandardized Coefficients		Standardized Coefficients		
	β	Std. Error	Beta	t	Sig.
(Constant)	0.000	0.014		0.000	1.000
Cash flow	0.078	0.031	0.153	2.551	0.011
Sales Growth	0.038	0.066	0.035	0.580	0.562
Tobin Q	0.082	0.024	0.209	3.483	0.001
R -square	0.064				
Adjusted R -square	0.053				
Std. Error of the Estimate	0.222				
F - statistic	5.941				
Significance (F - statistic)	0.001				

Table 4.3 presents cash flow to investment sensitivity (β_3) as being equal to 0.078. This can be interpreted as a shilling increase in cash flow increases investment by 7.8 cents. From the above results, one would argue that the relationship between investments and cash flows is insignificant. However, that is not the case. Cleary et al. (2007) noted that under fairly standard assumptions, the relationship between internal funds and investments is U-shaped, that is, investment increases monotonically with internal funds if they are large but decreases if they are very low. Indeed, Cleary et al. (2007) explain that their cash flow coefficients are very small and inconsistent with earlier findings where positive monotonic function between cash flow and investment was advocated but consistent with their theory that if the relation between internal funds and investment is U-shaped, then the average slope will depend on the sample composition and cannot be expected to be positive and large. Chau & Hirth (2010) note that if the relationship between cash flow and investment is U shaped, then it would be logical to observe the coefficient averages close to zero, where the average would not be able to capture the high sensitivity values for extreme cash flow values. The above results show some consistency with previous research by Cleary et al. (2007), the researcher interpreted the

observations as a prediction that there could be some relationship between cash flow and investment.

To test whether there is indeed a statistically significant relationship between investment and internal funds as predicted, the standard empirical approach, pioneered by Fazzari et al. (1988), of splitting the sample into sub-samples, running separate regressions for each of them, and comparing the coefficients was then used. The observations were partitioned by year, industry, age, dividend pay-out and size.

4.4 Analysis by Year

The researcher divided the observations based on the years and then studied the relationship between investment and cash flow across the years. The advantage of grouping by years is that it allowed firm fixed effects to vary across the years. All variables were demeaned by firm to remove the firm fixed effects and then a cross-sectional regression of investment on cash flow in each year was estimated. The results are reported in Table 4.4.

Table 4.4 Results of regression by year

Year	Q_{it-1}	t-stat	$\frac{\Delta S_{it}}{S_{it-1}}$	t-stat	$\frac{CF_{it}}{K_{it-1}}$	t-stat	Obs	R^2	Adjusted R^2	Sd. Error	F	Sig
2004	0.037	0.984	(0.16)	(1.185)	0.101	0.777	28	0.157	0.051	0.146	1.485	0.024
2005	(0.022)	(0.286)	0.16	0.854	0.645	6.128	25	0.645	0.595	0.160	12.740	-
2006	0.022	0.298	0.37	2.837	(0.301)	(3.343)	28	0.511	0.450	0.129	8.370	0.001
2007	0.136	3.376	0.19	0.885	0.418	3.834	29	0.428	0.359	0.149	6.235	0.003
2008	0.037	0.439	0.14	1.110	0.004	0.057	29	0.054	(0.059)	0.178	0.478	0.700
2009	(0.020)	(0.172)	0.15	0.617	0.543	3.438	31	0.315	0.239	0.303	4.146	0.015
2010	0.338	2.596	(0.12)	(0.603)	(0.045)	(0.975)	33	0.223	0.143	0.228	2.776	0.059
2011	0.066	0.843	0.03	0.140	0.756	3.832	31	0.388	0.320	0.183	5.699	0.004
2012	0.112	1.161	0.21	1.133	0.334	3.003	32	0.317	0.244	0.190	4.337	0.012

Table 4.4 reports coefficients estimated from regression of investment on Tobin's Q, sales growth rate, and cash flow with data grouped by the year of observation, where:

$\frac{I_{it}}{K_{it-1}}$ is investment deflated by beginning-of-period non-current assets; Q_{it-1} is the previous year's Tobin's Q; $\frac{\Delta S_{it}}{S_{it-1}}$ is the sales growth rate; and, $\frac{CF_{it}}{K_{it-1}}$ is cash flow deflated by beginning-of-period non-current assets. All variables were demeaned by firm to remove the firm fixed effects. Obs represents the number of observations; R^2 measures the proportion of the total variability in investments explained by sales growth, cash flows and Tobin's Q; Sd Error represents the standard error; F represents the F-test for the null hypothesis that the model has no explanatory power; Sig represent the ρ - values used to evaluate whether to reject or not to reject the null hypothesis while t-stat represents the null hypothesis that the coefficients for the independent variable do not help in predicting the dependent variable. The ρ - values for the t-stat were found to be consistent with the ρ - values for the F and as such have not been reported.

The results indicate that the model should not be relied on for the year 2008 given the F-statistic significance of 0.70. Results also show the investment to cash flow sensitivity (β_3) for year 2006 and year 2010 as negative. The cash flow co-efficient, for the remaining years, are significantly higher but follow no particular trend. This observation is inconsistent with Chen & Chen (2009) who observed a declining pattern of the investment-cash flow sensitivity. A possible explanation for the inconsistency is the level of financial market development. Whereas Chen & Chen (2009) research focussed on companies in the United States of America (a country with more developed financial markets), this study focussed on companies based in Kenya (a country with less developed financial markets). Indeed, Islam & Mozumdar (2007) show that the sensitivity decreases with the financial market development while Wurger (2000) show that capital allocation is more efficient in financially developed markets. The uniqueness in the results for the three years (2006, 2008 and 2010) may be attributed to the political activities taking place in the country around that time; that is, a constitutional referendum in November 2005, post-election violence in 2008 and another constitutional referendum in 2010 all of which increased political activities in the country increasing the uncertainty

in the business environment which directly impacted on investments. Based on the above analysis, the researcher observe that, after allowing for firm fixed effects to vary across the years, cash flow has a statistically significant effect on investments in countries with less developed financial systems. The results also show that, political risks (actual or perceived) may have an effect on the relationship between cash flow and investment.

4.5. Analysis by Industry Groups

We divide the observations into seven industry groups as categorized by the NSE: Agricultural; Automobiles & Accessories; Commercial & Services; Construction & Allied; Energy & Petroleum; Manufacturing & Allied; and, Telecommunication & Technology. The rationale for forming industry groups is that firms in different industry groups might experience different external credit market environments and have access to different financing alternatives (Cleary et al., 2007). This split also helps maintain homogeneity of sample composition over time. However, caution must be taken while interpreting the results because the NSE industry groups do not necessarily comprise of companies operating under similar environments.

Table 4.5 reports the averages and medians for the variables that the researcher used in the empirical model. The table shows that each industry groups experience different characteristics over the years with Automobile & Accessories experiencing negative average cash flows for six out of the nine years presented, while Energy & Petroleum group experiencing two years of negative average cash flows. Negative average investment was experienced only in 2012 under the Automobile & Accessories group. Tobin's Q changes with the level of the stock market, increasing when the level is high and decreasing when low.

Table 4.5 Average and median for industry group variables

		$\frac{I_{it}}{K_{it-1}}$		Q_{it-1}		$\frac{\Delta S_{it}}{S_{it-1}}$		$\frac{CF_{it}}{K_{it-1}}$	
	Observations	Mean	Median	Mean	Median	Mean	Median	Mean	Median
NSE001 - Agricultural									
2004	5	0.023	0.010	1.195	1.158	0.089	0.021	0.079	0.066
2005	3	0.069	0.064	1.280	1.262	0.347	0.374	0.112	0.055
2006	5	0.047	0.027	1.453	1.359	0.065	0.070	0.069	0.045
2007	5	0.038	0.026	1.561	1.496	0.143	0.081	0.075	0.078
2008	5	0.055	0.050	1.496	1.377	0.009	(0.005)	0.042	0.025
2009	5	0.026	0.015	1.253	1.227	0.300	0.335	0.147	0.086
2010	5	0.070	0.020	1.195	1.182	0.301	0.053	0.131	0.075
2011	5	0.061	0.033	1.390	1.368	0.212	0.160	0.186	0.174
2012	5	0.039	0.031	1.278	1.266	0.069	0.098	0.120	0.100
NSE002 - Automobiles & Accessories									
2004	4	0.037	0.018	1.896	1.534	0.173	0.287	(0.080)	(0.110)
2005	4	0.061	0.070	1.387	1.343	0.208	0.077	(0.050)	(0.028)
2006	4	0.065	0.066	1.583	1.376	0.058	0.058	0.116	0.095
2007	4	0.033	0.036	1.772	1.668	0.197	0.157	(0.025)	(0.017)
2008	3	0.072	0.074	1.519	1.567	0.198	0.279	(0.055)	(0.096)
2009	4	0.058	0.034	1.285	1.244	0.055	0.052	(0.120)	(0.078)
2010	4	0.050	0.052	1.239	1.224	0.056	0.053	0.004	0.015
2011	2	0.251	0.251	1.249	1.249	0.186	0.186	(0.010)	(0.010)
2012	4	(0.138)	0.023	1.142	1.120	(0.025)	(0.034)	0.163	0.135
NSE003 - Commercial And Services									
2004	5	0.403	0.396	2.235	1.430	0.037	0.108	0.232	0.240
2005	5	0.241	0.197	2.153	1.795	0.213	0.150	0.320	0.369
2006	5	0.392	0.536	2.442	2.237	0.150	0.133	0.406	0.260
2007	5	0.430	0.177	2.958	2.252	0.193	0.124	0.519	0.232
2008	6	0.325	0.298	2.731	2.301	0.030	0.051	0.001	0.109
2009	6	0.534	0.151	1.928	2.033	0.110	0.121	0.415	0.190
2010	7	0.056	0.066	1.887	1.687	0.135	0.122	1.195	0.258
2011	7	0.015	0.069	2.106	1.839	0.116	0.171	0.183	0.166
2012	7	0.065	0.111	1.768	1.424	0.063	0.140	0.152	0.110

Table 4.5 Average and median for industry group variables (continued)

		$\frac{I_{it}}{K_{it-1}}$		Q_{it-1}		$\frac{\Delta S_{it}}{S_{it-1}}$		$\frac{CF_{it}}{K_{it-1}}$	
	Observations	Mean	Median	Mean	Median	Mean	Median	Mean	Median
NSE004 - Construction & Allied									
2004	5	0.101	0.040	2.102	1.709	0.314	0.180	0.238	0.219
2005	5	0.503	0.211	2.113	1.512	0.289	0.287	0.439	0.219
2006	5	0.373	0.228	2.673	2.073	0.274	0.172	0.035	0.195
2007	5	0.231	0.110	3.545	2.705	0.356	0.322	0.112	0.150
2008	5	0.253	0.180	2.933	2.935	0.167	0.143	0.213	0.100
2009	5	0.263	0.207	2.287	2.333	0.022	0.092	0.407	0.401
2010	5	0.168	0.097	1.888	1.865	0.149	0.161	0.251	0.193
2011	5	0.165	0.068	2.002	1.822	0.273	0.278	0.172	0.165
2012	4	0.085	0.070	1.762	1.624	0.038	(0.045)	0.150	0.125
NSE005 - Energy & Petroleum									
2004	3	0.111	0.129	1.450	1.587	0.586	0.680	(0.157)	0.028
2005	3	0.176	0.150	1.814	1.808	0.168	0.211	0.336	0.370
2006	3	0.154	0.132	1.763	1.577	0.083	0.111	0.043	0.010
2007	4	0.192	0.186	1.667	1.558	0.102	0.115	0.320	0.181
2008	4	0.222	0.188	1.492	1.454	0.436	0.172	0.090	0.096
2009	3	0.128	0.039	1.351	1.348	0.134	0.096	0.354	0.389
2010	4	0.190	0.187	1.162	1.194	0.235	0.077	(0.341)	0.165
2011	4	0.233	0.266	1.218	1.191	0.457	0.321	0.066	0.117
2012	4	0.160	0.135	1.169	1.211	0.105	0.123	0.340	0.330
NSE006 - Manufacturing & Allied									
2004	6	0.087	0.095	2.188	1.742	0.107	0.098	0.270	0.230
2005	5	0.026	0.040	2.467	2.758	0.124	0.156	0.262	0.308
2006	6	0.060	0.094	2.762	2.451	0.083	0.107	0.284	0.382
2007	6	0.140	0.178	3.364	3.491	0.114	0.129	0.161	0.222
2008	6	0.180	0.183	2.648	2.380	0.035	0.076	0.666	0.406
2009	7	0.136	0.138	2.512	2.174	0.098	0.059	0.111	0.163
2010	7	0.188	0.087	2.392	2.424	0.097	0.122	0.247	0.250
2011	7	0.181	0.158	2.725	2.228	0.058	0.043	0.315	0.262
2012	7	0.152	0.177	2.150	2.021	0.166	0.074	0.215	0.206
NSE007 - Telecommunication & Technology									
2009	1	0.390	0.390	2.909	2.909	0.148	0.148	0.373	0.373
2010	1	0.256	0.256	2.287	2.287	0.191	0.191	0.324	0.324
2011	1	0.329	0.329	3.113	3.113	0.129	0.129	0.380	0.380
2012	1	0.279	0.279	2.317	2.317	0.128	0.128	0.361	0.361

Table 4.5 reports the averages and medians for the industry group variables, by year of observation, used in our empirical model:

$\frac{I_{it}}{K_{it-1}} = \alpha_i + \alpha_t + \beta_1 \times Q_{it-1} + \beta_2 \times \frac{\Delta S_{it}}{S_{it-1}} + \beta_3 \times \frac{CF_{it}}{K_{it-1}} + \varepsilon_{it}$, where: $\frac{I_{it}}{K_{it-1}}$ is investment deflated by beginning-of-period non-current assets; Q_{it-1} is the previous year's Tobin's Q; $\frac{\Delta S_{it}}{S_{it-1}}$ is the sales growth rate; and, $\frac{CF_{it}}{K_{it-1}}$ is cash flow deflated by beginning-of-period non-current assets.

4.5.1. Regression Results for Industry Groups

Table 4.6 presents the estimation results for the primary specification in Equation (1) for six of the seven industry groups (Telecommunication & Technology industry group has been dropped given that it had only one valid observation in only four of the nine years presented which the researcher has determined to be inadequate for statistical analysis). Within each industry group, the sample was divided into three consecutive subsample periods (to get statistically significant number of observations) and the regression coefficients were estimated for each of them. Firm and year fixed effects are included but were not reported. The standard errors were considered to be heteroskedasticity-consistent and clustered at the firm level.

The sixth column of Table 4.6 lists the investment-cash flow sensitivities β_3. For the agricultural industry group, the investment-cash flow sensitivity is 0.463 in the 2004 to 2006 sample period. It is statistically significant with the t-statistic equal to 4.944. However, the investment-cash flow sensitivity declines to 0.054 for the sample period 2007 to 2009 and then increases to 0.296 for the sample period 2010 to 2012. The political activities in 2007 and 2008 may be the reason for the decline in the sensitivity (and negative sensitivity) observed in the sample period 2007 to 2009. The trend observed under the agricultural industry group was replicated in all other sampled

industry groups with the exception of the commercial & services group where the investment-cash flow sensitivity increased from 0.044 for the 2004 to 2006 sample period to 0.767 in the 2007 to 2009 sample period and then decreased to 0.006 for the sample period 2010 to 2012. For the 2004 to 2006 and 2010 to 2012 sample periods, the F-statistic had a significance level of 0.999 and 0.71 respectively, an indication that the regression model should not be relied on to explain the relationship between the variables in those sample periods for the commercial & services group. The unique results under this industry group were attributed to the composition of the firms in this group whose nature of business and operations are not related - companies under this category operate in the retail, media, hospitality, and transport sectors.

Table 4.6 Industry group regression results

	Q_{it-1}	t-stat	$\frac{\Delta S_{it}}{S_{it-1}}$	t-stat	$\frac{CF_{it}}{K_{it-1}}$	t-stat	Obs	R^2	Adjusted R^2	Sd. Error	F	Sig
NSE001 - Agricultural												
2004-06	0.046	1.668	0.068	2.272	0.463	4.944	13	0.810	0.747	0.021	12.8	0.001
2007-09	0.069	1.958	(0.022)	(0.589)	0.054	0.797	15	0.510	0.376	0.023	3.812	0.043
2010-12	0.042	0.175	(0.101)	(1.006)	0.296	1.028	15	0.158	0.121	0.073	2.689	0.078
NSE002 - Automobiles & Accessories												
2004-06	(0.004)	(0.142)	0.039	0.499	0.155	1.677	12	0.074	(0.274)	0.060	2.212	0.085
2007-09	(0.016)	(0.578)	0.034	0.908	(0.135)	(3.037)	11	0.595	0.421	0.035	3.424	0.082
2010-12	0.018	0.061	2.261	4.700	0.097	2.132	10	0.815	0.722	0.147	8.802	0.013
NSE003 - Commercial And Services												
2004-06	(0.000)	(0.002)	0.010	0.057	0.144	1.108	15	0.002	(0.270)	0.227	0.007	0.999
2007-09	(0.020)	(0.165)	0.707	0.674	0.767	3.386	17	0.510	0.397	0.515	4.51	0.022
2010-12	0.016	0.255	0.226	0.929	(0.006)	(0.135)	21	0.076	(0.087)	0.236	0.466	0.71
NSE004 - Construction & Allied												
2004-06	0.086	0.725	0.804	1.714	0.263	1.161	15	0.308	0.119	0.431	1.628	0.039
2007-09	0.050	1.288	(0.049)	(0.188)	(0.125)	(0.955)	15	0.250	0.045	0.160	1.221	0.048
2010-12	(0.006)	(0.068)	0.185	0.863	0.122	1.083	14	0.369	0.210	0.141	1.249	0.086
NSE005 - Energy & Petroleum												
2004-06	0.153	5.084	0.029	0.598	0.154	1.925	9	0.844	0.751	0.045	9.039	0.018
2007-09	(0.122)	(0.759)	0.122	1.316	(0.114)	(0.712)	11	0.248	(0.075)	0.147	0.768	0.547
2010-12	0.611	2.664	(0.028)	(0.356)	0.117	1.372	12	0.485	0.292	0.104	0.104	0.132
NSE006 - Manufacturing & Allied												
2004-06	0.005	0.308	0.144	0.611	0.297	2.833	17	0.641	0.558	0.075	7.745	0.003
2007-09	0.028	1.777	(0.145)	(1.153)	0.020	0.578	19	0.237	0.084	0.083	1.554	0.242
2010-12	0.102	2.062	0.109	0.364	0.065	0.261	21	0.271	0.142	0.212	2.102	0.138

Table 4.6 reports coefficients estimated from regression of investment on Tobin's Q, sales growth rate, and cash flow for six of the seven industry groups (Telecommunication & Technology industry group has been dropped given that it had only one valid observation in only four of the nine years presented which the researcher has determined to be inadequate for statistical analysis), where: $\frac{I_{it}}{K_{it-1}}$ is investment deflated by beginning-of-period non-current assets; Q_{it-1} is the previous year's Tobin's Q; $\frac{\Delta S_{it}}{S_{it-1}}$ is the sales growth rate; and, $\frac{CF_{it}}{K_{it-1}}$ is cash flow deflated by beginning-of-period non-current assets. Within each industry group, the sample was grouped into three consecutive subsample periods (to get statistically significant number observations) and the regression coefficients were estimated for each of them. Firm and year fixed effects are included but

were not reported. The standard errors were considered to be heteroskedasticity-consistent and clustered at the firm level. Obs represents the number of observations; R^2 measures the proportion of the total variability in investments explained by sales growth, cash flows and Tobin's Q; Sd Error represents the standard error; F represents the F-test for the null hypothesis that the model has no explanatory power; Sig represent the ρ-values used to evaluate whether to reject or not to reject the null hypothesis while t-stat represents the null hypothesis that the coefficients for the independent variable do not help in predicting the dependent variable. The ρ- values for the t-stat were found to be consistent with the ρ- values for the F and as such have not been reported.

With the above results, the research shows that, the effect of cash flow on investments in different industry groups is statistically significant but the impact is unique to each industry group. The results appear to be consistent with Lyandres (2007) and Lang et al (1996) who observed that the strength of the relation between the value of a firm's assets in place and the profitability of its investment opportunities may vary across industries and thus the relation between cash flow and investment depends on the industry in which the firm operates.

4.6 Analysis based on Dividend Pay-out

Fazzari et al (1988) segmented firms according to dividend payout ratios as a measure reflecting the degree of asymmetric information between a firm and its external investors. Accordingly, Fazzari et al (1988) argued that firms that paid no dividends were deemed to be financially constrained, firms that paid small dividends relative to net income were deemed to be partially financially constrained, and firms that paid moderate-to-large dividends relative to net income were deemed to be unconstrained. Although the researcher did not exactly replicate Fazzari et al (1988) partitioning, the observations were grouped into five categories using the dividend pay-out ratios. Within each category, the sample was divided into three consecutive subsample periods (to get

statistically significant number of observations) and the regression coefficients were estimated for each of them. The results are presented in Table 4.7.

Table 4.7 Analysis by dividend pay-out category

Pay-out	Q_{it-1}	t-stat	$\frac{\Delta S_{it}}{S_{it-1}}$	t-stat	$\frac{CF_{it}}{K_{it-1}}$	t-stat	Obs	R^2	Adjusted R^2	Sd. Error	F	Sig
0% - 24.99%												
2004-06	0.075	1.706	(0.004)	(0.042)	0.067	3.556	32	0.509	0.457	0.163	9.681	0.001
2007-09	0.069	1.538	(0.026)	(0.169)	0.014	0.948	32	0.099	0.002	0.180	1.023	0.007
2010-12	0.358	3.144	0.244	2.205	0.032	0.893	40	0.329	0.273	0.185	5.883	0.002
25% - 49.99%												
2004-06	0.152	1.484	1.143	2.601	0.284	2.469	18	0.602	0.517	0.299	7.054	0.004
2007-09	0.124	1.647	0.063	0.250	0.146	3.085	24	0.374	0.280	0.430	3.975	0.023
2010-12	(0.158)	(1.965)	0.068	0.522	0.207	1.825	22	0.342	0.233	0.160	3.121	0.012
50% - 74.99%												
2004-06	0.022	0.855	(0.021)	(0.190)	0.441	0.500	16	0.077	0.154	0.091	0.332	0.002
2007-09	(0.028)	(0.487)	0.305	1.034	0.256	4.155	17	0.650	0.570	0.238	8.065	0.003
2010-12	0.088	1.514	0.015	0.047	0.345	0.200	16	0.192	0.010	0.197	0.951	0.007
75% - 99.99%												
2004-06	(0.041)	(0.730)	(0.476)	(0.843)	0.154	2.135	7	0.615	0.230	0.088	1.599	0.050
2007-09	0.034	17.568	0.293	4.566	0.045	2.321	6	0.997	0.991	0.008	194.022	0.045
2010-12	0.132	3.005	(0.053)	(0.112)	0.152	0.780	8	0.716	0.503	0.093	3.360	0.036
>=100%												
2004-06	(0.015)	(0.878)	0.180	3.007	0.117	1.425	8	0.739	0.542	0.051	3.766	0.016
2007-09	0.053	1.184	(0.152)	(0.824)	0.087	0.985	10	0.353	0.030	0.080	1.093	0.421
2010-12	(0.002)	(0.038)	0.080	0.241	0.107	0.652	10	0.084	0.374	0.121	0.183	0.044

Table 4.7 reports coefficients estimated from regression of investment on Tobin's Q, sales growth rate, and cash flow when observations are partitioned according to dividend payout ratios, where: $\frac{I_{it}}{K_{it-1}}$ is investment deflated by beginning-of-period non-current assets; Q_{it-1} is the previous year's Tobin's Q; $\frac{\Delta S_{it}}{S_{it-1}}$ is the sales growth rate; and, $\frac{CF_{it}}{K_{it-1}}$ is cash flow deflated by beginning-of-period non-current assets. Firm and year fixed effects are included but were not reported. The standard errors were considered to be heteroskedasticity-consistent and clustered at the firm level. Obs represents the number of observations; R^2 measures the proportion of the total variability in investments explained by sales growth, cash flows and Tobin's Q; Sd Error represents the standard error; F

represents the F-test for the null hypothesis that the model has no explanatory power; Sig represent the ρ - values used to evaluate whether to reject or not to reject the null hypothesis while t-stat represents the null hypothesis that the coefficients for the independent variable do not help in predicting the dependent variable. The ρ - values for the t-stat were found to be consistent with the ρ - values for the F and as such have not been reported.

The researcher found that, for the 0% - 24.99% dividend payout categories, the investment-cash flow sensitivity is 0.067 in the 2004 to 2006 sample period. The sensitivity declines to 0.014 for the sample period 2007 to 2009 and then increase to 0.032 for the sample period 2010 to 2012. The political activities in 2007 and 2008 may be the reason for the decline in the sensitivity observed in the sample period 2007 to 2009. The trend observed under this category was replicated in all other categories. The degree of sensitivity appear to increase from coefficients of between 0.014 and 0.067 for firms in the 0%-24.99% category to coefficients of between 0.256 and 0.441 for firms in the 50%-74.99% category and then declines to coefficients of between 0.087 and 0.117 for firms with dividend pay-outs greater than 100%.

These results appear to be inconsistent with Fazzari et al (1988) who found the investment-cash flow sensitivities to decrease with dividend payouts. Possible explanation would be the fact that the researcher used an unbalanced panel whereas Fazzari et al (1988) used a balanced panel. This explanation is corroborated by Cleary et al. (2003) who, while using unbalanced panel, found little evidence resembling Fazzari et al (1988); indeed, they observed that while firms with the highest payout ratios have a lower cash-flow sensitivity than those in the lower-payout groups the sensitivities are actually lowest where the payout is lowest. They argued that when firms are classified by their internal funds, then a U-shaped investment curve leads to the prediction that among

the financially constrained firms, the more constrained ones will have lower investment-cash flow sensitivity.

4.7 Analysis based on Age

The researcher sorted the observations based on firm's age. The observations were grouped into four categories. Within each category, the sample was divided into three consecutive subsample periods (to get statistically significant number of observations), except for the 0 to 25 years category which lacked valid observations between 2004 and 2006, and then regression coefficients were estimated for each of them. The firm age is defined as the difference between the observation year and the year of incorporation. The researcher then estimated the investment-cash flow sensitivity for each group. Table 4.8 shows the results.

Table 4.8 Analysis based on age

Age	Q_{it-1}	t-stat	$\frac{\Delta S_{it}}{S_{it-1}}$	t-stat	$\frac{CF_{it}}{K_{it-1}}$	t-stat	Obs	R^2	Adjusted R^2	Sd. Error	F	Sig
0 - 25 Years												
2007-09	0.313	0.584	0.074	0.025	0.305	2.604	7	0.762	0.524	0.657	3.200	0.042
2010-12	0.092	0.843	(0.833)	(1.965)	0.675	2.792	9	0.619	0.390	0.200	2.703	0.050
25 - 50 Years												
2004-06	0.119	1.523	0.314	1.465	0.163	1.779	28	0.226	0.129	0.315	2.333	0.049
2007-09	0.055	2.893	0.075	1.094	0.010	0.200	31	0.284	0.204	0.126	3.566	0.027
2010-12	0.059	1.182	0.013	0.067	0.139	0.229	30	0.124	0.023	0.180	1.230	0.019
50 - 75 Years												
2004-06	0.005	0.516	0.039	0.839	0.021	2.685	33	0.314	0.244	0.049	4.434	0.011
2007-09	0.049	3.470	(0.002)	(0.028)	0.004	1.121	34	0.359	0.295	0.071	5.593	0.004
2010-12	0.058	1.175	0.178	1.694	0.014	0.518	35	0.105	0.019	0.172	1.218	0.040
> 75 Years												
2004-06	0.057	1.049	(0.194)	(0.832)	0.006	1.146	20	0.289	0.155	0.218	2.163	0.002
2007-09	(0.046)	(0.653)	(0.569)	(1.378)	0.001	0.960	17	0.136	(0.064)	0.218	0.680	0.050
2010-12	0.060	2.311	0.826	5.704	0.005	0.194	22	0.749	0.707	0.125	17.894	0.001

Table 4.8 reports coefficients estimated from regression of investment on Tobin's Q, sales growth rate, and cash flow when observations are partitioned according to age of

the companies, where: $\frac{I_{it}}{K_{it-1}}$ is investment deflated by beginning-of-period non-current assets; Q_{it-1} is the previous year's Tobin's Q; $\frac{\Delta S_{it}}{S_{it-1}}$ is the sales growth rate; and, $\frac{CF_{it}}{K_{it-1}}$ is cash flow deflated by beginning-of-period non-current assets. Firm and year fixed effects are included but were not reported. The standard errors were considered to be heteroskedasticity-consistent and clustered at the company level. Obs represents the number of observations; R^2 measures the proportion of the total variability in investments explained by sales growth, cash flows and Tobin's Q; Sd Error represents the standard error; F represents the F-test for the null hypothesis that the model has no explanatory power; Sig represent the ρ - values used to evaluate whether to reject or not to reject the null hypothesis while t-stat represents the null hypothesis that the coefficients for the independent variable do not help in predicting the dependent variable. The ρ - values for the t-stat were found to be consistent with the ρ - values for the F and as such have not been reported.

The researcher found the investment-cash flow sensitivity, for the firms in the 25 – 50 years category, to be 0.163 in the 2004 to 2006 sample period. The sensitivity declines to 0.01 for the sample period 2007 to 2009 and then increase to 0.139 for the sample period 2010 to 2012. The political activities in 2007 and 2008 may be the reason for the decline in the sensitivity observed in the sample period 2007 to 2009. The trend observed under this category was replicated in all other categories (except for the 0 to 25 years category which lacked valid observations between 2004 and 2006).

The degree of sensitivity appears to decrease from coefficients of between 0.305 and 0.675 for firms in the 0 – 25 years category to coefficients of between 0.001 and 0.006 for the firms in 75 years and above category. These results are consistent with Oliner & Rudebusch (1992) who found the sensitivities to be higher among younger firms as well as Hovakimian (2009) who investigated the corporate life cycle as an underlying factor of the negative relationship between cash flow and investment and argued that young firms are usually characterized by low internal funds, high growth opportunities and so need

external financing in order to support their investments; on reaching a second stage in terms of age and stability, those firms see their internal funds rising and their growth opportunity declining and eventually, they reach a stage where they keep investing without relying (or with less reliance than they used to) on their internal funds.

4.8 Analysis based on Size

Investment opportunities and access to external capital depend on firm size. The researcher partitioned the observations based on gross sales and then estimated the investment-cash flow sensitivities over the nine year period between 2004 and 2012. There is no official guidance on what constitutes a large or a small firm in Kenya. As such, the researcher judgmentally determined firms with gross sales of over KShs 5 billion to be large firms. The rest were considered smaller firms. The regression was then estimated for each of the groups, results of which have been presented on table 4.9.

The results for the smaller firms are similar to our findings under section 4.4 which indicated that the model should not be relied on for the year 2008, and the investment to cash flow sensitivities (β_3) for year 2006 and 2010 are negative. The sensitivity of investment to cash flow for the remaining years (for smaller firms) are higher compared to the results presented under section 4.4 with the sensitivity ranging from 0.22 in 2012 to 0.933 observed in 2009. The larger firms had negative sensitivity for five out of the nine years presented, and very low sensitivity for the four remaining years of which the significance of the F-statistic was relatively high. These results appear to be consistent with Gertler & Gilchrist (1994) view that firm size may be an indicator of access to external finance and consequently, the smaller the firm, the higher the sensitivity of investment to cash flow.

Table 4.9 Analysis based on size

Year	Q_{it-1}	t-stat	$\frac{\Delta S_{it}}{S_{it-1}}$	t-stat	$\frac{CF_{it}}{K_{it-1}}$	t-stat	Obs	R^2	Adjusted R^2	Sd. Error	F	Sig
Firms with Sales Revenue Less than KShs 5 billion												
2004	0.110	3.037	(0.322)	(2.228)	0.532	2.267	18	0.558	0.463	0.139	5.888	0.008
2005	(0.067)	(0.749)	0.295	1.639	0.851	5.762	14	0.826	0.773	0.200	15.796	-
2006	0.253	2.564	0.203	0.670	(0.232)	(1.282)	16	0.608	0.509	0.219	6.192	0.009
2007	0.195	5.392	0.106	0.421	0.665	6.583	16	0.865	0.831	0.163	25.638	-
2008	0.112	1.557	(0.136)	(0.496)	(0.058)	(0.643)	17	0.163	(0.030)	0.209	0.843	0.495
2009	0.187	0.997	(0.068)	(0.171)	0.933	4.424	17	0.696	0.626	0.368	9.908	0.001
2010	0.111	1.284	(0.330)	(1.344)	(0.035)	(0.763)	17	0.234	0.058	0.231	1.326	0.308
2011	(0.024)	(0.379)	0.040	0.193	0.719	1.337	14	0.217	(0.018)	0.172	0.923	0.265
2012	0.092	0.543	0.385	1.015	0.220	0.848	14	0.355	0.162	0.233	1.837	0.204
Firms with Sales Revenue Greater than KShs 5 billion												
2004	(0.028)	(0.731)	0.045	0.259	0.009	0.608	10	0.111	(0.334)	0.153	0.250	0.859
2005	(0.059)	(0.824)	0.295	0.403	0.012	1.547	11	0.324	0.034	0.150	1.119	0.404
2006	0.014	0.431	1.392	3.077	(0.235)	(1.024)	12	0.543	0.372	0.127	3.172	0.085
2007	0.008	0.370	(0.048)	(0.170)	0.007	0.065	13	0.018	(0.310)	0.097	0.054	0.982
2008	0.044	0.890	0.074	0.716	(0.023)	(0.083)	12	0.193	(0.110)	0.143	0.638	0.611
2009	0.032	0.829	0.255	1.098	0.003	0.025	14	0.151	(0.104)	0.153	0.593	0.633
2010	0.026	0.688	(0.092)	(0.627)	(0.023)	(0.417)	16	0.094	(0.133)	0.124	0.413	0.747
2011	0.048	0.987	0.068	0.397	(0.167)	(0.553)	17	0.109	(0.097)	0.148	0.529	0.670
2012	0.111	3.199	0.309	1.744	(0.095)	(0.929)	18	0.541	0.442	0.109	5.494	0.010

Table 4.9 reports coefficients estimated from regression of investment on Tobin's Q, sales growth rate, and cash flow when observations are partitioned according to size of the companies, where: $\frac{I_{it}}{K_{it-1}}$ is investment deflated by beginning-of-period non-current assets; Q_{it-1} is the previous year's Tobin's Q; $\frac{\Delta S_{it}}{S_{it-1}}$ is the sales growth rate; and, $\frac{CF_{it}}{K_{it-1}}$ is cash flow deflated by beginning-of-period non-current assets. Firm and year fixed effects are included but were not reported. The standard errors were considered to be heteroskedasticity-consistent and clustered at the company level. Obs represents the number of observations; R^2 measures the proportion of the total variability in investments explained by sales growth, cash flows and Tobin's Q; Sd Error represents the standard error; F represents the F-test for the null hypothesis that the model has no explanatory power; Sig represent the ρ - values used to evaluate whether to reject or not to reject the null hypothesis while t-stat represents the null hypothesis that the coefficients for the independent variable do not help in predicting the dependent variable. The ρ - values for the t-stat were found to be consistent with the ρ - values for the F and as such have not been reported.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter provides a summary of the key findings from the study. It also aims at reflecting on the feasibility of employed research methodology before making recommendations, for consideration, for further research.

5.2 Summary of Key Findings

This study was carried with an objective of determining the effect of cash flow on investment in fixed assets for companies listed at the NSE.

The period covered by the study was a ten year period from 2003 to 2012. The main sources of data were audited published financial statements of the listed companies obtained from the Capital Markets Authority (CMA) and the NSE trading information. The study followed Chen & Chen (2009) and identified cash flow, sales growth and Tobin's Q as the variables affecting investments. The data obtained was relevant to compute the specific variables being evaluated and to make conclusions as to whether cash flow affects investments in fixed assets for companies listed at the NSE.

After a thorough analysis of the data obtained the results showed that there is a largely positive effect of cash flow on investments. However, this effect varied under different scenarios as shown below:

- A simple analysis of the standard regression results of all observations; do not give statistically significant co-efficients to conclude whether cash flow affects investments. Prior studies have however, shown that the resulting co-efficients

can be used to predict a U-shaped relationship between investment and cash flows. Studies will however, need to be undertaken in the Kenyan context to establish whether, indeed, the U-shaped relationship exist

- A regression analysis based on the year of observation indicated that the effect of cash flow on investment varies from year to year and depending on the firm characteristics and the external environment facing the firm. For instance, it was noted that the effect of cash flow on investment may be affected by the level of development of financial systems and political risks. The less developed the financial systems, the poor the capital allocation and hence the higher the sensitivity of investment to cash flow.
- A regression analysis based on industry group indicated that the effect of cash flow on investment (in different industry groups), follow a similar trend but its significance varies from one industry group to the other. The sensitivity is relatively high in the agricultural industry group, very low in manufacturing and allied industry group and non-existent in the commercial and services industry group. However, caution must be taken in interpreting the results under commercial and services industry group given that it comprises largely of companies whose nature of business and operations are not related.
- Dividend pay-out ratio does not necessarily point out the financial circumstances facing the firm and may be influenced by many other factors other than financial constraints or availability of investment opportunities. The study found out that the effect of cash flow on investment was lowest for firms with the lowest dividend pay-out.

- Age of the company has a major impact on the relationship between investments and cash flows. The older the firm is, the less sensitive the investments are to cash flows. This is an indicator that market perceptions and potential ease of access to alternative source of financing do play a role in the relationship between cash flows and investments.
- The size of the company plays a major role in determining whether a firm's investment is affected by cash flows. For larger firms, the effect of cash flow on investments is largely negative or statistically insignificant. However, for small firms, the relationship is positive and statistically significant.

5.3 Conclusion

From the study results, it is evident that cash flows have a positive effect on investments. The findings of this study do suggest that, a firm's investment is likely to be affected by cash flows generated if it is young, small and is in agricultural, manufacturing & allied, construction & allied, automobile & accessories and energy & petroleum industry groups after controlling for political risks. The relationship does not hold for companies under commercial & services industry group, largely because the nature of business and operations for companies categorized under this industry group are unrelated.

5.4 Recommendations

The main objective of the study was to find out whether there is any significant effect of cash flows on investments in fixed assets for companies listed at the NSE. The results have shown that a firm's investment is likely to be affected by cash flows generated if it is young, small and is in agricultural, manufacturing & allied, construction & allied, automobile & accessories and energy & petroleum industry groups after controlling for

political risks. Most of the Kenyan firms fall under this category. Relevant authorities need to come with policies aimed at hastening financial systems development in the country. Fully developed financial systems will go a long way in disassociating investments from cash flows and hence encouraging more small firms to take advantage of investment opportunities as they arise. In addition to the financial systems development, measures should be put in place ensuring that the actual or perceived political risks in the country are maintained at minimum levels possible. This will increase the firms' confidence in the country's business environment (including the financial systems) leading to increased investments.

5.5 Suggestion for Further Research

Due to time limitation, the researcher was not able to cover all the aspects of the relationship between investments and cash flows. Thus, further research should be carried out focusing on the following areas:

- Same study could be repeated to cover a longer period and more firm characteristics while including more robust measures of financial constraints.
- Same study could be repeated while capturing the industry, age, dividend pay-out and size as variables in the model rather than clustering the observations based on these characteristics.
- A study focusing on human factors affecting the relationship as advocated in behavioral economics would go a long way in contributing to the literature available on this subject. Visiting such companies to understand their practices and interviewing the top management so as to obtain more insight can help in this.

- A study based on industry groupings of companies in identical operations would definitely shed some more light on the impact of cash flow on investments for the various industries that companies identify more closely with in Kenya.

5.6 Limitations of the Study

- The study was carried out using secondary data extracted from financial statements of the listed companies. There is possibility of this data being manipulated to suit the management and hence one has to be cautious of this limitation.
- Because of the time that has elapsed since 2003, not every set of financial statement required was obtained. However, it is expected that the relationship between investments and cash flows is independent over three year observation periods and absence of this data does not materially affect the results of this research. That is, conclusions would not have changed even with availability of this data.
- Period covered in the analysis of data was barely ten years. A longer period would certainly yield better results given the few number of companies listed at the NSE.

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