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Investment Policy and Net Book Value of Quoted Manufacturing Firms: Dynamic Panel Data Evidence From Nigeria

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ABSTRACT: This study examined the relationship between investment policy and dynamic of net book value of quoted manufacturing firms in Nigeria. Panel data of 15 quoted manufacturing firms was collected from the annual reports of the manufacturing firms from 2010-2019. Stock prices of the quoted firms was modeled as the function of short term portfolio investment, subsidiary investment, long term portfolio investment and long term investment. Multiple regressions were formulated. Panel data methodology was employed while the fixed effects model was used as estimation technique at 5% level of significance. Fixed effects, random effects and pooled estimates were tested while the Hausman test was used to determine the best fit. Panel unit roots and panel cointegration analysis were conducted on the study. The study found that the independent variables explained 69.1 percent of the systematic variation in net book value of the quoted manufacturing firms. Long term investment and subsidiary investment have positive relationship with net book value of the quoted manufacturing firms while short term and long-term portfolio investment have negative relationship with net book value of the quoted manufacturing firms while the probability coefficient of the variables informed us that the independent variables are statistically not significant. From the findings, the study conclude that investment policy affect significantly the net book value of the quoted manufacturing firms. It recommends that proper investment analysis should be carried out in appraising short term investment to enhance value of manufacturing firms. There is need for management to integrate the objectives of long term investment with the value objective of Nigeria manufacturing firms.

KEYWORDS: Investment Policy, Net Book Value, Quoted Manufacturing Firms, Dynamic Panel Data, Nigeria.

INTRODUCTION

Investment is component of aggregate demand. It is the most volatile component of aggregate demand and fluctuation in its level is highly correlated with fluctuation in Gross National Product known as business cycle (Iyoha, 2004). Corporate investment is an internal determinant of corporate value and has great extent to which it affects performance and survival of the firm. Investment structure of a firm can be categorized in time of duration which can be short and long term investment; it can also be categorized in terms of nature of investment such as subsidiary investment, equity investment and joint venture investment. The structure, nature and type of corporate investment have to a great extent determined corporate values.

Investment can be described as any business activity or decision which involves the commitment of resources with the goal of maximizing the value of the resources committed within a specified period. Investment activities involve strategic decisions and capital spending plan. These includes financing, products development, acquisitions and divestitures, large infrastructure project, staff training and development, research and development, risk management strategies and among others.

According to Warren Buffett, investment is the process of laying out money now with a calculated hope to receive more money in the future (Romer, 1986). Every activity of a business organization involves investment with the optimum goal to maximize its' shareholders (owners) wealth and add value to the firm. Therefore, knowing this ultimate goal of investment, most business organizations especially in the formal sector commit huge sum of resources in cash, time and human resource to ensure that good investments are identified and implemented or undertaken to maximize shareholders' wealth and the firm's value. The types of investment to undertake as asserted by Li, Donglin (2004) depend on the objectives and constraints of the investor.

The factors driving corporate value movements have become issue of concern to both researchers in academics and professional portfolio managers. While few researchers have approached the determinants of stock corporate value from the micro perspective, few others approached it from macro perspective. Incidentally, few studies in Nigeria have attempted to provide

empirical evidence of the determinants of corporate value movements (for instance Udegbunam and Eriki, 2001), while few others have done that at theoretical level.

While the study by Udegbunam and Eriki (2001) is lagging behind in time especially in the face of trends in the financial market, Rogier, Stulz and Van Dijk (2017) only provides a theoretical exposition that lacks quantitative empirical evidence. Again, at the different countries level, studies conducted on the determinants of corporate value movements showed divergent outcomes, even though it seems that some determinants commonly appeared for all stock markets. The above studies failed to study the effect of investment policy on the corporate value of quoted Nigeria manufacturing firms. From the problems and knowledge gap, this study examined the effect of investment policy on the net book value of quoted manufacturing firms in Nigeria.

LITERATURE REVIEW

Investment Policy

Emekekwue (2005) defined investment as the art of planning expenditures whose return are expected to exceed one It involves a sacrifice of present consumption in exchange of future benefits. Since investment involves a sacrifice of present condition, there is an element of risk that future outcome may not be realized. The efficiency in the use of fixed assets can be measured with fixed assets turnover ratio. Pandey (1981) opined that the fixed assets turnover ratio measures the efficiency with which a firm is utilizing its investment in fixed assets, such as land, building, plant and machinery, furniture. It also indicates the adequacy of sale in relation to the investment in fixed assets.

A firm acquires plant and machinery and other productive fixed assets for the purpose of generating sales. Therefore, the efficiency of fixed assets should be judged in relation to sales. Generally, a high fixed assets turnover ratio indicates efficient utilization of fixed assets in generating sales, while a low ratio indicates inefficient management and utilization of fixed assets. Thus a firm, whose plant and machinery has considerably depreciated, may show a higher fixed assets turnover ratio than the firm which has purchased plant and machinery recently. By comparing the fixed asset turnover of the two firms, it cannot be concluded that the former is more efficient in managing fixed assets because of the effects of depreciation. Pandey (2010) opined that a company's investment in fixed asset is dependent, to a large degree, on its line of business. Some businesses are more capital intensive than others. Firms in the natural resource just as firms in the brewery industry and other and industry producers require a large amount of fixed-asset investment and large capital equipment while, service companies and computer software producers need a relatively small amount of fixed assets.

This fixed asset turnover ratio indicator, looked at asset over time and compares the ratio to that of competitors. This gives the investor an idea of how effectively a company's management is in using fixed asset. It is a rough measure of the productivity of a company's fixed assets with respect to generating sales. The higher the number of times turns over, the better. However investors should look for consistency or increasing fixed assets turnover rates as positive balance sheet investment qualities (Pandey, 2010).

Firm Value

Firm's value can be measured by the earnings generated by the company in terms of profitability (Barron, 2002). Firm's performance is the measurement of what has been attained by the firm, which is an indicator of the good conditions for a period of time. The objectives of measuring firm value are to obtain very useful information about flow of funds, the uses of firm finances, their efficiency and effectiveness. Besides, the managers are able to make best decisions from the information on firm's performance (Almajali, 2012). Investors are more willing to buy shares in firms whose value are high due to enhanced reputation, and if the demand for its shares increases the shares prices increases hence an increase in the firm's value. Profitability enables a firm to withstand negative economic shocks and enhances stability of the firm. Increased firm value maximizes the utility for shareholders through dividend and stakeholders' interest through corporate social responsibility (Bhutta&Hasan, 2013).

Net Book Value

The book value of a company is seen as the total assets minus intangible assets and liabilities and often discussed as stockholders equity, owners' equity, shareholders equity or simply equity (Prasetyo, 2012). One of the measures of market and firm value is the book value. Investors reflect the ratio of capital market such as the ratio of price per book value to determine the stock whose price is reasonable. Book value reveals how much a company is worth especially if it were to be liquidated and all assets sold. Book value shows how much the company's; assets are worth as contained in the balance sheet, while market values reveal what investors think the company is worth, also market value reveals what investors think the company is worth and how much they will pay to buy stock in the firm.

Long-Term Investment: Long term assets are assets that a company uses in its production process and that typically come with a useful life of more than one year. Such assets can also be considered to be fixed assets as they can contribute to a big portion of

the company's fixed costs associated with production. For example, an automobile manufacturer might consider factories to be long term assets since they are at the core of the business' production process.

Investment in Subsidiary: Means a subsidiary of firms engaged or organized to engage exclusively in the ownership and management of assets authorized as investment for the firm if each subsidiary agrees to limit its investment in any asset. In this study we measure in subsidiary investment as investment of the firms in other subsidiaries.

Short Term Portfolio Investment: With regard to investing, generally refers to a holding period of less than three years. This is also generally true for categorizing investors as well as bond securities. In fact, many investment securities including stocks, mutual funds, and some bonds and bond mutual funds are not suitable for investment periods of less than three years. In this study, short term portfolio investment represents investment of the firms in money market instruments.

Long Term Portfolio Investment: Many investment securities including stocks, mutual funds, and some bonds and bond mutual funds are not suitable for investment periods of less than three years. In this study, long term portfolio investment represents investment of the firms in capital market instruments.

THEORETICAL REVIEW

Theories of Investment

John M. Keynes and Irving Fisher, both argued that investments are made until the present value of expected future revenues, at the margin, is equal to the opportunity cost of capital. This means that investments are made until the net present value is equal to zero. An investment is expected to generate a stream of future cash flows C(t). Since investment I, represents an outlay at time O, this can be expressed as a negative cash flow, - C_0. The net present value can then be written as:

$$NPV = -C_0 + \int_0^{\infty} C(t)e^{g-r)t}dt \quad (1)$$

Where, g denotes growth rate and r the opportunity cost of capital (discount rate). As long as the expected return on investment, i, is above the opportunity cost of capital, r, investment will be worthwhile. When r = i the NPV = 0. The return on investment, i, is equivalent to Keynes' marginal efficiency of capital and Fisher's internal rate of return. From equation (1) the PV of an investment, I, can be written as $C_1/(r - g)$, implying that PV/I = 1.

The methodology to measure marginal q developed by Mueller and Reardon (1993) also belongs to this line of thought.

Neoclassical Theory of Investment

The starting point for Jorgenson's (1963, 1967 and 1971) neoclassical investment theory is the optimization problem of a firm. Maximizing profits in each period will yield an optimal capital stock, assuming that the production function can be written as a conventional Cobb-Douglas function.

$$Y(t)\ f\left(K(t), L(t)\right) = AK^{\alpha}\ L^{1-\alpha} \quad (2)$$

Where Y(t) is firm output, K is capital and L denotes labour, all in period t. The profit function for a representative firm can then be expressed as follows:

$$\pi(t) = p(t)Y(t) - s(t)I(t) - w(t)L(t) \quad (3)$$

$\pi(t)$ denotes profit, p (t) is the price of output, s (t) is the price of capital and w (t) is the wage. Assuming profit maximization, the current value of a firm, V(0), can be written as:

$$V(0) = \max\ E_{\phi_0} \int_0^{\infty} \pi(t)e^{-rt}\ dt =$$

$$E_{\phi_0}\ \left[p(t)Y(t) - s(t)I(t) - w(t)L(t)\right]e^{-rt}\ dt \quad (4)$$

$s.t..\ dK/dt = I(t) - \delta K(t) - K(t)$ and K(0) is given.

The term E is an expectations operator conditional on the information set, Φ, available for the firm in each period. We leave this aside for now and return to the role of expectations and the efficient market assumption in section 4.4. To avoid clutter and simplify, the time notations are dropped from now on.

To maximize V (0) the first step is to set up a Lagrangian.

$$L = V(0) + \int_0^{\infty} \lambda\left[\left(I - \delta K\right)\ K\ \right]e^{-rt}\ dt \tag{5}$$

which gives:

$$L = \int_0^{\infty}\left[\left(pY - sI - wL + \lambda\ (I - \delta K) - \lambda K\ \right]e^{-rt}\ dt\right. \tag{6}$$

From this we obtain the familiar current value Hamiltonian.

$$H = pf\ (K, L) - sI - wL + \lambda\ (I - \delta K) \tag{7}$$

Where, the Lagrangian multiplier λ(t) is our constant variable. It should be noted that λ (t) represents the shadow price of capital. Differentiating the Hamiltonian, we obtain the following first order conditions:

$$\frac{\partial H}{\partial I} = -s + \lambda = 0 \tag{8}$$

This condition holds that the opportunity cost of capital shall be equal to the shadow price of capital.

$$\frac{\partial H}{\partial I} = sp_L^i - w = 0 \tag{9}$$

This condition simply says that the labour should be employed until the marginal revenue of labour equates with the wage. Recalling the maximum principle (Intriligator, 1971) we get:

$$\frac{\partial H}{\partial \lambda} = \frac{\partial K}{\partial t} = I - \delta K = 0 \tag{10}$$

Which says that in equilibrium, net investment should be zero and gross investment equal to the depreciation of K. finally, the marginal condition for capital is:

$$\frac{\partial H}{\partial K} = pf_K^i - \lambda\delta = 0 \tag{11}$$

The canonical equation (Intrilligator, 1971) requires that $\dot{y} = -\partial K / \partial K,$ where y is the control variable such that $y = \lambda e^{-rt}$ at time t. Thus:

$$-\frac{\partial H}{\partial I} = \frac{d}{dt}\left[e^{-rt}\ \lambda(t)\right] = \frac{\partial \lambda}{\partial t} - r\lambda \tag{12}$$

This means that equation (11) can be written as:

$$-pf_K^i + \lambda\delta = \frac{\partial \lambda}{\partial t} - r\lambda \tag{13}$$

From equation (8) we know that s = λ, which implies that $\partial s / \partial t = \partial \lambda / \partial t.$ This also means that $\partial H / \partial K$ can be stated in the following way:

$$pf_K^i + s\delta = \frac{\partial s}{\partial t} - rs \tag{14}$$

Rearranging this we obtain:

$$pf_K^i = s[\delta + r - (\partial s/\partial t)/s] \quad (15)$$

Since $-pf_K^i$ is the marginal rate of return on capital, mrr_k, equation (11) can be rewritten as the marginal product of capital:

$$f_K^1 s[\delta + -(\partial s/\partial t)/s]p \quad (16)$$

Note that $f_K^i = \partial Y/\partial K.$ Johanson's (1963) user cost of capital, c is defined as: $s[\delta + r - (\partial s/\partial t)/s]$, which means that:

$$pf_K^i = c \quad (17)$$

This can now be used to derive the optimal capital stock, K^*, and the investment function. Using Cobb-Douglas technology the marginal product of capital becomes:

$$\frac{\partial \lambda}{\partial K} = \frac{\alpha Y}{K} \quad (18)$$

Multiplying by p, and recalling equation (17) we get:

$$\frac{\partial H}{\partial K} = p\,\frac{\alpha Y}{K} = c \quad (19)$$

Solving for k we obtain an expression for the optimal capital stock:

$$K^* = \frac{p\alpha Y}{c} \quad (20)$$

It is now easy to see that K^* depends on output, price of output and the user cost of capital, c. thus, investment becomes the change in capital between two periods:

$$I\ \frac{p\alpha Y}{c} - K^*\ (t-\tau) \quad (21)$$

Note, that this assumes that K (t) adjust instantaneously and fully to K^* (t).

Accelerator Theory

The accelerator approach is often association with a Keynesian approach which is primarily due to its assumption of fixed prices. The acceleration principle was however first suggested by Clark (1917) and is well known for its applications by Samuelsson (1939) to business cycles. The accelerator is, in fact, merely a special case of the neoclassical theory of investment where the price variables have been reduced to constants. If the price of output is assumed to be constant and the price variables s and r is Jorgenson's (1963) user cost of capital $(c = s[\delta + r - (\partial s/\partial t)/s])$ are fixed, equation 21 reduces to following:

$$K^* = \alpha Y \quad (22)$$

This is simply the well-known accelerator principle where the desired capital stock is assumed to be proportional to output. Investment in any period will therefore depend on the growth in output:

$$I = \alpha \dot{Y} \quad (23)$$

Given flexible prices and partial adjustment toward the desired capital stock each period investment depends on prices of output and input and interest rates (cost of capital).

Empirical Review

Okwo, Ugwunta and Nweze (2012) assessed the impact of a company's investment in fixed assets on its operating profit margin. The study is based on a sample four companies in the Nigerian brewery sector over an eleven year period from 1999 to 2009. We used regression statistical method to ascertain the relationship between level of investment in fixed assets and its impact on the operating profit reported by Nigerian brewery firms. Though the relationship is positive, but the result is not statistically significant. Therefore, the result did not suggest any strong positive impact of investment in fixed assets on the operating profit of brewery firms in Nigeria. This finding is in which is in line with past academic researches show that investment in fixed asset does not have any strong and statistical impact on the profitability of brewery firms in Nigeria.

Mwaniki and Job Omagwa (2017) studied the relationship between the asset structure and the financial performance of the firms quoted under the commercial and service sector at the NSE, Kenya. The target population by the study was the secondary data from the annual reports of the firms. The asset structure is analysed in term of: Property, Plants and Equipment; current assets; intangible assets; and long term investments and funds, which formed the independent variables. The dependent variable of interest was the financial performance of the firms, and was measured in terms of: earning per share; return on assets; return on equity, profit margin (return on sales); and current ratio, by aid of a composite index. A census was done on the entire firms listed under this sector by the year 2014, for a five year period, 2010 to 2014. A document review guide was used to collect the secondary data from the financial statements of the firms under study. A multiple regression analysis (standard) was conducted with the aid of statistical programs SPSS version. The results of the study indicate that asset structure had a significant statistical effect on the financial performance. In particular, the study found that: Property, Plants and Equipment, and long-term investments and funds have a statistically significant effect on financial performance, while current assets and intangible assets do not have statistical significance on financial performance sectors.

Okwo et al. (2012) assessed the impact of a company's investment in fixed assets on its operating profit margin. The study is based on a sample four companies in the Nigerian brewery sector over an eleven year period from 1999 to 2009. The operating profit margin was taken as the dependent variable while the independent variables were Sales/Net Fixed Assets ratio, Interest Rates, Foreign Exchange Rate, and Inventory/Cost of Sale ratio. The findings of the study was that though the relationship between the level of investment in fixed assets and its impact on the operating profit was positive, the result was not statistically significant. Therefore, the result did not suggest any strong positive impact of investment in fixed assets on the operating profit of brewery firms in Nigeria.

Olatunji et al. (2014) examined the effect of investment in fixed assets on profitability of selected Nigerian banks. Data were obtained from annual reports and accounts of thirteen selected Nigerian commercial Banks for the period from 2000-2012. The relationship between the dependent variable (Net profit) and independent variables (Building, Land, Leasehold premises, fixtures and fitting, and investment in computers.) indicated that there was a significant relationship between them. The study concluded that investments in fixed assets had strong and positive statistical impact on the profitability of banking sector in Nigeria.

Martina (2015) investigated the relationship between tangible assets and the capital structure of Croatian small and medium-sized enterprises. The study was conducted on a sample of 500 Croatian SMEs for the period between 2005 and 2010. The data used for the empirical analysis were taken from companies' annual reports. The results of the research found that tangible assets are differently correlated with short-term and long-term leverage. The relationship between tangible assets and short-term leverage was negative and statistically significant in all observed years. The relationship between tangible assets and long-term leverage was positive in all observed years and statistically significant. The results showed that small and medium-sized companies use their collateral to attract long-term debt, which means that small and medium-sized companies use lower costs and the interest rate of long-term debt in relation to short-term debt. These findings are consistent with the trade-off theory which predicts a positive relation between leverage and tangibility (Frank et al., 2011), and also with the pecking order theory, which is generally interpreted as predicting a negative relation between leverage and tangibility (Koralun-Bereźnicka, 2013).

Mawih (2014) examined the effects of assets structure (fixed assets and current assets) on the financial performance of some manufacturing companies listed on Muscat Securities Market (MSM), for the period 2008-2012. The assets structure was measured by fixed assets turnover and current assets turnover while the financial performance was measured by ROA and ROE. The overall result of the study was that the structure of assets does not have a strong impact on profitability in terms of ROE. Another result of the study indicated that only the fixed assets had impact on ROE unlike ROA. Further, the result suggested that the effect of asset structure had an impact on ROE only in petro-chemical sector. It also concluded that there was no impact for current assets on ROE and ROA.

Nwala, Gimba and Oyedokun (2020) examined the impact of corporate financial policy on firm value of insurance firms in Nigeria for the period 2011 to 2017. In carrying out this study, expost-facto research design was employed, and secondary data sourced from 25 insurance annual report and Nigeria Stock Exchange factbook for the period of 7 years. Pool time series data were extracted related to dividend payout, equity issuance, debt asset, equity asset, return on asset and Tobin Q was used as proxies for firm value in this study. The findings indicate that dividend payout and equity issuance have significantly impacted on firm performance (Tobin Q), the study also stated that ROA has no significant relationship with dividend payout, equity asset, debt assets and equity issuance during the period under study. It was recommended that insurance managers should devote adequate

time in designing a dividend policy that will enhance firm's performance (ROA) and shareholder value. Again, the company should review its dividend policy in order to reduce agency cost and maximize the value of the company.

Okeke (2019) examined the effect of capital structure on firm value of selected quoted firms in Nigeria. It adopted long term debt, equity capital, as independent (x) variables of capital structure while Tobin Q was used as proxy for firm value the dependent variable. It adopted ex-post facto research design. The statistical package used for the analysis was e-view version 8.0. The population of the study was firms drawn from conglomerate and consumer goods sectors of Nigeria Stock exchange for a period of nine (9) years 2007-2015. Descriptive statistics, correlation and ordinary least square (OLS) of multiple regression analysis were used to test the hypotheses formulated to guide the study. The coefficient of determination R^2 showed that 65% systematic variations in firm value could be explained by the independent variables. The F value (62.44647) was significant at 1% which means that the parameters estimated were statistically significant in explaining the effect of the independent variables on the dependent variable. The study, therefore, concluded that capital structure with regard to long term debt was negatively but statistically significant to firm value, while equity capital was positively insignificant to firm value. The study recommended that firms should be more concerned with management of equity capital in business financing since it is more related to the value of the firm.

Shourvarzi and Azadvar (2008) examined the relationship between investment opportunity and performances. Their results showed a positive relationship between investment opportunity and performance. Kordestani and Najafi (2009) examined the determinants of capital structure based on data from 93 companies listed in TSE during 2000-2007. Their findings indicate a positive significant relationship between firm size and liability ratio on book value as well as a positive significant relationship between investment opportunity and liability ratio.

Khademi (2010) studied the relationship between investment opportunity and asset growth at companies listed in TSE during 1999-2006. He used three criteria to measure investment opportunities. According to this study, there is a significant relationship between three indicators considered for investment opportunity and asset growth. The manipulation of these three criteria will leads to a higher level of asset growth. Hashemi and Akhlaghi (2011) examined the effect of financial leverage, dividend policy and profitability on firm value. Their results showed a positive significant relationship between financial leverage, dividend policy and profitability on firm value as well as a positive significant relationship between these variables and future firm value. In addition, the findings showed that probable increase in future firm value increases as the ratio of financial leverage, dividend policy and profitability increases.

Literature Gap

Okwo et al. (2012) assessed the impact of a company's investment in fixed assets on its operating profit margin. Olatunji et al. (2014) examined the effect of investment in fixed assets on profitability of selected Nigerian banks. Mawih (2014) on some listed manufacturing companies indicated that the fixed assets had impact on ROE but not on ROA. Martina (2015) investigated the relationship between tangible assets and the capital structure of Croatian small and medium-sized enterprises. Mawih (2014) examined the effects of assets structure (fixed assets and current assets) on the financial performance of some manufacturing companies listed on Muscat Securities Market (MSM), for the period 2008-2012. The above studies focused more on the effect investment structure on corporate profitability while this study focused on investment policy and stock prices of quoted manufacturing firms in Nigeria.

METHODOLOGY

Research Design

This study used ex-facto research design, to examine the relationship that exists between investment policy and value of quoted manufacturing firms in Nigeria. The choice of this form of research design is based on its reliability to provide objective estimates of study variable relationships free from subjective errors. The ex-post facto design was considered to be the right research design for the study.

Population of the Study

Nogales (2002) defined population as the total number of elements that conform to the characteristics needed for the purpose of the study. The population for this study consists of 63 quoted manufacturing firms listed on the Nigerian Stock Exchange (NSE) within the period of 2010 to 2019 financial years.

Sample and Sampling Techniques

From the population, a sample size of 15 quoted manufacturing firms was selected randomly from each manufacturing sector. The rationale for the sample size is the ease in getting relevant and reliable data for the study from the annual financial reports submitted to the Nigeria Stock Exchange within the time scope of this study.

Sources of Data

The data for this study are secondary data sourced from the financial statement and annual reports of the selected quoted firms.

Model Specification

From theories, principles and empirical findings, the models below are specified in this study.

$$NBV = \beta_0 + \beta_1 STPI + \beta_2 SSI + \beta_3 LTPI + \beta_4 LTI + \mu \quad 1$$

Where

NBV= Net Book Value of the quoted firms
STPI = Short term portfolio investment
SSI = Subsidiary investment
LTPI = Long term portfolio investment
LTI =Long term investment

β_0 =Regression Intercept

β_1 - $\beta 4$ =Coefficient of the independent variables to the Dependent variable

μ = Error term

Table 1: Analysis of Variables and A-Priori Expectation

Variable	Measurement	Notation	Expected relationship
Net book value	Log of total assets less depreciation	NBV	Dependent variable
Short term portfolio investment	Log of investment in short term financial assets	STPI	+
Subsidiary investment	Log of revenue from group company	SSI	+
Long term portfolio investment	Log of total portfolio investment	LTPI	+
Long term investment	Log of fixed assets	LTI	+

Techniques of Analysis

The signs and significance of the regression coefficients were relied upon in explaining the nature and influence of the explained variables and dependent variables as to determine both magnitude and direction of impact. Regression analysis is often concerned with the study of the dependence of one variable, the dependent variable, on one or more other variables, the explanatory variables, with a view to estimating and/or predicting the population mean or average value of the former in terms of the known or fixed (in repeated sampling) values of the latter (Gujarati and Porter, 2009).

Coefficient of Determination (r2)

The coefficient of determination is the primary way we can measure the extent, or strength, of the association that exists between two variables. In other word, it is measure of degree of linear association or correlation between two variables, one of which happen to be independent and other being dependent variable. It measures the percentage total variation in dependent variable explained by independent variables. The coefficient of determination value can have ranging from 0 to +1. If the regression line is perfect estimator R^2 = +1. Thus the value of R^2 = 0 when there is no correlation. In this study, coefficient of determination is calculated to know the degree of correlation of dividend per share with earning per share and market price per share with earning per share.

Regression Constant (a)

The value of constant, which is the intercept of the model, indicated the average level of dependent variable when independent variable is zero. In another words, it is better to understand that 'a' (constant) indicates the mean or average effect on dependent variable of all the variables omitted from the model.

Regression Coefficient

The regression coefficient of each independent variable indicates the marginal relationship between that variable and value of dependent variable, holding constant the effect of all other independent variables in the regression model. In other words, the coefficient describes how changes in independent variables affect the value of dependent variables estimate.

Standard Error of Estimate (SEE)

With the help of regression equations perfect prediction is practically impossible. The standard error of the estimate measures the accuracy of the estimated figures. It also measures the dispersion about an average line. If standard error of estimate is zero, then the estimating equation to be 'perfect' estimator of the dependent variable. It indicates that the smaller value of SE estimates the closer will be the dots to the regression line. Thus, with the help of standard error of estimate, it is possible for us to ascertain how good and representative the regression time is as a description of the average relationship between two series. In this research work, standard error of estimate is calculated for the selected dependent and independent variables specified on the model.

Regression Analysis

In coefficient analysis, two or more independent variables are used to estimate the value of dependent variables whereas in the simple regression analysis single independent variable is used to estimate the values of a dependent variable. Multiple regression analysis helps to know relative movement in the variable.

However, for the purpose of this study, panel data regression was employed because available data contain both time series and cross-sectional elements. A panel of data embodies information across time and space and most importantly, a panel retains the same entities and measures some quantity about them over time (Brooks, 2008). As such, this study employs the use of the panel data regression to analyze the performance of Nigerian manufacturing firms from 2009—2018.

Econometrically, the panel data standard linear model can be written as follows (Verbeek, 2012; Brooks, 2014);

$$Y_{it} = \beta_0 + X_{it}\beta + \varepsilon_{it} \quad (2)$$

Where Y_{it} is the dependent variable for firm —I at time-i; fib is the intercept term; X1 is a k dimensional vector of independent variables; ε_{it} is the error term; the error term changes over individuals and time and encompasses all unobservable factors that affect Y_{it}.

Moreover, in examining the panel data set through multiple regression techniques, this study is aware of the treatment of the possibilities of individual effects in the adopted models. Individual effect implies that each individual has a divergent effect. There are two core individual effects models in panel data analysis: the fixed effects model and the random effects model (Koop, 2008).

The Fixed Effects Model (FEM) takes into account the existence of each individual effect of the observations in a particular model. Put differently, the FEM allows for heterogeneity or individuality among entities by allowing them has separate intercept values. Hence, the individual effect subsists when it is assumed that each entity can have diverse intercepts in a particular model. Econometrically, the fixed effects model can be expressed as the equation below (Koop, 2008).

$$Y_{it} = ai + X_{it}\beta + \varepsilon_{it} \quad (3)$$

The above equation is almost similar with the common pooled model. Where, a_1 symbolizes a fixed (individual) effect. The difference resides in a_1, which varies across entities. Hence, it allows each entity to have its own separate intercept.

While the Random Effects Model (REM) just like the fixed effects, model suggests different intercept terms for each entity, it maintains that intercepts are constant over time, with the relationships between independent and dependent variables assumed to be same, both cross- sectionally and temporally (Brooks, 2014). The random effects model can be written as:

$$Y_{it} = \beta_0 + X_{it}\beta + ai + u_{it} \quad (4)$$

Where, Y_{it} is a k-dimensional vector of independent variables, but unlike the FEM, there are no dummy variables to capture the heterogeneity (variation) in the cross-sectional element.

= $\varepsilon_{it} = ai + u_{it}$, , which implies that the error term consists of two components: an individual specific component that does not vary over time, and a remainder component that is assumed to be uncorrelated over time (Brooks, 2014; Verbeek, 2012). Moreover, in deciding whether to adopt either the FEM or the REM, this study employs the Hausman-test. According to Koop

(2008), the idea behind the Hausnian-test rests on the assumption that if Ho (the individual effect is uncorrelated with any of the independent variables) is true, then both the FEM and REM estimators are consistent and provide relatively identical results. But, in the instance where 'Ho'is false, the REM will be inappropriate, while FEM will be suitable, and the results obtained could be quite dissimilar.

Multiple regression analysis makes it possible to analyze the relationships between background variables and the dependent variables of interest under the fixed effects or random effects models. In essence, panel data regression analysis is employed to evaluate the relationship between the risk, agency cost and corporate financial policies of the manufacturing firms.

RESULTS AND DISCUSSION OF FINDINGS

Table 1: Test of Panel Unit Root at Level Series

Method : Series: NPV	Statistic	Prob.**	Cross-sections	Obs
Levin, Lin & Chu t*	-9.03409	0.0000	15	120
Im, Pesaran and Shin W-stat	-3.76192	0.0001	15	120
ADF - Fisher Chi-square	72.8094	0.0000	15	120
PP - Fisher Chi-square	62.6941	0.0004	15	135
Series: LTI				
Levin, Lin & Chu t*	-3.97083	0.0000	15	120
Im, Pesaran and Shin W-stat	-2.30591	0.0106	15	120
ADF - Fisher Chi-square	52.2121	0.0072	15	120
PP - Fisher Chi-square	112.735	0.0000	15	135
Series: LTPI				
Levin, Lin & Chu t*	-3.52884	0.0002	15	120
Im, Pesaran and Shin W-stat	-1.74189	0.0408	15	120
ADF - Fisher Chi-square	44.2040	0.0457	15	120
PP - Fisher Chi-square	101.459	0.0000	15	135
Series: SSI				
Levin, Lin & Chu t*	-3.36546	0.0004	15	120
Im, Pesaran and Shin W-stat	-1.38862	0.0825	15	120
ADF - Fisher Chi-square	46.2578	0.0294	15	120
PP - Fisher Chi-square	80.6820	0.0000	15	135
Series: STPI				
Levin, Lin & Chu t*	-3.49379	0.0002	15	120
Im, Pesaran and Shin W-stat	-1.46964	0.0708	15	120
ADF - Fisher Chi-square	42.2599	0.0680	15	120
PP - Fisher Chi-square	66.4564	0.0001	15	135
Panel Unit Root Test at Difference				
Levin, Lin & Chu t*	-15.9430	0.0000	15	90
Im, Pesaran and Shin W-stat	-4.21918	0.0000	15	90
ADF - Fisher Chi-square	72.9396	0.0000	15	90
PP - Fisher Chi-square	159.490	0.0000	15	105
Series: D(LTI,2)				
Levin, Lin & Chu t*	-14.5325	0.0000	15	90
Im, Pesaran and Shin W-stat	-5.73333	0.0000	15	90
ADF - Fisher Chi-square	93.3152	0.0000	15	90
PP - Fisher Chi-square	254.873	0.0000	15	105
Series: D(LTPI,2)				
Levin, Lin & Chu t*	-30.7744	0.0000	15	90
Im, Pesaran and Shin W-stat	-7.85997	0.0000	15	90
ADF - Fisher Chi-square	86.2216	0.0000	15	90
PP - Fisher Chi-square	226.145	0.0000	15	105

Series: D(SSI,2)				
Levin, Lin & Chu t*	-6.92146	0.0000	15	90
Im, Pesaran and Shin W-stat	-2.96811	0.0015	15	90
ADF - Fisher Chi-square	63.6347	0.0003	15	90
PP - Fisher Chi-square	161.193	0.0000	15	105
Series: D(STPI,2)				
Levin, Lin & Chu t*	-13.5391	0.0000	15	90
Im, Pesaran and Shin W-stat	-4.66144	0.0000	15	90
ADF - Fisher Chi-square	83.2379	0.0000	15	90
PP - Fisher Chi-square	193.040	0.0000	15	105

Source: Extract from E-View Window, 9.0, 2021

The objective of table 2 was to test the stationarity of the variables on the relationship between investment policy and value of the quoted manufacturing firms at level using four test statistics which are Levin, Lin & Chu t, Im, Pesaran and Shin W-stat, ADF - Fisher Chi-square and PP - Fisher Chi-square. The results show that stock price is not stationary at level using Levin, Lin & Chu t, Im, Pesaran and Shin W-stat, ADF - Fisher Chi-square but stationary with PP - Fisher Chi-square. other results show that some of variables are stationary at level with and PP - Fisher Chi-square while some are not stationary Levin, Lin & Chu t, Im, Pesaran and Shin W-stat, ADF - Fisher Chi-square and PP - Fisher Chi-square. The results show that all the variables are stationary at first difference, therefore we conclude that the variables are integrated in the order of 1(I).

Table 3: Presentation of Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LTI	0.016356	0.038289	0.427173	0.6700
LTPI	-0.054333	0.036766	-1.477798	0.1419
SSI	0.020692	0.034049	0.607727	0.5444
STPI	-1.987808	1.69E-08	-1.175419	0.2420
C	0.576913	0.370285	1.558027	0.1216
	Effects Specification			
Cross-section fixed (dummy variables)				
R-squared	0.728406	Mean dependent var		0.445667
Adjusted R-squared	0.691088	S.D. dependent var		0.445399
S.E. of regression	0.247552	Akaike info criterion		0.163505
Sum squared resid	8.027958	Schwarz criterion		0.544852
Log likelihood	6.737107	Hannan-Quinn criter.		0.318434
F-statistic	19.51877	Durbin-Watson stat		1.181122
Prob(F-statistic)	0.000000			

Correlated Random Effects - Hausman Test			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	16.597209	4	0.0023

Source: Extract from E-View Window, 9.0, 2021

The probability of the Hausman test is 0.0023 < 0.05 therefore the null hypothesis is rejected, this implies that the fixed effect results is appropriate for the study. Base on the fixed effect results, we formulate the regression line.

NBV = 0.576913+ 0.016356 LTI -0.054333 LTPI + 0.020692SSI + -1.987808 STPI + εt

The result shows that the adjusted R^2 is 0.691088 indicating that the independent variables explained 69.1 percent of the systematic variation in net book value of the quoted manufacturing firms over the observed years, while the remaining 30.9 percent is explained outside the unspecified variables, thus, exogenously explained. The F-statistic and probability informs that the model is significant while the Durbin Watson statistic informed that the results are free from autocorrelation. The regression results informed us that if the variables are hold constant, net book value of the quoted manufacturing firms can increase by

0.576. The beta coefficient informed that long term investment and subsidiary investment have positive relationship with net book value of the quoted manufacturing firms while short term and long-term portfolio investment have negative relationship with net book value of the quoted manufacturing firms. The probability coefficient of the variables informed us that the independent variables are statistically not significant.

Table 4: Presentation of Panel Cointegration Results

		Statistic	Prob.	Weighted Statistic	Prob.
Pedroni Residual Cointegration Test					
Series: NBV LTI LTPI SSI STPI					
		Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic		-2.931510	0.0083	-3.205337	0.0093
Panel rho-Statistic		3.969825	0.0000	4.458322	0.0000
Panel PP-Statistic		1.211586	0.0472	3.103837	0.9990
Panel ADF-Statistic		2.759636	0.0071	3.498135	0.0098
		Statistic	Prob.		
Group rho-Statistic		5.924970	0.0000		
Group PP-Statistic		3.414917	0.0097		
Group ADF-Statistic		2.817152	0.0076		

Table 4 tested whether long–run steady state or cointegration exist among the variables and to confirm what Coiteux and Olivier (2000) state that the panel cointegration tests have much higher testing power than conventional cointegration test. Since the variables are found to be integrated in the same order I (1), we continue with the panel cointegration tests proposed by Pedroni (1999, 2004). In constant level, we found that the seven statistics reject null hypothesis of no cointegration at the five percent level of significance for the ADF statistic and group ρ –statistic, while the group –ADF is significant at one percent level.

Table: 5

Null Hypothesis:	Obs	F-Statistic	Prob.
LTI does not Granger Cause NBV	120	0.03725	0.9634
NBV does not Granger Cause LTI		1.05658	0.3510
LTPI does not Granger Cause NBV	120	0.79470	0.4542
NBV does not Granger Cause LTPI		0.17362	0.8408
SSI does not Granger Cause NBV	120	0.14694	0.8635
NBV does not Granger Cause SSI		6.53512	0.0021
STPI does not Granger Cause NBV	120	0.44823	0.6399
NBV does not Granger Cause STPI		0.40557	0.6675

Source: Extract from E-View Window, 9.0, 2020

As shown in table 5, there is no causal relationship between the variables, this means we accept null hypothesis of no causal relationship as against the alternate.

Table 6: Test of Panel Cointegration Test for Sampled Firms

Cross ID	AR (1)	Variance	HAC	Bandwidth	Obs
Cross ID	AR (1)	Variance	Lag	Max lag	Obs
Berger paint plc	0.043	0.001735	1	--	8
Premier paint plc	-0.092	0.002785	1	--	8
Dangote cement plc	-0.208	0.003220	1	--	8
Lafarage wapco plc	0.892	0.003770	1	--	8
Cutix plc	0.043	0.008214	1	--	8
Cement company of north plc	-0.626	0.064355	1	--	8
Flour mills plc	0.260	0.011532	1	--	8

Unilever plc	-0.277	0.019627	1	--	8
Guiness plc	0.697	0.007758	1	--	8
Nigeria breweries plc	0.630	0.023254	1	--	8
Glaxsmithline plc	-0.808	0.010669	1	--	8
May and baker plc	-0.130	0.015681	1	--	8
Livestock feeds plc	-0.357	0.054804	1	--	8
National salt company plc	0.427	0.069984	1	--	8
GEIF Company plc	-0.216	0.003734	1	--	8

Source: Extract from E-View Window, 9.0, 2021

The result of the power for all the test procedure when the underlying time series model is stationary AR, all the procedures produced a reasonably high power over all the sample sizes and order considered except at order 2 where ADF (Augmented Dickey Fuller) and KPSS produced extremely low power compared to PP. Under this condition, Philip-Peron (PP) has the highest power over all the sample sizes and AR orders considered. The table presents similar analysis on stationary MA, the power of the tests are extremely high over all the sample sizes and orders considered. Similar conclusion as in AR was also observed here. Table 4.6 presents the power of the mixed model (Stationary ARMA), all the test procedures produced high power over all the sample sizes at order 1 but ADF and KPSS produced low power over all the sample size at order 2 & 3.

Discussion of Findings

The objective of the second hypothesis was to test the relationship between investment policy and net book value of the quoted manufacturing firms. The multiple regression formulated in the chapter three of this study had net book value as the dependent variable. Results from the estimated model shows that investment policy explains 69.1 percent (adjusted R^2) variation on net book value. The estimated regression line is significant when judged from the f-statistic and probability. The Durbin Watson statistic proved that the result is free from autocorrelation.

The multiple regression results further revealed that short term portfolio investment have negative and no significant relationship with net book value of the quoted manufacturing within the periods covered in this study. The estimated coefficient indicates that increase in short term portfolio investment will reduce net book value of the firms by 1.9 percent (see table 3). The negative relationship between short term portfolio investment and net book value of the quoted manufacturing firms contradict our a-priori expectation and justify theories of investment. The negative relationship between the variable contradict the findings of Nwala, Gimba and Oyedokun (2020) that dividend payout and equity issuance have significantly impacted on firm performance (Tobin Q).

The multiple regression results further revealed that long term portfolio investment have negative and no significant relationship with net book value of the quoted manufacturing within the periods covered in this study. The estimated coefficient indicates that increase in long term portfolio investment will reduce net book value of the firms by 0.05 percent (see table 3). The negative relationship between long term portfolio investment and net book value of the quoted manufacturing firms contradict our a-priori expectation and contradict theories of investment. The negative relationship between the variable confirm the findings of Okeke (2019) that capital structure with regard to long term debt was negatively but statistically significant to firm value, while equity capital was positively insignificant to firm value.

The multiple regression results further revealed that long term investment have positive but no significant relationship with net book value of the quoted manufacturing within the periods covered in this study. The estimated coefficient indicates that increase in long term portfolio investment will increase net book value of the firms by 0.016 percent (see table 3). The positive relationship between long term investment and net book value of the quoted manufacturing firms confirm our a-priori expectation and justify theories of investment. It could be recalled that the neoclassical theories assume optimization behavior on behalf of the decision maker (investor). The neoclassical and Tobin's theory of investment explicitly assumes profit/value maximization. The accelerator theory of investment assumes this implicitly, by assuming that investment is determined by an optimal capital stock this means that investments are made until the net present value is equal to zero. The positive relationship between the variable confirm the findings of Uzokwe (2019) whose findings validated the relevance of capital structure theory formulated by Gordon in 1956.

However, the multiple regression results further revealed that subsidiary investment have positive but no significant relationship with net book value of the quoted manufacturing within the periods covered in this study. The estimated coefficient indicates that increase in subsidiary investment will increase net book value of the firms by 0.02 percent (see table 3). The positive

relationship between subsidiary investment and net book value of the quoted manufacturing firms confirm our a-priori expectation and justify theories of investment. The positive effect of subsidiary investment on the net book value of the quoted firms can be traced to effective investment policies such as corporate diversifications. The positive relationship between the variable contradict the findings of Uzokwe (2019) whose findings validated the relevance of capital structure theory formulated by Gordon in 1956.

CONCLUSION AND RECOMMENDATIONS

Conclusion

The result shows that the adjusted R^2 is 0.691088 indicating that the independent variables explained 69.1 percent of the systematic variation in net book value of the quoted manufacturing firms. The study found that long term investment and subsidiary investment have positive relationship with net book value of the quoted manufacturing firms while short term and long-term portfolio investment have negative relationship with net book value of the quoted manufacturing firms while the probability coefficient of the variables informed us that the independent variables are statistically not significant.

From the estimated regression results, we conclude that, that there is no significant relationship between long term investment and net book value, no significant relationship between long term portfolio investment and net book value, no significant relationship between subsidiary investment and net book value, that there is no significant relationship between short term portfolio investment and net book value and that there is no significant relationship between total capital ratio and stock prices of the quoted manufacturing firms.

Recommendations

i. Proper investment analysis should be carried out in appraising short term investment to enhance value of manufacturing firms. There is need for management to integrate the objectives of long term investment with the value objective of Nigeria manufacturing firms.

ii. The finance manager of the manufacturing firms should widen the equity investment and the financial market should be well examined to achieve value. Investment in subsidiaries of the manufacturing firms should be increased and management should formulate policies of managing subsidiary investment. There is need for manager to formulate measures and policies of investment management among the manufacturing firms.

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