

Impact of Cash flow on Investment levels in quoted Nigerian Manufacturing Firms.

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Abstract

This study examines the effect of cash flow on investment levels of quoted manufacturing firms in Nigeria. The objective is to identify if investment is sensitive to internally generated cash flow. The assessment covers the investment levels of 16 listed firms over the period 2004-2008. The OLS results of the study show a significant positive relationship between investment and cash flow, suggesting that investment is affected by the availability of internal finance. The study established that firm size text has significant negative effect on cash flow-investment relationship. The results also show that the industrial classification have varying effect on cash flow-investment relationship. While chemical and paints and building materials have positive effect on investment-cash flow relationship, conglomerates, food, beverages and tobacco have negative effect on the relationship between internally generated funds and investment. However, only chemical and paints had a significant positive effect on the cash flow-investment nexus. Thus, the study establishes among others that investment levels of firms can be affected by the availability of internal finance and industry type and that a misalignment of investment with internal / characteristic factors can be detrimental.

Keywords: Cash flow, Investment, Industry

1. Introduction

Firms are more likely to stumble because of a lack of investment ideas and opportunities than because of poor methods of appraisal. An investment is the current commitment of funds for a period of time to derive a future flow of funds that will compensate the investing unit for the time the funds are committed, for expected rate of inflation, and also for the uncertainty involved in the future flow of funds (Frank and Kelly, 1982). According to Sarkis (1983), investment is the commitment of funds with the expectation of a positive return commensurate with the level of risk assumed. One common thread with the several definitions of investment is the commitment of funds.

The availability of finance is one of the most important factors that constrain a firm's investment (Clarke et al, 1992). Whether firms can secure the funds they need to undertake their profitable investment is an important consideration for growth. Such funds could be externally or internally generated. Funds could be generated externally via equity or debt financing. In real life, the capital market is not perfect due to the presence of information asymmetries. As a result, economic agents are not equally well informed; consequently, outside investors will ask for a premium to purchase a firm's equity. Prospective investors are only willing to purchase shares in the firm except at a reduced price (Schiantarelli, 1996). Oliner and Rudebusch (1996) argue that this conflict of interest increases the cost of external finance. On the other hand, due to information asymmetries in debt financing, lenders may only fulfill a part of borrowers' requirements for loans. Such credit rationing is done to mitigate risks and inherent information asymmetries. As such, firms become less accessible to external funds. In this light, profits gained from previous investments would have to be retained in order to smooth future investment activities. As a result, investments become very sensitive to availability of internal funds flow since internal funds may be less costly than external funds (due to financing constraints).

Presently, accounting researchers at the local level have not made any significant contribution to the debate on whether cash flow has effect on investment of firms. Finance literature in advanced economies like America and Europe tend to demonstrate evidence of the impact of cash flow on corporate investment. These economies have viable investment climates and vibrant stock markets. However, the economy of African countries and Nigeria in particular significantly differs from advanced countries. The capital markets are almost in a state of disrepair and are at contrast to that found in the America and Europe. Nigeria makes a good case for examining the impact of cash flow on investment. First and foremost, empirical studies indicate that the Nigerian capital market is imperfect (Oludoyi, 1999; Adelegan, 2006). Second, access to credit has been ascertained as the most critical problem facing the country (World Bank, 2007). This is associated with credit and capital rationing coupled with

discrimination in the credit market. Potential savers would demand high-risk premiums as compensation from borrowers with low net worth who are usually regarded as high credit risks. According to Inanga (1999), the cost of external finance to such borrowers compels them to fall back on internal finance to fund investments.

This study is poised at unfolding the impact of cash flow as an internally generated source of funding to investment opportunities in Nigerian firms. The results of the study would be far-reaching and instructive. It will be useful for policy makers to ascertain the effects of financial constraints on firms' investment. It would as well provide useful information to management on issues of liquidity, financial flexibility and present cash flow levels as possible early warning signal to the health of operating firms.

2. Review of Prior Literature and Hypotheses Development

An issue that is arguably the central issue in corporate finance is the interaction between investment and internally generated cash flow (Lewellen and Lewellen, 2013). In a strictly neoclassical world, cash flow does not belong in an investment equation. However, empirical studies have invariably significantly associated cash flow to investment; though both the strength of the relationship and its cause are the subject of much debate.

The relationship between investment and cash flow has had a turbulent history. According to Carpenter and Guariglia (2003), the interpretation of the correlation between cash flow and investment is highly controversial. Some have argued that it is as a result of financial constraints, others by the correlation between cash flow and investment opportunities that are not properly measured by Tobin's Q. The use of Q is based on the idea that investment opportunities, which are forward looking, can be captured by equity market participants who are also forward looking. The Q theory is a theory of investment behavior developed by the U.S economist James Tobin in 1969. The theory commonly referred to as the Tobin's q theory purports to relate the market value of shares issued by a company to the replacement costs associated with the company's assets. The higher Q is, the cheaper it should be for firms to raise funds by, say, issuing equity, and thus the less important cash flow should be as a constraint on investment (Abel and Olivier, 1986). The theory explains the observed trends in investment. Tobin (1969) reasoned that firms would accumulate more capital when $Q > 1$ and should draw down their capital stock when $Q < 1$. In other words, net investment in physical capital would depend on where Q is in relation to one. The U.S economist in his Q theory argued that once measured, Q should be a sufficient statistic for investment.

Several studies that have focused on the predictors of investment have utilized Tobin's Q as proxy for investment opportunities of a firm (Gugler, Mueller and Yurtoglu, 1997). Carpenter and Guariglia (2003) regress investment on Q and cash flow and find that although cash flow affects investments of both large and small firms, its effect is stronger for small firms. Devereux and Schiantarelli (1990) used an expanded version of the q model used by Fazzari, Hubbard and Petersen (1988) wherein they incorporated a cost of debt increasing in the level of debt. Their main finding was that cash flow is particularly important for smaller and infant firms. Bond et al (2003) present evidence that the investment of U.K firms is more sensitive to cash flow fluctuations than the investment of firms in the continental European countries. Their results are based on estimates of investment equations for four European countries (Belgium, France, Germany and U.K). Fazzari et al (1988) 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. Kaplan and Zingales (1995) are perhaps the best known critique of the cash flow constraint arguments. In their study which investigated the same firms identified in Fazzari et al (1988) found that only a small percentage of these firms had difficulty financing their investment whether from internal or external sources. In 2001, a study by Allayanis and Muzumdar (2001) showed that negative cash flow observations may have a distortionary impact on estimated investment –cash flow sensitivities. They observed that when firms incur cash losses, investments are down to their lowest possible levels and investment-cash flow sensitivity becomes extremely low. Gugler et al (1997) estimate investment using a measure of marginal Q while examining the possible relationship between cash flow and investment. In a related study in Trinidad and Tobago, Matthias and Ibrahim (2003) while examining the impact of cash flow on corporate investment documented a strong positive relationship between investment and internally generated funds (cash flow) which suggest that the financial and real decisions of listed firms are not independent.

This study seeks to clarify the role of cash flow on investment opportunities. We utilize Q as proxy for expectations reflecting the firm's insiders' evaluation of opportunities and future new investment projects. Thus, the following hypothesis is stated in null form:

H_1 – Cash flow has no significant effect on the investment levels of quoted manufacturing firms in Nigeria.

Firms' size has been used as an indicator of access to external finance (Gertler and Gilchrist, 1994). Mizen and Vermeulen (2005) argue that small firms have less collateral making them less likely to attract external finance. As such these firms tend to rely mostly on internally generated funds. According to Schaller (1993), small firms and those that do not belong to a corporate group in Canada are more sensitive to cash flow than others. In their seminal study, Fazzari et al (1988) point out that when they split samples according to size, small firms have

relatively low cash flow coefficients. Chatelain et al (2003) in a cross country study of Germany, France, Italy and Spain find a significant larger effect of cash flow on investment for smaller firms only in the Italian case. This study hypothesizes in null form that:

H₂ – Firm size has no significant effect on the cash flow- investment relationship of quoted manufacturing firms in Nigeria.

A new literature has emerged, making use of industrial characteristics to determine whether these features are responsible for changes in the cash flow – investment sensitivity. Dedola and Lippi (2005) have in their study shown that industries with characteristics such as greater investment intensity are more likely to show greater sensitivity of changing cash flow levels because their ‘cost side’ is more sensitive to the real cost of capital. Barth and Ramey (2000) have linked the differential effects of cash flow fluctuations arising from monetary policy shocks to the impact of ‘cost’ and ‘demand influences which are connected to the exposure of particular types of industries to these influences. This study thus hypothesizes in null form that:

H₃ – Industrial structure has no significant effect on the cash flow-investment relationship of quoted manufacturing firms in Nigeria.

3. Methodology

3.1 Population and Sampling

This study focuses exclusively on selected manufacturing firms within the four major industry groups as classified by the Nigerian Stock Exchange and the Corporate Affairs Commission. A filter is employed to sieve study firms. These firms must have filed their annual reports within the last ten years to be selected. In addition, the companies must have all the accounting and market data required for the study period 2004-2008. These restrictions place a limit on the number of firms qualifying for investigations. Thus the data set covers 16 manufacturing firms from the Foods, beverages and Tobacco, Building materials, Chemicals and Paints and Conglomerates. Manufacturing firms are the focus of this study because of their importance in the growth and development of the Nigerian economy and also because of their aggressive investment cycles and dependency on internally generated revenues.

3.2 Data Source

Data is obtained mainly from annual reports and accounts of sample companies for the period 2004 to 2008. Market prices are also extracted from daily official listing of Nigeria Stock Exchange.

3.3 Model Specification

We utilize the ordinary least square (OLS) method of multiple regressions in testing the relationship that exists between cash flow and investment activities.

The following specification is employed:

$$TQ_{it} = b_0 + b_1CF_{it} + U_{it} \dots\dots\dots (1)$$

Where TQ_{it} = Tobin’s Q (A proxy for level of investment for firm i at time t)

CF_{it} = cash flow for firm i at time t

U_{it} = error term.

To control for the effect of Size, a firm size variable is introduced as follows:

$$TQ_{it} = b_0 + b_1CF_{it} + b_2FS_{it} + U_{it} \dots\dots\dots (2)$$

Where TQ and CF remain in definition as in equation 1

FS = Firm Size

Industrial structure is also incorporated into the model in a third equation as follows:

$$TQ_{it} = b_0 + b_1CF_{it} + b_2IND_{it} + U_{it} \dots\dots\dots (3)$$

Where TQ and CF remain in definition as in equation 1

IND = Industrial Structure/ Classification.

3.4 Measurement of Variables

Tobin’s Q is measured along the line of Koo and Maeng (2005) as the ratio of book value of total debt and market capitalization to replacement cost of total assets.

Cash flow is measured as operating income plus depreciation. We measure cash flow as operating income rather than net income because net income includes extraordinary income components unrelated to usual operations and is severely subject to manipulation in Nigeria.

Firm Size is captured as the natural logarithm of total assets of the firm. We use the logarithm because of the widely varied values of assets and in a bid to mitigate heteroscedasticity.

This study captures industrial structure/ classification as a dummy variable which assumes the value of one (1) for the industry under consideration and zero (0) for the remaining industries.

4. Results and Discussion

Using the Statistical Package for Social Sciences (SPSS) Version 16.0, the regression results of the relationship

between cash flow and investment of sample firms (equation 1) is as shown below:

Table 1 Model Summary

Model	R	R square	Adjusted R Square	Std. error of the estimate
1	.916 ^a	.838	.836	423.17568

- a. Predictors: (constant), Cash flow
- b. Dependent variable: Tobin's Q

Table 2 Anova^b

Model	Sum of squares	df	Mean square	F	Sig
	7.234E7	1	7.234E7	403.957	.000 ^a
Residual	1.397E7	78	179077.658		
Total	8.631E7	79			

- a. Predictors: (constant), Cash flow
- b. Dependent variable: Tobin's Q

Table 3 Coefficients

	Unstandardized coefficients		Standardized coefficients		Sig
	B	Std.error	Beta	t	
(constant)	90.953	49.077		1.853	.068
Cash flow	.003	.000	.916	20.099	.000

- a. Dependent variable: Tobin's Q

The coefficient of determination is 0.84. In other words, 84% of the changes in investment level (Tobin's Q) are explained by the regression plane. The model is well-fitted. The F statistic was found to be significant at 1% level. Table 3 shows that cash flow has a positive significant impact on investment levels of study firms. This result provides evidence for the rejection of hypothesis that cash flow has no significant effect on the investment of quoted manufacturing firms in Nigeria. In other words, the higher the cash flow, the higher the investment level of the firm. Our result corroborate the findings of Kaplan and Zingales (1995), Lamont (1997) and Schnure (2000) who document a strong positive relation between cash flow and investment. However, our findings contravene those of Allayanis and Muzumda (2001) who found a negative relation between investment levels and cash flow. Regression results of the second equation which examines the effect of firm size on the cash flow –investment relationship are as follows:

Tables 4, 5 and 6 show the regression results of the relationship between cash flow and investment after controlling for the effect of firm size.

Table 4 Model Summary

Model	R	R square	Adjusted R Square	Std. error of the estimate
1	.932 ^a	.869	.866	382.91731

- a. Predictors: (constant), Cash flow, Firm Size
- b. Dependent variable: Tobin's Q

Table 5 Anova^b

Model	Sum of squares	df	Mean square	F	Sig
	7.502E7	2	3.751E7	255.813	.000 ^a
Residual	1.129E7	77	146625.667		
Total	8.631E7	79			

- a. Predictors: (constant), Cash flow, Firm Size
- b. Dependent variable: Tobin's Q

Table 6 Coefficients

	Unstandardized coefficients		Standardized coefficients		Sig
	B	Std.error	Beta	t	
(constant)	1003.684	218.144		4.601	.000
Cash flow	.003	.000	.923	22.366	.000
Firm Size	-242.228	56.680	-.176	-4.274	.000

- a. Dependent variable: Tobin's Q

Results show a strong negative relationship between investment and firm size while cash flow effect remains statistically and negatively significant at 1% level (in line with the prior expectation). These results provide

evidence for the rejection of the second null hypothesis that firm size has no significant effect on the cash flow-investment relationship of study firms. The proportion of the total variation in firm's investment explained by the regression plane as reported in Table 4. Precisely, the coefficient of determination is about 87% which is an improvement on the first model. The model is well fitted and its overall significance is guaranteed by the significant F statistic at 1% level. Implications of the negative relationship between Tobin's Q and firm size could be explained by the fact that newer and younger firms are more sensitive to cash flow and hence have often invest less in order to reduce financial constraints and grow in size. On the other hand, matured firms tend to invest less in order to sustain already attained positions and sizes. Also, smaller firms usually have less collateral making them unable to access external fund. Our results support the findings of Gertler and Gilchrist (1994); Matthias and Abraham (2003) who document negative relationships between firm size and investment levels. Equation 3 examines the effect of industrial classification on cash flow-investment relationship. Specifically, four industrial structures under the Manufacturing sector are examined by this study. The table below presents regression results.

Table 7 Regression Model 3 Results (Tobin's q, Cash flow and Industrial Classification)

		Coefficients							
	Classification	R	R-square	Constant	Cash flow	Dummy Variable	Sig	Remark	
Model 3a	CONGLOMERATES	.917a	0.840	119.567	0.003	-106.864	0.337	Not Sig	
Model 3b	FOOD, BEVERAGES AND TOBACCO	.918a	0.843	137.441	.003	-174.714	0.114	Not Sig	
Model 3c	CHEMICAL AND PAINTS	.922a	0.851	18.060	0.003	273.543	0.012	Sig	
Model 3d	BUILDING MATERIALS	.916a	0.838	89.081	0.003	9.378	0.939	Not Sig	

Results show that cash flow coefficient for the four industries remain the same. This implies that the investment levels of the four industrial structures are not sensitive to fluctuations in cash flow. However, the classification coefficient for the industries widely varied. The industrial structure coefficient for chemical and paints is higher than that of building materials by 29 times. This indicates that firms in chemical and paints are more significantly affected by the investment –cash flow relationship. It is important to note that although the coefficient for conglomerates, food, beverages and tobacco and building materials are not significant, there was a slight improvement in R square values indicating that their inclusion in the model have incremental explanatory power.

5. Conclusion

This study used three independent variables (cash flow, firm size and industrial classification) for the purpose of predicting investment- cash flow relationship. A significant positive relationship between investment and cash flow was documented. This suggests that the investment level of study firms is predicted by the availability of internal finance. The second model also revealed that firm size has a significant negative effect on cash flow-investment relationship of study firms. As such as firms grow bigger in size, they have less need for internal investment funds. The third regression model results show that there exists a positive impact of the chemical and paint industry on the investment level while other industries showed an insignificant relationship. A possible explanation for this could be that nature of firms in the chemical and paints which are mostly indigenous. They are smaller in size in relation to the conglomerates, food, beverages and tobacco industries and would as found from regression equation 2 need to invest more so as to reduce financial constraints and grow in size.

This study clearly establishes that investment levels are affected by the availability of internal finance and that smaller firms are motivated to invest more. We also document that the industry type plays a crucial role in determining investment levels. In view of these findings, we emphasize that it is important that managers consider investment initiatives in the light of the firm's corporate abilities. Managers should understand that a misalignment of investment with internal/ characteristic factors can be detrimental. Size and Industry type of firms are salient characteristic features that must be put into consideration while undertaking investment strides and decisions involving internal funds availability.

Future researchers might need to incorporate other industries/ sectors into this heated finance debate and also possibly extend the study period while employing long and short term sources of finance. It may also be useful to determine whether significant relationships emerge or change as longer term financial information is brought

to bear.

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