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Cash flow and capital investment: Empirical evidence of firms in services and consumer goods sector

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Abstract

This paper explores the relationship between cash flow and capital investment of a firm. Using a panel of Nigerian publicly quoted firms in the services and consumer goods sectors, we found that cash flow is insignificantly related to capital investment. This observed insignificant relationship is stronger in episodes where we have a sub-sample of younger firms. The younger firms recording insignificant relationships revealed that these firms cannot easily access external funds when there is a cash flow shortfall because of their low level of experience in their socio-economic networks. On the evidence of older firms, the study shows that when there is a cash flow shortfall for older firms, these firms may face difficulties in financing their investment with internal sources of funds; though, these firms can easily access external funds because of their level of experience in socio-economic networks. The results provide support that internal and external sources of funds can be substituted perfectly for experienced firms.

Keywords: Capital investment; Internal finance; Cash flow; Debt ratio; Growth opportunity

1. Introduction

Nigerian firms from diverse sectors have recorded considerable growth, though; the significant impact of firms from the services and consumer goods sectors on the huge population of the country cannot be undermined. Industrialisation in most advanced economies followed a three-stage process of agriculture, industry, and services. Nigeria has evolved in this same pattern, as declining shares of output and employment in agriculture have been absorbed by the services and consumer goods sectors. The services and consumer goods sectors, which have the highest employment elasticity, are also capable of contributing the highest percentage of output. The GDP contribution of these sectors as of 2017 was 57% (CBN, 2017).

Maintaining this potential and taking advantage of the growth opportunity in these sectors will however require keen capital investment by various corporate entities. Firms with value-increasing investment opportunities have a greater incentive to maintain internal finance that will sustain their competitive positions (Chen & Chuang, 2009). Corporate governance issues prevalent in many firms in Nigeria have hindered the free flow of this incentive. Afza and Mirza (2010) argue that increasing firm incentives for cash savings out of free cash flows will exhibit the presence of value-increasing investments and financial constraints, which will in turn reduce the payout ratio of the firm if that access to external finance is restricted to a certain level.

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A retention decision is expected to bear little if that decision is not informed by the firm's growth opportunities. Essentially, retention decisions will be directly related to benchmarked investment activity around the date of the sale, given the personal benefits of proceeds reallocation by the manager (Bates, 2005). In the work of Bunn and Young (2004), firms obtain their investment capital through the retention of earnings and distribute residual funds as dividends rather than using new equity as the marginal source of finance. Firms avoid using an external funding mix whenever internal funds are available; hence, firms adjust their dividend payout ratio in consideration of their investment opportunities and cash flow (Shahjahanpour, Ghalambor, & Aflatooni, 2010). Chen and Chuang (2009) claimed that shareholders can be free of concern about the agency problem of excess cash that grants firms the privilege to hold high levels of cash to undertake high-return investment opportunities if the corporate governance structure of the firm can protect the interests of shareholders.

In a similar note, firms preference for internally generated funds over external funding is a reflection of low income distribution as dividends (low payout ratio) and high retention ratios (high retained earnings), consequently a low leverage ratio of the firm. Myers (1984) posits that since target dividend payout ratios are sticky and investment opportunities fluctuate relative to internal cash flow, the firm will from time to time exhaust its ability to issue safe debt. Firms' cost disadvantage of external finance determines the magnitude of the effect of the retention practices on their investment behaviour. This implies that high cost disadvantage will result in the greatest effect on firms that retain most of their income, while slight cost disadvantage would result in a lesser effect (Fazzari, Hubbard & Petersen, 1987).

The bankruptcy costs theory pleads for an adverse relation between the dividend payout ratio and debt ratio. Low dividend payout means an increase in the internally generated funds (retain earnings) and low exposure to financial distress (Baral, 2004). Harford, Klasa, and Maxwell (2014) posit that firms hold larger cash holdings to reduce refinancing risk related to shorter maturity debt, and if a firm is forced to refinance its debt at a considerably higher rate of interest, large cash reserves could enable the firm to mitigate adverse effects emanating from this. The authors assume that cash holdings could enable the firm to undertake investment in growth opportunities, and if a firm is unable to obtain refinancing funds, large cash holdings could allow the firm to avoid selling off key assets to call off maturity debt. A large cash holding is also assumed to reduce the likelihood of an inefficient liquidation of the firm in case of firm liquidation.

Retention decisions will be directly related to the firm's cash reserves and free cash flow prior to the sales, given management's tendency for liquidity and their private incentives that are largely absolute (Bates, 2005). Harford, Klasa, and Maxwell (2014) proclaim that higher cash holdings could increase the likelihood that lenders would offer a firm a shorter-term loan, and the firm's tendency to accept such a loan offer depends on the cash holding positions of the firm to mitigate refinancing risk. Cash holdings and debt maturity are likely endogenously determined. On a similar note, Denis and Sibilkov (2010) assert that cash holdings can be a valuable source of funds for many firms when other sources of funds, including cash flows, are inadequate to satisfy firms' demand for capital. This implies that the availability of cash holdings for firms facing external financing constraints helps the firms fund their necessary investment expenditures.

The frictions, which are the section between internal and external costs of capital created by information asymmetry, can attribute to firms with greater information asymmetry about their investment opportunities to hold more cash (Gao, Harford & Li, 2013). In addition, the intertemporal trade-off between current and future investments gives constrained firms the incentives of precautionary savings, especially when there is an indication that future cash flow risk cannot be fully diversifiable (Han & Qiu, 2007). Gao et al. (2013) assert that financing frictions lead firms to have a precautionary demand for cash holdings.

These arguments confirmed with intuition that because of managers' incentives to reduce firm risk and their discretion, they have a higher appetite for cash holdings. This higher appetite for cash holdings can lead managers to place too much importance on the precautionary motive for holding cash (Opler, Pinkowitz, Stulz & Williamson, 1999). Chen and Chuang (2009) contradict the position that corporate cash holdings are functions of the investment environment and that the impact of effective corporate governance on cash holdings also depends on the investment opportunities of a firm. In a similar argument, Bond and Meghir (1994) stress that the effect of the availability of internal funding on investment decisions is built on the position that the cost at which investment funds can be obtained is the only financial consideration that matters in the determination of investment. It is therefore, against these premises, that the study sought to examine the effect of cash flow on capital investment of firms in services and consumer goods sectors listed on the Nigeria Stock Exchange (NSE). The paper is organised as follows: Section 2 outlines possible theoretical links between cash flow and capital investment and reviews existing empirical studies. Sections 3 discuss the empirical design, and section 4 reports the empirical results from a panel data analysis. Finally, Section 5 presents the conclusions.

2. Literature Review

Extant literature asserts that there is a significant relation between cash flow and investment expenditure of many firms holding investment opportunities constant and also given that external finance will be differentially available to many firms (Caloiniris & Hubbard, 1988). Since profits are highly cyclical and investment is a function of the availability of profits, the investment of a firm will have greater sensitivity to fluctuations in economic activity than would otherwise be the case (Bond & Meghir, 1994). Though the credit restrictions to some classes of firms are a function of contract equilibrium, the severity can differ significantly with respect to financial turbulence. The level of external funding of many firms depends on the distribution of internal finance, aggregate net worth positions, and feasibility of the investment (Caloiniris & Hubbard, 1988).

Demarzo, Fishman, He, and Wang (2012) assert that value-increasing investment decisions can be compromised by frictions in external financing; hence, one important source of financial market frictions encompasses agency problems. The relationship between cash flow and investment should not occur under the null hypothesis that company investment expenditures are not affected by financial constraints. In addition, the excessive sensitivity of investment expenditures to cash flow is attributed to the importance of financial constraints (Bond, Elston, Mairessea & Mulkay, 2003). Almeida and Campello (2006) argue that the link between capital spending and cash flows is not monotonic in the firm's asset tangibility. Underinvestment theory advocates for a connection between cash flow and investment as well as subsequent cash flow and earnings levels (Minton, Schrand & Walther, 2002).

Financing hierarchy models argue that the availability of internal funds grants the firm the chance to carry out investment opportunities without the need to resort to external funding that attracts high financing costs. Apparently, given that greater internal cash flow enhances a firm's balance sheet and net worth positions, which in turn result in a lower cost of new debt, firms seek debt at the margin that leverages internal cash flow growth realisation (Fazzari, Hubbard & Petersen, 1987). The above assertion is an indication of the effect of cash flow on the investment decisions of a firm, given that the cost of capital differs by source of funds.

Financing hierarchy theory assumed a varying cost for internal and external sources of funds, owing to the fact that external finance from either debt or equity issues may be more expensive than internal finance from retained earnings (Bond & Meghir, 1994). Supporting the position of Ismail, Ibrahim, Yusoff, and Zainal (2010) that the presence of a financing hierarchy is an indication that internal and external sources of funds are not perfect substitutes given the existence of financial constraints in the market. Information asymmetries and agency problems are the two significant sources of financing hierarchy.

In the spirit of Fazzari et al. (1987), due to the financing hierarchy, in which internal finance has important cost advantages over external finance, investment expenditures of a firm are a function of cash flow. This theory assumes that firms with higher financing deficits are expected to hold a low quantum of cash and that firms with a longer cash conversion cycle are expected to hold more cash (Bates, 2005). This is an indication that more cash is held in the presence of longer cash conversion cycles and when the firm has a financing surplus or a lower financing deficit. In principle, higher levered firms as well as firms with higher net working capital are expected to hold less cash, confirming the general wisdom that cash can be considered a negative debt and net working capital can be considered a valid cash substitute (Bates, 2005). In the opinion of Dudley and James (2015), contracting cost explanations assume that debt may be costlier to issue when cash flow volatility is high, supporting the argument that constrained firms hoard the proceeds from debt capital issued when volatility is low but spend the proceeds from debt capital issued during the period of high volatility.

According to Fazzari et al. (1987), some firms do not have sufficient access to external capital markets to enable them to respond to changes in the cost of capital, asset prices, or tax-based investment incentives. To the extent that investment expenditures of these constrained firms highlighted above may be sensitive to the availability of internal finance. This shows that investments may display excess sensitivity to movements in cash flow. Supporting the assertion that firms with higher costs of external funds will have lower investment (Minton & Schrand, 1999).

Underinvestment is essentially when firms with cash flow shortfalls (insufficient internally generated cash flow) reduce investment in growth opportunities as a result of the cost (expensive) of external financing (Gay & Nam, 1998). Firms with high growth opportunities apparently should be financed with equity sources, which in turn reduces agency costs. In support of the arguments that financing decisions seem to be a function of firms' growth opportunities, Booth, Aivazian, Demirguc-Kunt, and Maksimovic (1999) advocate that highly profitable slow-growing firms should generate the most cash, but less profitable fast-growing firms will need significant external financing. Myers (1984) confirmed that firms holding valuable intangible assets or growth opportunities tend to borrow less than firms holding mostly

tangible assets. On this note, firms with high growth opportunities not financed by equity effectively transfer dividends from stockholders to debt holders.

The use of debt is limited in firms with growth opportunities, as in the case of bankruptcy, the value of growth opportunities will be close to zero. Chang, Chen, Hsing, & Huang (2007) affirm that the investment opportunities hypothesis postulates that secured debt financing is more valuable for issuing firms with high growth opportunities. Debt overhangs underscore the fact that investment frequently leads to external benefits that accrue to the debt-holders of the firm. These external benefits consequently lead managers that have equity claims to undertake investment decisions to internalise only part of investment benefits and thus underinvestment relative to the level that maximises the total value of the firm (Diamond & He, 2014). In conformism, Chang, Chen, Hsing, and Huang (2007) proclaim that firms may experience underinvestment problems due to a lack of motivations to employ fresh capital to undertake value-increasing investment opportunities where returns are mainly captured by bondholders. Though cash holdings ease the risk of future underinvestment, this requires a liquidity premium because of possible suboptimal investments (Disatnik, Duchin & Schmidt, 2014).

In an imperfect market, given the presence of transaction costs and asymmetric information, a financial source tends to impact the real investment decisions of a firm, which gives rise to underinvestment or overinvestment problems (Aivaziana, Ge & Qiu, 2005). Overinvestment is investment expenditure in access of that necessary to maintain assets in place and to finance expected new investments in positive NPV projects. The relationship between positive free cash flow and overinvestment is expected to be asymmetric given that firms with negative free cash flow are forced to go for alternative sources of funds to undertake investment projects, which are assumed to serve as an additional monitoring role in disciplining managerial use of funds (Richardson, 2006). This is an indication that in a firm without free cash flow, the likelihood of the occurrence of overinvestment is eliminated, as the firm is left with no option but to access external markets for capital rising to undertake additional investment.

Chang et al. (2007) argue that free cash flow is a function of investment opportunities of a firm because firms with relatively few growth opportunities are more likely to have free cash flow. Hence, this will in turn result in the overinvestment problem that shareholders' wealth will not be maximized. Agency cost theory advocates that this problem can be mitigated by binding managers to payout future cash flows. In the work of Almeida, Campello and Weisbach (2011), whether a constrained firm underinvests or overinvests in liquid assets in relation to unconstrained firms in frictionless capital markets is a function of the relative strength of current versus future constraints and also the profitability of current versus future investment opportunities. On the same view, Chang et al. (2007) assert that firms need to be aware that while the issue of secured debt mitigates the underinvestment problem, it may in turn create an incentive for overinvestment.

3. Empirical design

3.1. Research method and variable definition

This study examines the effect of cash flow on capital investment of firms in Nigeria. By controlling for firm-specific factors, the study considered the effects of leverage, growth opportunity, and firm age on capital investment. To mitigate the possible problems of heterogeneity and the adjustment delay of cash structure, this study employed panel data estimations. For the dependent variable (capital investment) and independent variable (cash flow), the following are the definitions of the variables.

3.1.1. Capital investment and cash flow variable

Capital investment is investment expenditures (capex) in capital assets for a given accounting year. Capital investment is long-term expenditures distinct from operating expenditures (opex). Most of the capital expenditures are investments in tangible assets. Tangible assets strengthen the borrowing power, which in turn gives room for further investment in tangible assets. Hence, firms with more tangible assets may have greater access to external funds because tangibility eases contractibility problems as it increases the value that can be recaptured by investors in default states (Almeida & Campello, 2006). Capital investment is a proxy for capital expenditures divided by total assets.

Cash flow is defined as the firm's quarterly operating cash flow (Minton & Schrand, 1999). Cash flow can also be defined as the earnings position of a firm (Hubbard, 1998; Calomiris & Hubbard, 1995; Devereux and Schiantarelli, 1990). Cash flow creates information acquisition costs. High cash flow reduces the firm's debt capacity but increases the option value for shareholders and thus makes them more reluctant to default on their debt obligations. While a reduction in cash flow of a firm increases the systematic risk of the firm. Cash flow is the driving force of asset acquisitions, which raises

the liquidity of the assets and the conventional value of the assets. Lagged net earnings for the period were used as a proxy for cash flow in our estimation.

3.1.2. Firm-specific control variables

Total debt ratio is the aggregate fixed-charge external capital employed by the firm to finance assets. It measures the proportion of a firm's total assets that are financed with creditors' funds. Total debt ratio indicates a firm's risk exposure and its' vulnerability to bankruptcy. A firm that is highly levered apparently has high volatile net profit. Thus, the total debt ratio influences the rate of return for an investment relatively to the magnitude of unsystematic risk. It encompasses short-term and long-term debts divided by total assets.

Growth opportunity is a value-increasing investment that has the potential to grow the earnings position of a firm. That is, an opportunity for a firm to invest in profitable projects. New investments are often presented to a firm as growth opportunities. If future growth extending today's investment will not occur, current investment is less attractive (Diamond & He, 2014). Growth opportunities are an important factor in agency cost theory, as the transfer of wealth can cause the shareholders to turn down value-increasing investment opportunities (Booth et al., 1999). Growth opportunity is a proxy for the yearly growth rate in a firm's sales.

Also, a firm's age as one of its specific characteristics was included as a control variable in the study. The firm's age was measured as the log of the number of years since inception to the date of observation. Majumdar and Chhibber (1999), citing the work of Stinchcombe (1965), affirm that older firms can acquire experience-based economies and mitigate the liabilities of newness.

3.2. Data and sample selection

The panel data are from annual reports and statements of accounts of publicly quoted firms in Nigeria. The sample contains services and consumer goods sector firms listed on the Nigerian Stock Exchange from 2006 to 2017. The initial collection includes firms listed in these two sectors as of 2017, producing 552 firm-year observations. After eliminating missing values, the sample size decreases to 336 firm-year observations.

3.3. Statistics description and correlation analysis

The results in Table 1 report the descriptive statistics of all variables employed in the study. The average capital investment in the sample accounts for 39.30% of total investments. This indicates that the average firm invests over 39.30% of their asset value each year in capital assets. This invariably is an indication that a high proportion of asset value was employed in capital expenditures (CAPEX). For instance, for every ₦1 net investment, ₦0.39 was employed in capital investment within this period. The maximum and minimum of 91.18 and 0.56 for capital investment, respectively, indicated high variation in investment in these outlays within the period under study. Though the standard deviation of 21.72 for capital investment is almost half of the mean, it implies that capital investment is less volatile.

Table 1 Summary Statistics

Variable	Mean	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
Capital investment	39.300	91.182	0.563	21.722	0.011	2.266
Cash flow$_{t-1}$	-6.288	4633.333	-2100.000	387.034	5.130	76.217
Total debt ratio	62.003	305.801	12.424	26.754	3.131	26.993
Growth opportunity	167.180	46432.53	-90.702	2653.788	17.401	303.865
Firm age	3.599	4.543	0.693	0.617	-1.693	6.43169

The negative average of 6.29 for lagged cash flow revealed relatively instability among the sample firms within the period of study, which is an indication of average decline earnings of ₦6.29. This is an indication of high volatile earnings among the sample firms within this period, which was observed in the standard deviation many times the mean and also the maximum of 4,633.33 and the minimum of -2,100.00. These volatile earnings were relegated to external funding, resulting in an average of 62% for the total debt ratio. This proportion is an indication of a high leverage ratio, which implies that 62% depletion in assets of Nigerian firms will affect bondholders' funds since owners stakes in the firms cover only 38% of the firm's assets, thus contributing to high agency costs and reorganisation costs. And the

leverage ratio of our sample firms within this period recorded a high discrepancy when the maximum of 305.80 was compared to the minimum of 12.42.

The firms' growth opportunity with the mean of 167.18 is an indication that our sample firms have a chance of growing every ₦1,000.00 invested capital in value-increasing investment opportunity by ₦167.18, which reflects market expectations of strong growth opportunities for firms in the services and consumer goods sectors. This observed high growth opportunity can be deduced as one of the reasons for the high average total debt ratio since our sample firms need to substitute internal cash flow that remained low with external capital to reduce underinvestment problems. Although this growth opportunity varies highly among the years of the study, the maximum and minimum recorded respective values of 46,432.53 and -90.702 and the standard deviation more than ten times the mean indicate strong volatility. However, firm age revealed a mean of 3.60, which implies that the average of experience of our sample is 3.6 years in their operations in the services and consumer goods industries, indicating a slight possibility to mitigate the liabilities of newness. But firm age among the firms recorded minor variation as depicted in maximum and minimum values of 4.54 and 0.69, respectively. The insight for the slight volatility was confirmed with the standard deviation more than ten times below the mean.

The positive value of Skewness for our data set revealed that the data points are skewed to the right of the data average, except for firm age with negative Skewness, which implies that data points are skewed to the left of the data average. Apparently, the variables indicated that the data are normally distributed, except for capital investment, and that the data are not normally distributed as a result of sets of data not balanced by normal distribution (skewness of zero). Confirming the above insight, Kurtosis results in Table 1 showed that the variables are normally distributed, which revealed a symmetric distribution with well-behaved tails excluding capital investment with a less than expected value of 3, indicating that a symmetric distribution is not well-behaved. Although kurtosis confirmed that all the variables are heavily-tailed distributions with positive expected values.

Table 2 Correlation

Variable	Capital investment	Cash flow	Total debt ratio	Growth opportunity	Firm age
Capital investment	1				
Cash flow$_{t-1}$	-0.082	1			
Total debt ratio	0.217	-0.025	1		
Growth opportunity	-0.043	-0.058	-0.038	1	
Firm age	0.091	0.015	0.229	-0.007	1

The result of the correlation for the variables is reported in order to examine the correlation between capital investment and explanatory variables (cash flow and firm-specific control variables). The results show that there are mixed outcomes between capital investment and explanatory variables. Specifically, capital investment recorded negative relations with cash flow and growth opportunity, while capital investment turned out to have positive relations with debt ratio and firm age. The observed negative link between capital investment and cash flow was relegated to the observed high average total debt ratio (see table 1) since our sample firms need to substitute internal cash flow that remained low with external capital to reduce the underinvestment problem. Though high observed average growth opportunity (see table 1) was not significantly exploited with external finance, resulting in a negative correlation between capital investment and growth opportunity.

4. Empirical results

This study employs two model specifications: model (1) examines the effect of cash flow on capital investment of firms in services and consumer goods sectors, and model (2) examines the effect of cash flow on capital investment on a sub-sample of older and younger firms in services and consumer goods sectors. Table 3 and 4 show the empirical results.

4.1. Cash flow and capital investment

The results of the panel data estimated for the effect of cash flow on capital investment are presented in Table 3. We observed that lagged cash flow had an insignificant negative and positive effect on capital investment relatively for empirical models (pooling regression, fixed effect, and random effect). The outcome recorded marginal insignificant

coefficient estimates that range from -0.004 to 0.0004, suggesting that the capital investment decreases and increases by about 0.4 units and 0.04 units, respectively, when the cash flow increases by 1. Specifically, for pooling regression, there is an indication that increases in cash flow resulted in an insignificant decrease in capital investment of firms' in the services and consumer goods sectors. On the flipside, fixed effect and random effect indicated that increases in cash flow resulted in insignificant increases in capital investment of firms' in services and consumer goods sectors. The result revealed that total debt ratio recorded positive and significant influence on capital investment, whereas growth opportunity exerted negative and insignificant influence on capital investment.

Table 3 Panel Regression Results

	Pooling regression	Fixed Effect	Random Effect
Intercept	23.363*** (3.201)	-6.618 (-0.478)	4.399 (0.365)
Cash flow$_{t-1}$	-0.004 (-1.423)	0.0004 (0.264)	0.0002 (0.136)
Total debt ratio	0.165*** (3.531)	-0.047 (-1.536)	-0.039 (-1.282)
Growth opportunity	-0.0003 (-0.704)	-0.0003 (-1.100)	-0.0003 (-1.163)
Firm age	1.592 (0.787)	13.588*** (3.577)	10.368*** (3.264)
Hausman test	Chi^2 = 10.887**		
Observations	336	336	336
Adj. R^2	0.044	0.784	0.030

The table provides the empirical results of the effects of cash flow on the capital investment of firms in services and consumer goods sector. t-statistics are provided in parenthesis below the coefficient estimates. The Hausman specification test is used to test the fixed-effect model versus the random effect model. **Significant at the 5% level. ***Significant at the 1% level.

The coefficient estimates for the outcome of total debt ratio range from -0.047 to 0.165 for the empirical models. The results show that total debt ratio has a positive effect on capital investment at the 1% significant level for pooling regression. This implies that a unit increase in total debt ratio was responsive for 16.5 units increase in capital investment because of the irresponsiveness of internal capital; external capital turned out to be a perfect substitute. The aforementioned relationship confirmed the position of Ismail et al. (2010) that cash flow and investment expenditure seem not to be significant because external funds provide a perfect substitute for internal capital. While the empirical results for fixed effect and random effect show that total debt ratio has a negative, insignificant effect on capital investment. Therefore, it confirms the findings of Hirth & Uhrig-Homburg (2010) that lack of free liquid funds results in an underinvestment problem, which is based on the view that internal and external capital are not perfect substitutes.

Though not significant, the result of growth opportunity contradicts the position that firms may easily obtain external funds to smooth their value-increasing investment opportunities when internal and external sources of funds can be substituted perfectly. From the findings, we observed that growth opportunity had a negative, insignificant influence on capital investment, which implies that increases in growth opportunity resulted in an insignificant decrease in capital investment of firms' in the services and consumer goods sectors. The results show that firm age has a positive effect on capital investment, and the point estimates range from 1.59 to 13.59, suggesting that capital investment increases by about 1.59% to 13.59% when the firms become a year older. This positive firm age-capital investment relationship is insignificant on pooling regression but significant on other empirical models (fixed effect and random effect). This implies that the experience of the firms did or didn't mitigate the liabilities of newness in capital acquisition depending on the employed empirical model.

We conduct the Hausman statistical test (Hausman, 1978) to compare the fixed effect and random effect models. Hausman test, which will reveal in a given estimation if the composite error term is correlated with the explanatory variables, that is, whether the random effect model is the appropriate model or if the fixed effect model is the appropriate model (Gujarati, 2013). On this note, if the model is correctly specified and if individual effects are

uncorrelated with the independent variables, the fixed effect and random effect estimators should not be statistically different. The results suggest that the fixed effect model is most appropriate in estimating the investment equation.

4.2. Cash flow and capital investment of sub-sample of older and younger firms

We have shown in the previous section that cash flow has an insignificant positive effect on capital investment, suggesting that cash flow does not play an important role in the capital investment of firms in the services and consumer goods sectors. Fazzari et al. (1987) argued that business recessions and changes in corporate tax policy that invariably affect internal finance will likely have a greater effect on the growth rates and investment behaviour of small immature firms if internal and external sources of funds are not perfect substitutes. On this note, our sampled firms were grouped into older and younger firms in model 2 (see table 4) in order to determine the role of firm experience in the industry. Therefore, the estimations in model 2 were to check if the outcomes in our previous results were due to the presence of immature firms in the sample.

Table 4 Capital investment, cash flow and firm age

	Older firms			Younger firms		
	Pooled OLS	Fixed Effect	Random Effect	Pooled OLS	Fixed Effect	Random Effect
Intercept	-14.453	-170.207***	-131.617***	81.923***	8.366	19.058
	(-0.589)	(-4.587)	(-3.975)	(7.579)	(0.611)	(1.332)
Cash flow$_{t-1}$	-0.005	0.0008	0.0007	-0.009	-0.001	-0.002
	(-1.351)	(0.526)	(0.433)	(-1.362)	(-0.298)	(-0.445)
Total debt ratio	0.204***	-0.060**	-0.050*	-0.174	0.108	0.088
	(4.181)	(-1.980)	(-1.677)	(-1.450)	(1.137)	(0.942)
Growth opportunity	-0.0003	-0.000113	-0.0001	-0.088	-0.026	-0.032
	(-0.584)	(-0.543)	(-0.691)	(-1.221)	(-0.599)	(-0.729)
Firm age	11.073*	55.395***	45.323***	-14.321***	6.457	3.058
	(1.783)	(5.874)	(5.422)	(-4.247)	(1.404)	(0.713)
Hausman test	Chi^2 = 16.667***			Chi^2 = 6.514		
Observations	240	240	240	96	96	96
Adj. R^2	0.084	0.817	0.121	0.206	0.718	-0.022

The table provides the empirical results of the effects of cash flow on the capital investment on sub-sample of older and younger firms in services and consumer goods sector. t-statistics are provided in parenthesis below the coefficient estimates. The Hausman specification test is used to test the fixed-effect model versus the random effect model. * Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

The results of the empirical models for older firms did not significantly change from that of the main estimation recorded in model 1. The outcomes indicated that lagged cash flow does not contribute to capital investment in the services and consumer goods sectors. The estimated coefficient of lagged cash flow is -0.005 in the pooling regression, 0.0008 in the fixed effect regression, and 0.0007 in the random effect regression. On the flipside, the estimations for the younger firms show that lagged cash flow is insignificantly negatively related to capital investment. The estimated coefficient of lagged cash flow ranges from -0.009 to -0.001, suggesting that the capital investment decreases by about 0.9 units and 0.1 units when the cash flow of younger firms in the industry increases by 1 unit.

The coefficients of our empirical models for the relationship between total debt ratio and capital investment for both the older and the younger firms range from -0.174 to 0.204. The estimations for older firms are statistically significant and statistically insignificant for the younger firms, suggesting that the total debt ratio has a significantly greater influence on the capital investment of older firms than that of younger firms. The results for older firms that are not significantly different from our previous results suggest that external funds provide a perfect substitute for internal capital when cash flow is irrelevant to capital investment. The outcome conforms to the assertion that when there is a cash flow shortfall for older firms, these firms may face difficulties in financing their investment with internal sources of funds; though, these firms can easily access external funds because of their level of experience in socio-economic networks (Fagiolo & Luzzi, 2004).

5. Conclusion

This paper studies the relationship between cash flow and capital investment for a panel of firms in the services and consumer goods sectors. We found that cash flow is irrelevant to the capital investment of these firms. Furthermore, the irrelevant effect is even greater for younger firms since these firms cannot easily access external funds because of their low level of experience in their socio-economic networks. The study observed further that older firms confronted with difficulties in financing their investment with internal finance when there were cash flow shortfalls were able to finance their investment in growth opportunities with external capital because of their level of experience in socio-economic networks. Our results therefore provide support that internal and external sources of funds can be substituted perfectly; firms may easily obtain external funds to smooth their value-increasing investment opportunities. Whether investment in a firm is financed with internal or external instruments is irrelevant. Though, what really matters for investment is the costs at which the firm will obtain its' external funds.

Compliance with ethical standards

Disclosure of conflict of interest

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