Investment Spikes and Firm Profitability

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A B S T R A C T

Investment has become a window for enhancing firm profitability and other corporate objectives. This study aimed to investigate the effect of investment spike on the profitability of consumer goods firms quoted on the Nigerian Exchange Group between 2011 to 2021. The incidence of investment spike and size of investment spike were the independent variables controlled by the firm size while return on asset was the measure for firm profitability. Data were collected from the annual reports of the selected consumer goods firms. The study employed the pane regressed based on Fixed and Random Effect for data analysis. The results showed that all the variables of investment spike including incidence of spike and size of spike had positive and significant effects on the return on assets of consumer goods firms. The coefficient of determination and f-statistics revealed that revealed that investment spikes explained about 80% of variations in the firm profitability. The study posited that investment spike is a determinant of firm profitability among the consumer goods sector in Nigeria.

INTRODUCTION

Investment is the commitment of funds to develop, built and establish an operation that would yield series of returns on the future date. Firms carryout investment through innovation, addition to asset and

improved network with the hope of meeting corporate objectives among which could be enhanced customer satisfaction, faster and better production and improve profitability. Investment can be a continuous exercise for firms to to build up asset for operations, inject more innovations and or increase the business capacity. If the level of investment appears flat on a trend, it may be described as normal investment. Abnormal investment results in an outlier in a plotted trend. Thus, what defines a spike in investment is the lumpiness of the amount involved (Gourio & Kashyap, 2007; Otekunrin, Nwanji, Ajayi, Awonusi, Falaye & Eluyela, 2018). Investment spike results from a surge in level of investment that often result in a sudden and dramatic increase in asset value within a short-term event (CallCentre, 2022). It is often rare and one huge event that outweighs several periods of chunks of investments put together.

Investment spike can be captured in terms of size or incidence of occurrence. The size of investment spike is the lumpiness of investment which explains the largeness of small of each stream of investment (Gradzewicz, 2018). The lumpy investment that constitutes a spike is one that meet a threshold of a ratio of total investment normalized by the size of the stock of capital from the previous period (or beginning of the period) defined as I_t/K_{t-1} (Gradzewicz 2018). In the work of Power (1998), spikes is considered as large investment events relative to each firm's investment within the threshold of multiples between 1.75 and 3.25 of the firm's median investment rate over the period under review. This study adopts the threshold of 0.2 of investment – capital ratio as the benchmark for investment spike. The incidence of spike however, measures that sporadic events that can be spotted in a given period within a given threshold above 0.2. This connotes that spike is identified in this study as presence of an event and degree or largeness of the event.

Theoretical studies have advocated that technological innovation is the drive for investment (Cooley Greenwood & Yorukoglu, 1997). Such huge investments that can constitute a spike is driven by the need to meet the new innovation in production and management. Firms discard old production installations in order to introduce a new invention that is expected to be more effective and efficient. These innovations that enhance firm performance can be as a result of involvement in research and development (R&D) that will lead to innovations or physical investment that is capable of increasing assets in form of building, plant and machinery and so on. The idea behind physical investment is to expand the infrastructure to meet higher productivity and more efficiency. The accumulation of physical capital with established firms and the associated investment required can pose a significant barrier to entry for new companies, especially for the capital-intensive industries like the consumer goods sector. The diversification of physical capital is the yardstick to measuring the level of diversification in a particular industry (Segal, 2020). The investment in R&D are intended to discover new knowledge about new or existing products (Beld, 2014).

Firms can be motivated into investment when firm profitability will be enhanced by a marginal efficiency of capital input. Some of these factors that engenders investment could be profitability, increasing sales (market share), growth in employment, productivity and firm value. The study is conceptualized on the philosophy that lumpy investment (investment spike) drives firm performance. This is always true at the macroeconomic level where investment has been found to co-move with productivity (Gradzewicz, 2018). Several studies found that investment spike at macroeconomic level yields to improvement in performance such as total factor productivity (see Cooley *et al.*, 1997; Jovanovic & Nyarko, 1996; and De Long & Summers, 1991, as cited in Gradzewicz, 2018). Empirical concern in literature has remained the effect of firm level investment spikes on corporate performance. This study thus aims to investigate investment spike nexus in Consumer goods firms in Nigeria. The

consumer goods sector as an appendage of the manufacturing industries in the business of converting raw materials into finished goods for the household products has remained a very attractive sector for investment in Nigeria (Proshare, 2016), and account for a significant share of the industrial sector production in Nigeria (Dickson, 2010).

Investment Spike and Firm Profitability Nexus

The theoretical expectation of investment strides is an increased firm profitability (Chen, Yao, Yu & Zhang, 2008). Investment in either R&D or physical assets can stimulate enterprises to develop new products and new technology. When new technology is applied to industrial process, it may increase sales revenue and profit, expand market share and enhance the core competitiveness of company's products. Investment must align with quality of asset selection and efficient utilisation have a direct impact on the company's profitability (Santoso, 2019). This supposes that "if the selection of fixed asset type is right and its use is efficient, it will have a direct impact on the company's profitability" (Harjito & Martono, 2013). The expectation of positive growth from increased investment outlay must align with sound investment decisions. Good investment opportunity expects at least a positive Net Present Value (NPV) from investment and then an optimal growth rate from marginal investment outlays. For firms to envisage prospects in lumpy investment outlay is an indication that such investment will launch the firm into god pedestal among competitors and contemporaries.

A plethora of empirical exposition on the Table below further expatiates the nexus between investment spike and firm profitability across economies of Europe, Asia and Africa. The empirical studies revealed that investment represented by either physical investment or Research and Development expenditure, or total investment, show significant effects on firm profit. This according to a study from Grazzi, Jacoby, & Treibich (2013), Xu, Sim & Jin (2016), Taipi and Ballkoci (2017), Albulescu, Drăghici and Tăucean (2018), Mweresa and Muturi (2018), Abdullahi and Musa (2019), and Saif, Islam, Meo and Usman (2020) is expected to be a positive effect which that an increase in investment would result in increasing firm profit. This is equally correct even for investments in research and development to boost innovation in firm products and output (Muli, 2016). Heshmati & Lööf (2008) explained that investments surge is not necessarily the cause of increasing firm profitability, as granger causality does not exist between Gross Physical Investment and Firm profitability in Sweden. This was supported by Balarabe (2020) which claimed that investment do not significantly influence firm performance indicators.Some contemporary studies have explained that the effect of investment on fir profitability can be time variant. Usman, *et al* (2017) found that investment dynamics had negative effect on the profitability of the firm in the same year but becomes positive after a year and then of no effect as the time progresses. Other studies from Farooq, Ahmed & Saleem (2015) revealed that a normal investment would show positive effect on firm profitability by abnormal investments whether is an over-investment and under-investment had huge negative impact on firm performance.

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Table 1: Webometric review of empirical studies on investment spike and firm profitability nexus

SN	Author & Date	Main objective	Scope	Variables of Analysis	Methods	Major Finding
1	Albulescu (2001)	Effect of investment spike on firm level profitability	Wine industry. European Union (EU): France, Italy, Spain; 2007 to 2014	**Dependent**: Growth rate of fixed assets **Independent**: Liquidity ratios (liquidity ratio and current ratio), profitability ratios (Return on Equity and Return on Assets); capitalization ratio (capital to total assets ratio)	System-GMM estimator	Effect is country dependent. Profit has significant positive effect in France and Spain. Cap. has significant negative effect Liquidity has significant negative effect in Spain.
2	Heshmati & Lööf (2008)	Causal relationship between firm profitability and investment.	Swedish firms:1992 to 2002 Small and Large sized firms	**Dependent**: Firm Profitability **Independent**: Research and Development (R & D); Gross Physical Investment (GPI)	Correlation and Granger causality tests	No causality. Large-size firms had bi-directional causality for both R&D and GPI
3	Grazzi, Jacoby, & Treibich (2013)	Assess spike-profit nexus	manufacturing firms: France and Italy	**Dependent**: Return on sales (ROS) **Independent**: Dt0(same year), Dt1 (after 1 yr), Dt2 (after 2 yrs), DBefore (two years before) and Dleast (At least 1 investment spike with sample period)	Panel Regression	Investment spike have positive and significant effects on profitability in France but not Italy
4	Farooq, Ahmed & Saleem (2015)	Impact of over-investment and under-investment problems on corporate performance	Manufacturing firms: 2005 to 2011 Singapore,	**Dependent**: Return on Asset (ROA), Return on Equity (ROE); Tobin q **Independent**: normal investment, firm size, over-investment, under-investment and industry effect	Panel data. LM test, Hausman test, and Fixed effect test	Investment (over- and under-) had negative impact on firm performance
5	Muli (2016)	Effect of investment decisions on financial performance	Savings and Credit Cooperatives (SACCO); Kitui Central Sub-County; 2006 to 2015	**Dependent**: Dividends **Independent**: Replacement Decision, Expansion Decision, Renewal Decision, and R&D decision	Simple multivariate and Karl Pearson's correlation techniques	R&D had significant effect on performance
6	Xu, Sim & Jin (2016)	Effect of R&D investment on firm performance and enterprise value	Shenzhen and Shanghai Stock Exchange; 2011 to 2013	**Dependent**: Operating Profit Margin (OPM) **Independent**: R&D intensity and R&D personnel intensity **Control**: Firm size and liability ratio	Regression analyses	No correlation between R&D and profitability R&D personnel intensity is positive

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7	Usman, *et al* (2017)	investigate the impact of R&D investment on firm performance	G-7 countries; Data frame: country level, industry level and firm level. non-financial firm; Stock exchange; 2004 to 2016	**Dependent**: ROA, Cash Flow by Operating Revenue (CFOR) **Independent**: R&D divided by total asset: R&D intensity for current year (t), R&D intensity for one lagged year (t-1), R&D intensity for two year lagged year (t-2). **Control:** firm size, age, leverage, GDP growth, interest rate and financial crises dummy	HLM regression analysis technique	R&D investment has negative effect on firm performance in same yr, but positive effect in lag yr 1 and no effect afterwards.
8	Taipi and Ballkoci (2017)	Relationship between capital expenditures and firm performance	construction sector firm; Albania 2008 to 2015	**Dependent**: ROA **Independent**: capital expenditures **Control:** leverage ratio and firm size	linear regression model	Significant Positive effect
9	Mweresa and Muturi (2018)	effects of investment decisions on the performance	Public sugar firms in western Kenya; Population; 2,284 employees	**Dependent**: Financial performance **Independent**: investment decisions into production investment decision, financial assets investment decision, and distribution chain investment decision	survey design Frequency, mean, mode, median & standard deviation; regression analysis; & ANOVA	Investment has positive effects
10	Albulescu, Drăghici and Tăucean (2018)	Effect of financial performances on investment dynamics	Wine industry firms; Central and Eastern European; 2007 to 2014	**Dependent**: Capitalization, Liquidity, Profitability **Independent**: investment dynamics	panel data AMADEUS statistics	profitability is positively influenced by investment dynamics
11	Otekunrin, *et al* (2018)	Examine if one investment decisions technique yields greater benefits than another	1990 to 2001 Nigerian Breweries Plc	**Dependent**: Future profitability **Independent**: Payback period (PBP), discounted payback period (DPBP), accounting rate of return, net present value, and internal rate of return	chi-square, Questionnaire	Investment decisions of firms improve their level of profitability
12	Santoso (2019)	Effect of investment decisions on the performance of firms	consumer goods sub-sector; Indonesia Stock Exchange 2010 to 2017	**Dependent**: Return on investment (ROI) **Independent**: Investment in long-term assets; short-term assets and funding	Path analysis	Asset structure has an effect on financial performance capital structure affects the financial performance
13	Mansaray-	impact of	Sierra Leone	**Dependent**: ROA	correlation	PBP has high

	Pearce (2019)	capital budgeting techniques on commercial bank financial performance	employees of commercial banks	**Independent**: PDP, PI, ARR, NPV IRR	and regression techniques questionnaire	positive correlation with ROA Others are negative and not significant
14	Abdullahi and Musa (2019)	Relationship between financial performance analysis and investment decisions	Deposit money banks in Nigeria	**Dependent**: FP **Independent**: capital adequacy (CA), Management efficiency (ME), Earnings quality (EQ)	CAMEL parameter Multiple Linear Regressions	FP = significant positive effect on investment decision CA had negative relationship ME & EQ had significant positive
15	Saif, Islam, Meo and Usman (2020)	Relationship between corporate investment decision and firm performance	Nonfinancial companies; 2013 to 2017	**Dependent**: ROA **Independent**: Growth rate of total assets, Growth rate of fixed asset, Capital structure, Investment Index 1; Investment index 2. **Moderator**: cash flows	simple multiple regression and moderated regression analysis	Investment Decision influence FP Cash-flow cause negative effects in the model
16	Balarabe (2020)	effect of capital budgeting on the growth of firm profitability	Nigeria; Manufacturing firms; Cross sectional; 2018	**Dependent**: ROA **Independent**: acquisition of fixed assets, investment appraisal techniques, and outsourcing long-term debt **Control**: Firm size	OLS regression technique	Insignificant effects

3.0. METHODOLOGY

The *ex-post facto* design was adopted for the study using panel data set from published Financial Statements and Annual Accounts of the consumer goods companies quoted in Nigerian Exchange Group. Sample of Fifteen (15) out of the 21 consumer goods firms quoted on the floor of the Nigeria Exchange Group were selected for the study, for a period of 11 years spanning 2011 to 2021.

Description of Variables

The dependent variable was captured with profitability as an indicator of managerial competence and measured with return on asset (ROA) is used to measure profitability. The ROA is the ratio of profitability to total assets, and is obtained through the formula: $ROA = \dfrac{Net\ Profit}{Total\ Asset}$.

Independent Variables

➤ **Incidence of Investment Spike (IIS):** This is captured as the dummy notation using "1" to depict presence of investment spike for a chosen company. This means that the periods where there is a lumpy investment outlays will be denoted as "1". This implies that the firm invested huge capital higher than the normal annual investment of the other years. On the other hand, the periods of normal investment outlays was denoted as zero (0) to depict that there is no investment spike in those periods.

➤ **Size of Investment Spike (SIS):** This is defined as investment lumpiness in the work of Gradzewicz (2018). The size of investment as a ratio of investment normalized by the size of the stock of capital from the previous period (or beginning of the period) defined as I_t/K_{t-1} (Gradzewicz 2018). Where I is annual investment; k is stock of stock which is the total assets of the firm t is the time period. The threshold adopted is based on the theoretical work of Cooper, Haltiwanger and Power (1999) that investment rate above 0.2 denoted spike episodes. The measure of the investment size (lumpiness) is in line with the work of Usman *et al* (2017) as R&D investment divided by total asset.

➤ **Firm Size (FS)**: Firm size was measured with the natural logarithm of book value of assets as a moderating variable of the study.

Model Specifications

The model is adapted from the work of Gradzewicz (2018) which opines that spike can be measured in terms of occurrence and size. The study equally found that the extent of investment spikes depends on the size of the business. The functional model for the present study is thus:

ROA = f (IIS, SIS, FS,)

Where:

ROA = Firm profitability represented as return on asset.

IIS = Incidence of investment spike expressed as dummy of presence of lumpy investment as 1 and no presence of lumpy investment 0.

SIS = Size of investment spike expressed as a ratio of annual investment divided by stock of capital.

FS = firm size represented with total asset value.

This can be expressed in equation form as

$$\text{ROA} = a_0 + a_1\text{IIS} + a_2\text{SIS} + a_3\text{FS} + \varepsilon_t \qquad\qquad (1)$$

a_0 = the constant while a_{1-3} are the coefficients of explanatory variables.

The A'priori expectation following the Accelerator Model of Investment is such that IIS, SIS and FS are expected to have positive relationship with ROA. The sign (+) symbol indicates a positive relationship and effect while (-) denotes negative effect. A positive effect implies that an increase in the independent variable(s) will bring about a certain proportionate increase in the dependent variable. Likewise, a negative effect suggests that an increase in independent variable leads to decrease in the dependent variable and vice versa.

Method of Data Analysis

The study adopted a panel data regression technique. The regression is based on fixed or random effect model. The study employed the Hausman test to decide between random and fixed effect model. The estimation started with preliminary analysis including descriptive statistics and trend analysis. The descriptive statistics used mean, and standard deviation of the variables to explain the nature of the variables, whereas the trend analysis defines the behaviour of the variables over the time period of the study. The post estimation analysis are multicolinearity, Heteroskedasticity, and normal distribution tests.

Decision Criteria

The hypotheses is tested at 0.05 level of significance. The decision rule is to reject null hypothesis (that investment spikes have no significant effects on firm performance variables) when the computed probability value is less than 0.05 level; otherwise, accept null hypotheses when the computed probability value is greater than 0.05 level.

4.0 Model Estimation

Table 1: Panel Regression Result of the Effect of Investment spikes on Return on Asset of Consumer Goods Firms in Nigeria

Dependent Variable: ROA

Sample: 2011 2021

Periods included: 11

Cross-sections included: 15

Total panel (balanced) observations: 165

Independent Variables	Fixed Effect Model			Random Effect Model *Preferred		
	Coefficient	t-Statistic	Prob.	Coefficient	t-Statistic	Prob.
IIS	0.5937	2.2251	0.0222	0.0348	3.0141	0.0087
SIS	0.2408	3.2884	0.0034	0.1437	7.1907	0.0000
FS	0.0018	2.0164	0.0469	0.0140	12.1352	0.0000
C	1.0753	4.9890	0.0244	0.9317	3.9427	0.0342
R-Squared	0.42			0.80		
F-statistic (Prob)	6.88 (0.03)			13.57 (0.0021)		
Durbin Watson	1.1920			1.7869		
Hausman test	1.1185 (0.7726)					

The result was produced from least square regression based on Fixed Effect and Random Effect models. The most suitable model for the analyses was determined using the Hausman test. The result of the Hausman statistics is 1.1185 with 0.7726 probability value. Since the p.value is greater than 0.05 level of significance, the study did not reject the null hypothesis that the random effect model is preferred. Thus the random effect model is adopted for the analysis. The study therefore adopted the Random Effect Model to explain the effect of investment spike on return on asset among consumer goods firms in Nigeria. The result indicates that both cross-section and period effect influence the outcome of the analysis.

From the results, the R-square is 0.80 which indicates that about 80% of the changes in return on asset can be explained by investment spike of the consumer goods firms in Nigeria. The F-statistics which explains the overall effect of investment spike variables (IIS, SIS, FS) on return on asset has a value of 13.57 with 0.0021 level of probability. Since the p.value is less than 0.05 level of significance the study rejected the null hypothesis and posit that investment spike has about 80% joint positive and significant effect on return on asset in the consumer goods firms quoted in Nigeria Exchange group.

The results of the coefficient of independent variable is used to produce equation of the relationship from the model as given below:

$$ROA = 0.9317 + 0.0348IIS^* + 0.1437SIS * + 0.0140FS$$

**significant at 5%, *significant at 1%

This above equation reveals that incidence of investment spike (IIS), size of investment spike (SIS) and firm size (FS) have a significant positive effect on return on assets. This is shown by the coefficient of IIS (0.0348), SIS (0.1437) and FS (0.0140) and their corresponding p.values at 0.0087, 0.000, 0.000 and 0.0342, respectively. Since the p.values are less than 0.05 level of significance, the study posits a significant positive effects of IIS, SIS and FS on ROA. This suggests that a unit change in IIS, SIS and FS lead to improvement in the value of the ROA of the selected consumer goods firms in Nigeria.

Discussion of Findings

The analysis of the effect of investment spike on return on asset showed that all the variables of investment spike including incidence of spike and size of spike have positive and significant effects on the return on asset of consumer goods firms. This implies that any unit rise in both the incidence (frequency) of investment spike and the size (largeness) of annual investment will result in higher level of firm profit. Thus any form of investment that is based on sound investment criteria should lead to higher returns. This supports that accelerator theory of investment. This theory as posited by Keynes (1931) is of the view that current net investment is a function of growth in aggregate demand. This means that any added investment is only responding to a seen demand and hence the needed stock of capital (whether inventory or other equipment) in a society must be consumed and paid for. Thus, investments only take place when income is growing.

In support of the accelerator theory of investment, the findings revealed that investment spike accounts for as high as 80% of variations in firm profitability. This implies that profit is a function of the level of investment in the firm. Low investment result to low profit and higher investment yields to higher profitability. This is true since fixed capital are held constant for all production activities and only the variable cost changes with the level of investment. So, the more the expected level of investment the higher the profit growth rate.

The empirical literature have report both negative and positive effects. Most of the previous studies investigated investment (growth) and not necessarily investment spike and still found that investment has positive effects on firm profitability (Taipi & Ballkoci, 2017; Mweresa & Muturi, 2018; Albulescu, *et al* 2018; Santoso, 2019). The studies that centred on investment spike further posit that the level of effect investment has on firm profitability is a function of the firm size, time duration, country specific. For instance, Grazzi, *et al* (2013) posit that investment spike has positive and significant effects on profitability in France but not in Italy. Heshmati and Lööf (2008) relationship of investment and profitability only holds for large firms and does not cover the small firm. This tends to implies that the more firms growth in size the higher the expected profit growth from added investment. In addition, some investment spikes affects profit from the first year, some after certain periods of a year, two and so on (Usman, *et al,* 2017). Thus the findings of this study may have held on for Nigeria, the consumer goods firms and even within the time bound of this study.

Conclusion and Recommendations

All the variables of investment spike including incidence of spike and size of spike have positive and significant effects on the return on assets of consumer goods firms. Investment spike indicators had

significant positive effect on ROA, and about 80% of variations in the dependent variable could be accounted for by the joint effect of the independent variables. The study concludes that investment spike is a determinant of firm performance among the consumer goods sector in Nigeria. The prospects on return on assets, sales growth, labour productivity, employment growth and firm value as strategic performance evaluation indicators are significantly hinged on sound investment spike management. It was thus recommended that investors should adopt a higher investment profile as signals for higher profitability.

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