**FINANCIAL CONSTRAINTS, FIRM SIZE AND INVESTMENT CASH FLOW SENSITIVITY AMONG NON-FINANCIAL FIRMS LISTED AT THE NAIROBI SECURITIES EXCHANGE, KENYA**

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**Abstract**

The purpose of the study was to establish the effect of financial constraints and firm size on the investment cash flow sensitivity of non-financial firms listed at the Nairobi Securities Exchange. The study employed descriptive and longitudinal research design and secondary data to study a population of 33 non-financial firms operating in Kenya and are listed at the Nairobi Securities Exchange. The data collected was analyzed through descriptive and inferential statistics. The study findings pointed to an effect of size on the positive relationships between financial constraints and firm investment cash flow sensitivity. Generally, larger firms in terms of tangible assets and higher sales turnover have ease of access of external capital especially when turnovers are used to assess ability to borrow and when tangible assets are used as collateral for debt finance. The overall conclusion was that firm size influences the positive relationships between financial constraints and the investment cash flow sensitivity of the non-financial firms. Specifically, firm managers rely on profitability to finance investments possibly because of financial market financing obstacles that include cost, access and information asymmetry. The positive effect of leverage and liquidity is a pointer to existence of pecking order preference in working capital and capital structure decisions. The study thus contributes to managerial policy in suggesting that corporate managers should increase the use of internally generated funds especially from retained profits and debt capital when financing their firm investment and operations in order to maximize the tax shield benefits available to their firms.

***Key words:*** *Financial Constraints, Firm Size, Investment Cash flow Sensitivity, Non-Financial Firms*

## Introduction

The relationship between investment cash flow sensitivity and firms’ financial constraints that is documented by Fazzari, et al. (2000), Hoshi, et al. (1991) and Agca and Mozumdar (2012) infer that the levels of investment cash flow sensitivity changes proportionately with the levels of a firm’s financial constraints. Contrarily, Kaplan and Zingales (1997) illustrate that investment cash flow sensitivity is high among the firms which are financially unconstrained thus creating a puzzle on the actual relationship. In Kayo and Kimura (2011), firm size is identified as a key determinant of access to external financing and thus a possible explanation of the puzzle.

The foregoing study is premised on the Agency, Pecking order and Trade off theories. According to Jensen and Meckling (1976), in the agency theory postulations, there is separation of corporate ownership and control where decision making authority is delegated to the agent including financing and investment decisions. Postulations of Pecking order theory by Myers and Majluf (1984) illustrate that the preference expressed by companies for new projects financing mainly through self-financing, followed by debt and finally by share issues constitutes the pecking order, under asymmetric information conditions. The trade-off theory advanced by Jensen (1986) and Myers (1984) assumes a target ratio of long term sources of finance by establishing a balance between costs and benefits associated with using debts in capital structure. Thus, a firm will borrow up to the point where the marginal value of the tax advantage of debt is balanced by the increase in the present value of bankruptcy costs.

In many cases, companies either invest beyond the level that would maximize shareholders’ wealth (they overinvest), or they forgo some good investment projects unless they have sufficient cash flow to undertake them (they underinvest) (Pindado, et al., 2011). In Kenya, as noted by Okumu (2014), new investments by listed firms are mainly financed through bank loans and overdraft facilities, which poses very high financial risks in terms of bankruptcy costs from the view of both the managers and investors. Furthermore, the firms that are listed in NSE have high cash flow sensitivities, dependent on size, liquidity and institutional ownership.

**1.1.1 Financial Constraints**

Literature presents several strands of definitions for financial constraints. Mulier, et al. (2016) holds that a firm is said to be financially constrained if its investment is limited by its generation of internal funds because it is unable to obtain sufficient external funds. In Silva and Carreira (2012), financial constraints are the inabilities of a firm or a group of firms to raise necessary amount to finance their optimal path of growth. In Lamont et al., (2001), financial constraint represents the financial friction that prevents a firm from funding all its desired investments.

The wedge between internal and external costs of funds caused by inability to borrow, credit constraint, inability to issue bonds, dependence on bank loans and inadequate or intangibility of assets represents financial constraints according to Kaplan and Zingales (1997). As noted by Okumu (2014), a financially constrained firm has limited access to external capital, and therefore its ability to undertake new viable investments is restricted. Ideally, the level of capital market development that determines the information asymmetry and hence levels of market imperfections explain the cost of funds wedge.

Researchers have over the years identified measures of the severity of the financial constraints. Bushman, et al. (2011) classify firms as financially constrained and unconstrained by using the Clearys Zfc index. Firms with high Zfc values are expected to be less financially constrained and should have no or less investment cash flow sensitivities and vice versa. Other measures include investment-cash flow sensitivities (Fazzari et al. 2000), Kaplan and Zingales (KZ) index of constraints (Lamont et al. 2001), Whited and Wu (WW) index of constraints (Whited and Wu, 2006).

**1.1.2 Investment Cash Flow Sensitivity**

Investment cash flow sensitivity is defined as the coefficient that measures the changes of capital investment decisions due to changes in internally generated cash flows by Fazzari, et al. (1988). Investment cash flow sensitivity therefore is the extent to which investment decisions rely on internally generated cash flows. Some studies have applied investment-cash flow sensitivity to measure the degree of the firms’ financial constraints. Consistent with the interpretations of cash flow sensitivity, firms with positive cash flow sensitivity are those that are more likely to face higher costs of external capital as compared to cash flow insensitive firms.

In Fazzari et al. (1998), investment cash flow sensitivity reflects higher costs of external financing that is relative to internal financing, which may occur due to information asymmetries as discussed by Myers and Majluf (1984) and Greenwald, et al. (1984), or agency problems, as discussed by Jensen and Meckling (1976), Grossman and Hart (1982) and Jensen (1986). According to Fazzari et al. (1998), firms with positive investment cash flow sensitivity are those that are more likely to face higher costs of external capital as compared to cash flow insensitive firms. Firms’ characteristics classified as having negative cash flow sensitivity suggest that they are even more likely to be liquidity constrained than firms with positive cash flow sensitivity.

In the literature, Investment cash flow sensitivity is measured by regressing investments on cash flow while controlling for investment opportunities with Tobin’s Q. According to Erickson and Whited (2000) and Alti (2003), measurement problems that are associated with Tobin’s Q affect sensitivity of investments to availability of internal funds.

**1.1.3 Firm Size**

Firm size, as defined by Booth et al. (2001) refers to the capacity at which a company in a given industry is operating at a given time. Firm size is a crucial factor affecting financing decisions of a company (Kayo & Kimura, 2011). Both the trade-off and the pecking order theories infer a positive relationship between firm size and leverage. In Titman and Wessels (2012), larger firms are expected to have lower bankruptcy risks and costs, more diversified portfolios, lower agency cost of debts, smaller monitoring costs, less volatile cash flows, high tangibility and hence more collateralized and easier access to credit market.

As documented by Gertler and Gilchrist (1994), the optimal size of a firm is the one at which its total production cost per unit of output is lowest. Firm size determines the extent to which firms are financially constrained. This is so because firm size may reflect its ability to access external financial markets. Firm size has been used in past studies as an indicator of access to external finance. Small firms are generally young, with higher levels of firm-specific risks and less collateral, making them less likely to attract external finance.

Firm size is measured by asset tangibility and sales growth. This is because tangible assets can be used as collateral while sales growth can affect a firm’s profitability and credibility thereof (Gertler & Gilchrist, 1994). Firm Size is also measured as amount of sales revenue and number of employees (Orlitzky, 2001).

**1.1.4 Non-financial Firms Listed at the Nairobi Securities Exchange**

In Owido, et al. (2003), it is illustrated that the Nairobi Securities Exchange is not perfect, and existing imperfections introduce a wedge between the costs of external and internal funds. Firms facing higher informational imperfections experience a wider wedge, and therefore are more financially constrained. Wale (2014) and Eli (2014) show that firms operating in Africa constantly face external financial constraints at different levels. According to Maina and Ishmail (2014), firms use more of short term borrowing than long term borrowing, probably due to inability to borrow long term funds. Okumu (2014) shows that firms listed in NSE are small and face external financial constraints.

According to Kayo and Kimura (2011), firms quoted in NSE, face challenges in raising external funds mainly because of a strong information asymmetry between lenders and borrowers. The effect of the information problem and levelling off of indebtedness puts smaller firms to a disadvantage by the financial institutions either by higher costs of borrowing or by higher guarantees. This has resulted to borrowing from banks by firms listed in NSE instead of raising funds from the capital market which is cheaper than bank loans and bank overdrafts.

**1.2 Research Problem**

The theoretical relationship between financial constraints and investment cash flow sensitivities is one of the most widely studied and unresolved areas in corporate finance whose history can be traced from the seminal work of Fazzari, Hubbard and Peterson (1988). Earlier studies illustrated that there is a correlation between financial constraints and investment cash flow sensitivity. However, subsequent studies arrived at contradicting results on the nature of the relationship between the two variables.

Financial markets in Sub-Saharan Africa, to which NSE belongs, are described as highly imperfect hence characterized with agency problems caused by information asymmetry, transaction costs and contracting costs (Eli, 2014). Firms listed at the NSE raise funds to finance new investments in form of equity and, or bonds (Kayo & Kimura, 2011). Lack of adequate and relevant legal and regulatory framework to enforce financial contracts has led to credit rationing and high collateralization which leads to financial constraints, hence under investment (Wale, 2014).

Several studies have been conducted on financial constraints and investment cash flow sensitivities both in developed and developing economies. Deveraux and Schiantarelli (1990) note that literature that investigate effect of financial constraints on investment behavior categorize firms in accordance with characteristics that include; possibility of getting financially constrained, size, capital structure and dividend payouts. Gilchrist and Himmelberg (1999) advance that financially constrained firms have the highest sensitivities to cash flows. Fazarri et al (1988) observed that investment cash flow sensitivities are higher among firms with lower dividends while Oliner and Rudebusch (1992) illustrate that the sensitivity is higher among younger firms. Kaplan and Zingales (1997) modify the firm classification characteristics into three categories as; not financially constrained, possibly financially constrained and financially constrained. Bond and Cummins (2001) apply the modified classification by Kaplan and Zingales (1997) to conclude that financially constrained firms have lowest sensitivity of corporate investment to cash flow. Okumu (2014) also established that for firms listed at the NSE, firm size, liquidity and institutional ownership have a definite influence on the levels of investment cash flow sensitivity. The foregoing studies therefore arrive at no conclusive finding on the exact relationships.

**1.3 Research Objectives**

The main objective of this study was to determine the effect of financial constraints and firm size on investment cash flow sensitivity of listed firms in Kenya.

**2.1 Literature Review**

The study is based on three theories. The Agency theory by Jensen and Meckling (1976) indicate that Agency costs and problems cause financial frictions that increase investment cash flow sensitivities. Pecking order theory by 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. The tradeoff theory by Jensen (1986) supports the proposition that financially constrained firms have higher investment cash flow sensitivities as compared to financially unconstrained firms.

## 2.2 Empirical Review

Devereux and Schiantarelli (1990) present that there is substantial literature estimating the possible impact of financial constraints on investment behavior. 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.

Kadapakkam, et al. (1998) examined the degree to which cash flow availability influences firm investment in six OECD countries. In particular, the study focused on the extent to which the reliance on internal funds is affected by firm size, since there is general agreement that smaller firms have less access to external capital markets and, thus, should be more affected by the availability of internal funds. The study first examine all firms, regardless of size, in each country, and find that the amount of corporate investment is affected by internal resources in all the six countries; that is, internal financing affects firm investment. The analysis is then repeated while segmenting the sample using three measures of firm size. Contrary to a priori expectations, the study find that the cash flow investment sensitivity is generally highest in the large firm size group and smallest in the small firm size group. The authors thus deduce that the explanations for these findings are grounded in managerial agency considerations, and in the greater flexibility enjoyed by large firms in timing their investments. Thus, the study concludes that the degree of sensitivity of a firm's investments to its cash flows cannot be interpreted as an accurate measure of its access to capital markets as interpreted in Kaplan and Zingales (1997).

Successive research studies have raised several objections to the earlier findings in Fazarri et al. (1988), Oliner and Rudebusch (1992), Hayashi and Inoue (1995) and Gilchrist and Himmelberg (1999). Kaplan and 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, Bond and Cummins (2001) findings indicate that the financially constrained firms have the lowest sensitivity of corporate investment to cash flow.

Fazarri et al. (1988) expound that firms can be classified according to whether they were likely to be financially constrained on the basis of their size, dividend pay-outs and capital structure. This characteristic determines whether they are more sensitive to the supply of internal funds measured by cash flow and after controlling for investment demand as measured by Tobins Q ratio.

Oliner and Rudebusch (1992) examine 99 NYSE-listed firms and 21 OTC firms during the period 1977-1983. They find that investment is most closely related to cash flows for the firms that are young, whose stocks are traded in the OTC, and that exhibit insider trading behaviour consistent with privately held information. Schaller (1993) studies 212 Canadian firms over the 1973-1986 period and concludes that investment for young, independent manufacturing firms with dispersed ownership concentration is the most sensitive to cash flows. Bond and Meghir (1994) employ an Euler equation model to directly test the first order condition of an intertemporal maximum problem, which does not require the measurement of Tobin’s Q. The strategy is implemented by imposing an exogenous constraint on external financing and testing whether that constraint is binding for a particular group of firms. These studies conclude that size and age affect firms ICFS. Hence, it is evident that there is an effect of financial constraints and firm size on investment cash flow sensitivity.

Soumaya (2012) summarize studies that analyze the relationship between financial constraints and investment cash flow sensitivity. The majority of the studies have proven the existence of a significant positive relationship between investment and the cash flow, but the unanimity has not explained the positive relationship. The study also analyzes the effect of debt, liquidity and firm size on the investment cash flow sensitivity among a sample of 82 French firms that compose the SBF 250 index in the period between 1999 to 2005. The study finds that market capitalization as a measure of firm size, has a positive and significant effect on the relationship between investment and cash flow. Also, long and medium term debts have negative effect on the investment cash flow sensitivity. Finally, the impact of the liquid assets on the cash flow investment sensitivity is not clear. Since the effect of cash stock is positive while the effect of liquid assets is negative.

Crisóstomo, et al. (2012) sought to verify the existence of financial constraints for investment in Brazil and the specific firm size effect on it. The study estimated dynamic investment models for a panel dataset of 289 Brazilian nonfinancial firms for the time period between 1995 to 2006. The study results show that Brazilian firms face financial constraints since their investments depend on the internally generated funds. The study also shows that Firm size is an important determinant of financial constraints and investment cash flows. Investment of smaller firms is more sensitive to cash flow than that of larger ones. At the firm level, the study findings suggest the need for further developments on information disclosure as a way to mitigate asymmetric information problem. At the policy level, the study recommend additional advance in the institutional environment which might also be important for minimizing financial constraints for the Brazilian firms.

**2.3 Conceptual Framework**

The study conceptualized that the relationship between financial constraints and investment cash flow sensitivity is mediated by firm size.

**Financial Constraints**

* Liquidity
* Leverage
* Profitability

**Firm Size**

* Sales
* Tangibility of assets

**Investment Cash flow Sensitivity**

Invit =β0+β1CF1+ε

**3.1 Methodology**

The study adopted the descriptive and longitudinal research designs. Descriptive research design enabled the researcher to ascertain and describe the characteristics of the variables of interest in a situation as explained in Mugenda and Mugenda (2003). Longitudinal design as explained in Irungu (2007) helped the researcher to determine the relationships that exist between financial constraints, firm size and investment cash flow sensitivities over a period of time among the 33 non-financial listed firms that constituted the population of the study.

**4.1 Findings, Conclusions and Recommendations**

Trend analysis was undertaken which revealed the variations of the study variables namely; ICFS and financial constraints proxied by Leverage, Liquidity and Profitability within the span of ten years. The outcome of analysis of the time series changes of the variables was presented using graphical models.



**Figure One: Trend of ICFS for the year 2009 – 2019**

Figure one above indicates that the mean value of ICFS variable for the firms listed at the NSE had a decreasing trend between year 2009 and 2019 in general. The general trend was made up of short term up and down periodical movements. The trend was uprising in 2012, 2014, 2015 and 2018 after which they are followed by a drop in subsequent years.



**Figure Two: Trend of Leverage for the year 2009 – 2019**

Figure two above indicate that the mean value of leverage for the 33 non-financial firms listed at the NSE had short term minimal up and down periodical movements between year 2009 and 2019. The general trend was made up of short term up in 2011 followed by a near constant trend till 2014 when it slightly declined till 2016. There is a short term up in 2017 that is subsequently followed by a short term decline.

As presented in Figure three below, the mean value of liquidity for the 33 non-financial firms listed at the NSE had an increasing trend between 2009 and 2019 with short term minimal up and down periodical movements. The general trend was made up of short term up between 2009 and 2013 followed by a short term down between 2014 and 2017 and short term up in 2018.



**Figure Three: Trend of Liquidity for the year 2009 – 2019**

Figure four below presents that the mean value of profitability for the 33 non-financial firms listed at the NSE.



**Figure Four: Trend of Profitability for the year 2009 – 2019**

The trend presented shows that they had a generally decreasing trend between 2009 and 2019 with short term minimal up and down periodical movements. The general trend was made up of short term ups in 2012, 2014 and 2017 followed by short term downs in subsequent years.



**Figure Five: Trend of Natural log of Sales for the Year 2010 – 2019**

As presented in figure five above, the general trend in average company sales for the 33 listed non-financial firms was increasing between 2010 and 2015. This has been preceded by periods on slight decline up to 2019.



**Figure Six: Trend of Asset Tangibility for the year 2010 – 2019**

Figure six above presents that on average, asset tangibility for the 33 listed non-financial firms was on a near static trend between 2010 and 2019. There was an increase between 2010 and 2012 then a decline in 2013, then an increase up to 2016 then a decline in 2017. This was followed by an increase up to 2018 and a decline in 2019.

The Baron and Kenny (1986) four steps approach was applied. In the first step, the dependent variable was regressed against the independent variable attributes as presented in Tables 1, 2 and 3 below. The regression model in Tables 1 and 2 below presents Adjusted R2= 0.057, F (3,329) = 7.686, p<0.05. The results of the regression analysis therefore shows that 5.7% of variations in investment cashflow sensitivity to be explained by variations in financial constraints amongst the listed non financial firms and the results are statistically significant (p<0.05).

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| **Table 1: Model Goodness of Fit for Financial constraints and Investment Cash flow Sensitivity** | | | | |
| Model | R | R2 | Adjusted R2 | SE |
| 1 | .257a | .066 | .057 | .16673 |
| a. Predictors: (Constant), Profitability, Liquidity, Leverage | | | | |

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| **Table 2: Model Overall Significance of Financial Constraints and Investment Cash flow Sensitivity** | | | | | | |
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | .641 | 3 | .214 | 7.686 | .000b |
| Residual | 9.062 | 326 | .028 |  |  |
| Total | 9.703 | 329 |  |  |  |
| a. DV: ICFS | | | | | | |
| b. Predictors: (Constant), Profitability, Liquidity, Leverage | | | | | | |

The results as presented in table 3 shows that the relationsip between liquidity and ICFS is positive but non statistically significant (β=0.068, t =1.254, p>0.05). The positive relationship between leverage and ICFS is also not statistically significant (β=0.080, t =1.444, p>0.05). The positive relationship between Profitability and ICFS is statistically significant (β=0.248, t =4.504, p<0.05).

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| **Table 3: Model Regression Coefficients of Financial Constraints and Investment Cash flow Sensitivity** | | | | | | |
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| B | Std. Error | Beta |
| 1 | (Constant) | -.006 | .017 |  | -.369 | .713 |
| Leverage | .075 | .052 | .080 | 1.444 | .150 |
| Liquidity | .004 | .003 | .068 | 1.254 | .211 |
| Profitability | .302 | .067 | .248 | 4.504 | .000 |
| a. Dependent Variable: ICFS | | | | | | |

In the second step, the intervening variable proxied by sales and tangibility of assets were regressed against the independent variable proxied by leverage, liquidity and profitability and the findings are presented in Tables 4, 5, 6, 7, 8 and 9 below.

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| **Table 4: Model Goodness of Fit for Financial Constraints and Sales** | | | | |
| Model | R | R2 | Adjusted R2 | SE |
| 1 | .432a | .186 | .179 | 1.93050 |
| a. Predictors: (Constant), Leverage, Liquidity, Profitability | | | | |

The regression model in Table 4 above and 5 below presents Adjusted R2= 0.179, F (3,329) = 24.871, p<0.05. The results of the regression analysis therefore shows that 17.9% of variations in firm sales may be explained by variations in financial constraints amongst the listed non financial firms and the results is statistically significant (p<0.05).

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| **Table 5: Model Overall Significance of Financial Constraints and Sales** | | | | | | |
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 278.069 | 3 | 92.690 | 24.871 | .000b |
| Residual | 1214.950 | 326 | 3.727 |  |  |
| Total | 1493.019 | 329 |  |  |  |
| a. Dependent Variable: Size Ln Sales | | | | | | |
| b. Predictors: (Constant), Leverage, Liquidity, Profitability | | | | | | |

As presented in Table 6 below, there is a negative results between firm liqudity and sales but statistically significant (β=-0.390, t=-7.705, P<0.05). There is a positive results between firm profitability and sales which is statistically significant (β=0.233, t=4.537, P<0.05) and the results between leverage and sales is negative and statistically significant (β=-0.015, t=-0.295, P>0.05).

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| **Table 6: Model Regression Coefficients of Financial Constraints and Sales** | | | | | | |
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| B | Std. Error | Beta |
| 1 | (Constant) | 22.682 | .202 |  | 112.111 | .000 |
| Liquidity | -.305 | .040 | -.390 | -7.705 | .000 |
| Profitability | 3.527 | .777 | .233 | 4.537 | .000 |
| Leverage | -.178 | .603 | -.015 | -.295 | .768 |
| a. Dependent Variable: Size (Sales ) | | | | | | |

As presented in Table 7 below, 26.9% of variations in asset tangibility is explained by variations in firm financial constraints namely; leverage, liquidity and profitability (adjusted R2 = 0.269).

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| **Table 7: Model Goodness of Fit for Financial Constraints and Tangibility of Assets** | | | | |
| Model | R | R2 | Adjusted R2 | SE |
| 1 | .525a | .275 | .269 | .19400 |
| a. Predictors: (Constant), Leverage, Liquidity, Profitability | | | | |

Table 8 below shows that the regression model is statistically significant in explaining the financial constraints proxied by leverage, liquidity and profitability on one hand and asset tangibility on another hand (F (3,329) = 41.310, p<0.05).

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| **Table 8: Model Overall Significance of Financial Constraints and Asset Tangibility** | | | | | | |
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 4.664 | 3 | 1.555 | 41.310 | .000b |
| Residual | 12.269 | 326 | .038 |  |  |
| Total | 16.933 | 329 |  |  |  |
| a. Dependent Variable: Size asset tangibility | | | | | | |
| b. Predictors: (Constant), Leverage, Liquidity, Profitability | | | | | | |

As presented in Table 9 below, there is a statistically significant positive results between leverage and asset tangibility (β=0.531, t=10.905, P<0.05). There are also positive results between asset tangibility and profitability (β=0.024, t=0.494, P>0.05) as well as liquidity (β=0.014, t=0.295, P>0.05) which are not statistically significant.

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| **Table 9: Model Regression Coefficients of Financial constraints and Asset Tangibility** | | | | | | |
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| B | Std. Error | Beta |
| 1 | (Constant) | .450 | .020 |  | 22.116 | .000 |
| Liquidity | .001 | .004 | .014 | .295 | .768 |
| Profitability | .039 | .078 | .024 | .494 | .621 |
| Leverage | .660 | .061 | .531 | 10.905 | .000 |
| a. Dependent Variable: Size asset tangibility | | | | | | |

In the third step, the intervening variables proxied by sales and asset tangibility are regressed against the dependent variable, in this case, ICFS. The findings are presented in Tables 10, 11 and 12 below.

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| **Table 10: Model Goodness of Fit for Size and Investment Cash Flow Sensitivity** | | | | |
| Model | R | R2 | Adjusted R2 | SE |
| 1 | .257a | .066 | .060 | .16649 |
| a. Predictors: (Constant), Size (asset tangibility), Size (Sales) | | | | |

The regression model in Table 10 above and 11 below presents Adjusted R2= 0.060, F (3,329) = 11.523, p<0.05. The results of the regression analysis therefore shows that 6.0% of variations in investment cashflow sensitivity may be explained by variations in size of the listed non financial firms proxied by asset tangibility and sales. The results is statistically significant (p<0.05).

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| **Table 11: Model Overall Significance of Size and Investment Cash Flow Sensitivity** | | | | | | |
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | .639 | 2 | .319 | 11.523 | .000b |
| Residual | 9.064 | 327 | .028 |  |  |
| Total | 9.703 | 329 |  |  |  |
| a. Dependent Variable: ICFS | | | | | | |
| b. Predictors: (Constant), Size (asset tangibility), Size (Sales) | | | | | | |

The results in Table 12 below indicates that there are statistically significant positive results between ICFS and size proxied by sales (β=0.156, t=2.910, P<0.05) as well as size proxied by tangibility of assets (β=0.197, t=3.679, P<0.05).

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| **Table 12: Model Regression Coefficients of Size and Investment Cash Flow Sensitivity** | | | | | | |
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| B | Std. Error | Beta |
| 1 | (Constant) | -.327 | .098 |  | -3.343 | .001 |
| Size (Sales) | .013 | .004 | .156 | 2.910 | .004 |
| Size (asset tangibility) | .149 | .041 | .197 | 3.679 | .000 |
| a. Dependent Variable: ICFS | | | | | | |

In the fourth step, the interaction term of the independent and intervening variable is regressed against the dependent variable and the results are presented in Tables 13, 14, 15, 16, 17 and 18 below.

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| **Table 13: Model Goodness of Fit for Financial Constraints, Sales and Investment Cash Flow Sensitivity** | | | | |
| Model | R | R2 | Adjusted R2 | SE |
| 1 | .256a | .065 | .057 | .16678 |
| a. Predictors: (Constant), Prof\*Sales, Liq\*Sales, Lev\*Sales | | | | |

The regression model in Table 13 above and 14 below presents Adjusted R2= 0.057, F (3,329) = 7.613, p<0.05. The results of the regression analysis therefore shows that 5.7% of variations in ICFS as explained by variations in the interaction term between financial constraints attributes and sales that proxy size of the listed non financial firms. The relationship is statistically significant (p<0.05).

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| --- | --- | --- | --- | --- | --- | --- |
| **Table 14: Model Overall Significance for Financial Constraints, Sales and Investment Cash Flow Sensitivity** | | | | | | |
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | .635 | 3 | .212 | 7.613 | .000b |
| Residual | 9.068 | 326 | .028 |  |  |
| Total | 9.703 | 329 |  |  |  |
| a. DV: ICFS | | | | | | |
| b. Predictors: (Constant), Prof\*Sales, Liq\*Sales, Lev\*Sales | | | | | | |

Table 15 below indicates that there are statistically significant positive results between ICFS and the interaction term between leverage and sales (β=0.110, t=1.975, P<0.05). The established statistically significant results lead to rejection of the sub hypothesis that the effect of sales on leverage and ICFS relationship in NSE listed non-financial firms is not significant.

The results in Table 15 below presents a non-statistically significant positive results between ICFS and the interaction term between liquidity and sales (β=0.079, t=1.445, P>0.05). The finding of a non-statistically significant results leads to acceptance of sub hypothesis that the effect of sales on liquidity and ICFS relationship in NSE listed non-financial firms is not significant.

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| --- | --- | --- | --- | --- | --- | --- |
| **Table 15: Model Regression Coefficients for Financial Constraints, Sales and Investment Cash Flow Sensitivity** | | | | | | |
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| B | Std. Error | Beta |
| 1 | (Constant) | -.015 | .018 |  | -.808 | .420 |
| Lev\*Sales | .005 | .002 | .110 | 1.975 | .049 |
| Liq\*Sales | .000 | .000 | .079 | 1.445 | .150 |
| Prof\*Sales | .013 | .003 | .239 | 4.359 | .000 |
| a. Dependent Variable: ICFS | | | | | | |

The results in Table 15 above indicates that there are statistically significant positive results between ICFS and the interaction term between profitability and sales (β=0.239, t=4.359, P<0.05). The established statistically significant results lead to rejection of the sub hypothesis that the effect of sales on profitability and ICFS relationship in NSE listed non-financial firms is not significant.

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| --- | --- | --- | --- | --- |
| **Table 16: Model Goodness of Fit for Financial Constraints, Asset Tangibility and Investment Cash Flow Sensitivity** | | | | |
| Model | R | R2 | Adjusted R2 | SE |
| 1 | .376a | .141 | .133 | .15988 |
| a. Predictors: (Constant), Prof\*Tang, Liq\*Tang, Lev\*Tang | | | | |

The regression model presented in Table 16 above and 17 below presents Adjusted R2= 0.133, F (3,329) = 17.863, p<0.05. The results of the regression analysis therefore shows that 13.3% of variations in ICFS are explained by variations in the interaction term between financial constraints attributes and asset tangibility that proxy size for the listed non financial firms. The results are statistically significant (p<0.05).

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| --- | --- | --- | --- | --- | --- | --- |
| **Table 17: Model Overall Significance for Financial Constraints, Asset Tangibility and Investment Cash Flow Sensitivity** | | | | | | |
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 1.370 | 3 | .457 | 17.863 | .000b |
| Residual | 8.333 | 326 | .026 |  |  |
| Total | 9.703 | 329 |  |  |  |
| a. Dependent Variable: ICFS | | | | | | |
| b. Predictors: (Constant), Prof\*Tang, Liq\*Tang, Lev\*Tang | | | | | | |

The results in Table 18 below indicates that there are statistically significant positive results between ICFS and the interaction term between leverage and assets tangibility (β=0.106, t=2.025, P<0.05). The established statistically significant results lead to rejection of the sub hypothesis that the effect of asset tangibility on leverage and ICFS relationship in NSE listed non-financial firms is not significant.

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| --- | --- | --- | --- | --- | --- | --- |
| **Table 18: Model Regression Coefficients for Financial Constraints, Asset Tangibility and Investment Cash Flow Sensitivity** | | | | | | |
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| B | Std. Error | Beta |
| 1 | (Constant) | -.020 | .015 |  | -1.361 | .174 |
| Lev\*Tang | .126 | .062 | .106 | 2.025 | .044 |
| Liq\*Tang | .012 | .005 | .127 | 2.453 | .015 |
| Prof\*Tang | .697 | .106 | .346 | 6.570 | .000 |
| a. Dependent Variable: ICFS | | | | | | |

The results in Table 18 above presents a non-statistically significant positive results between ICFS and the interaction term between liquidity and asset tangibility (β=0.127, t=2.453, P>0.05). The finding of a non-statistically significant results leads to acceptance of sub hypothesis that the effect of asset tangibility on liquidity and ICFS relationship in NSE listed non-financial firms is not significant.

The results in Table 18 above indicates that there are statistically significant positive results between ICFS and the interaction term between profitability and asset tangibility (β=0.346, t=6.570, P<0.05). The established statistically significant results lead to rejection of sub hypothesis that the effect of asset tangibility on profitability and ICFS relationship in NSE listed non-financial firms is not significant.

Considering that sales and asset tangibility proxy size while leverage is an indicator of financial constraints, the first and fourth sub hypothesis findings thus confirms the arguments in literature by Fazzari, Hubbard, and Petersen (1988), Oliner and Rudebusch (1992) and Schaller (1993) that the results between financial constraints and ICFS is affected by size. Generally, larger firms in terms of tangible assets and higher sales turnover have ease of access of external capital especially when turnovers are used to assess ability to borrow and when tangible assets are used as collateral for debt finance. The second and fifth sub hypothesis findings are a departure from the propositions by Bond and Meghir (1994) that size affect firms ICFS. This finding affirms that firm liquidity decisions vary amongst the firms not on the basis of size but on the basis of management conscious choices.

The objective of the foregoing study was to assess the intervening effect of firm size on the relationship between financial constraints and investment cash flow sensitivity of non-financial firms in Kenya. Firm size was measured by two variables namely; sales and asset tangibility. The latter was measured as the ratio of Non-current (fixed) assets to total assets. From the study findings, it is established that firm size in terms of sales and asset tangibility have significant intervening effects on the relationships between leverage and investment cash flow sensitivity as well as profitability and investment cash flow sensitivity of non-financial firms in Kenya. Increased firm size possibly comes with higher positive cash flow sensitivity. The findings infer that firm size in terms of both sales and asset tangibility do not have statistically significant intervening effects on the relationships between liquidity and investment cash flow sensitivity among non-financial firms in Kenya.

The study concludes that firm size as measured by sales and tangibility of assets positively affects the relationship between financial constraints (proxied by leverage and profitability) and investment cash flow sensitivities of firms listed at the NSE and the relationship is statistically significant. However, the effect of the firm size on the relationship between liquidity and investment cash flow sensitivity is not statistically significant. In the presence of firm size as the intervening variable, measures of the independent variable (leverage and profitability) have a statistically significant effect on the investment cash flow sensitivity of non-financial firms listed at the Nairobi Securities Exchange. The findings explain the diversity of the firms listed in NSE with respect to size and profitability levels.

The study suggests that further studies should evaluate the influence of financial constraints and firm size on investment cash flow sensitivities for companies not listed at the Securities exchange and draw comparable inferences or differences thereon. These studies can further be disaggregated by industry to offer more in-depth insight and should not presume linear relationships.

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