
FIRM CHARACTERISTICS AND CASH HOLDINGS OF QUOTED CONGLOMERATES IN NIGERIA

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Abstract

This study examined the nexus between firm characteristics and cash holdings of quoted conglomerates in Nigeria. Six (6) conglomerates constituted the sample size of this study between 2002 and 2021. Ex-Post facto research design was adopted while secondary data were collected from the annual reports and accounts of the sampled conglomerates and analysed using E-Views 9.0 statistical software. The study employed descriptive statistics and inferential statistics using Pearson correlation and Ordinary Least Square (OLS) regression analysis. Cash holding was measured with cash ratio while firm characteristic was measured using firm size, research and development and leverage. Three hypotheses were formulated and statistically tested at 5 per cent level of significance using Panel Least Square Regression (PLS) analysis, granger causality test and hausman test. Findings from the empirical analysis showed that there is a significant negative relationship between firm size cash ratio and; a significant negative relationship between research and development and cash ratio; a significant negative relationship between leverage and cash ratio of conglomerates listed on Nigeria Stock Exchange at 5% level of significance respectively. It was recommended amongst others that conglomerates should prefer to fund themselves with resources generated internally before resorting to the market in order to safeguard the firms against potential concerns of having to suffer potential losses from forced sale of assets to obtain cash.

Keywords: Firm Characteristics, Leverage, Research and Development, Cash holdings

Introduction

Since the outset of the financial crisis of 2008, the topic of corporate cash holdings has received considerable attention from many different interest groups, including economists, politicians, investors, banks, journalists, and Chief Finance Officers themselves. This interest has been sparked by the extremes that corporate cash holdings have traversed over the course of the financial crisis. Cash holdings are an essential part of the firm's growth and survival and receive a significant amount of interest by investors and financial analysts. Liquidity is measured as the ratio of cash and cash equivalents (Ezechukwu & Amahalu, 2020). This ratio deviates to a number of factors such as industry and firm's characteristics. Why do firms hold cash? There are some benefits proving cash holdings valuable to firms and its shareholders.

Cash holdings of firms have risen in significance during the financial crisis in the U.S and in Europe. Cash reserves for firms are vital – like oil in a car's engine. As we pick the appropriate oil for our car's engine, no less than the best the engine can get, the same way firms need to identify the optimal cash holding rate. Interestingly, arguments are put forward to explain the fluctuations that have varied in cash holdings. They have ranged from a recession and dearth of external finance to a lack of growth opportunities and historically low interest rates (Oshiole, Elamah & Amahalu, 2020). Cash becomes especially important in recessions. The credit crunch that started in late 2007 has had a massive and sustained impact on the way many companies operate throughout the world. Companies with sufficient cash on hand may escape the need to tap into the increasingly costly and restrictive credit markets. In financial environment without asymmetric information, taxes and agency and/or transaction costs, firms would not have need to hold cash since there are no benefits or costs of allocating cash. If internal cash of company is not enough they can obtain external financing at fair prices, without to compromise growth and investment. Hence, in a frictionless world, decisions about cash would not impact the firm value or shareholder wealth (Amahalu & Ezechukwu, 2017). Nevertheless, the markets are far from perfect; thus, raising external capital is more costly for firms relative to internal resources, due to market imperfections. As Denis and Sibilkov (2007) pointed out, some firms with attractive growth options in their portfolio take fewer investments than the first- best optimum. Therefore, in imperfect market cash holdings are an important asset in financial structures of these firms. Keynes (1936) began the financial literature about cash holdings, suggesting two key benefits from allocating cash: i) reduction transaction costs since to make payments firms do not need to liquidate assets and ii) cash is a precious buffer to meet future uncertainty. Accordingly, two main economic theories support the decision of firms to hold cash: the trade-off theory and the financial hierarchy theory (also known as the pecking order theory). Developed by Miller and Orr (1966), the trade-off theory suggests that firms define a target level of cash holdings by trading off the marginal costs and marginal benefits of cash allocation. In the opposite direction, the financial hierarchy theory sustain that there is neither optimal level of cash holdings nor an optimal debt for firms.

Firm characteristics are conceptualized differently by various studies depending on the criteria used to define it. Firm resources and objectives can be analyzed using three criteria namely structure, market and capital related firm characteristics. Structural firm characteristics includes, firm size, ownership and age. Moreover, Market related variables include industry type, environmental uncertainty and market environment while Capital-related variables consist of

liquidity and capital intensity. This study aims at shedding light on the empirical relationship between cash holdings and firm characteristics of quoted conglomerates in Nigeria.

Statement of the Problem

Firms are presumed to be operating on a going concern basis and hence have perpetual life. In reality, this may not be the case as companies often fail under unforeseen circumstances. Despite good rating and aggressive strategies, firms still encounter financial distress problems. Business success depends heavily on the ability of financial managers and the stakeholders in the execution of business operations. Thus, in the presence of asymmetric information companies prefer to finance their new investments projects first with cash generated internally, second with low risk debt and lastly with equity (Amahalu & Obi, 2020). Agency costs also influence the allocating of cash. Because holding cash is a matter of managerial discretion, and turning excess corporate cash into personal benefits is less costly to managers than transferring other assets to private benefits. Managers have strong incentives to hold more cash, therefore, high cash holdings may lead to the agency problem of free cash and, consequently, harm shareholders expectations and inadvertently on firm characteristics (profitability, asset structure, liquidity, business risk, growth opportunities/Tobin's Q, firm size, leverage, cash flow, net working capital investment, research and development and so on). However, the agency problem of free cash flow is more likely to arise in profitable firms with limited investment opportunities. Various anecdotal and empirical studies on this topic have already been conducted in different countries. The studies have documented an increase trend in the cash holdings for US firms (e.g., Bates, Kahle & Stulz 2009) and for European Union (EU) firms (Diaw 2020). Belgian firms (Drobetz & Grüninger, 2007); Nigeria (Amahalu & Ezechukwu, 2017). Yet, little or no attention has been given to the effect of firm characteristics cash holdings of conglomerates in Nigeria. In an attempt to fill the variables gap; this study considered Research and Development spending as a driver for firm characteristics. More so, prior similar studies focused on single-segment firms while the predominant focus of this present study is on diversified firms as applied on conglomerates in Nigeria.

Objectives of the Study

The main objective of this study is to ascertain the relationship between firm characteristics and cash holdings of quoted conglomerates in Nigeria.

The specific objectives of this study are to:

- i. Ascertain the relationship between firm size and cash ratio of quoted conglomerates in Nigeria.
- ii. Determine the relationship between research and development and cash ratio of quoted conglomerates in Nigeria.
- iii. Evaluate the relationship between leverage and cash ratio of quoted conglomerates in Nigeria.

Research Hypotheses

In a bid to proffering answers to the research questions above, the following were hypothesized in a null form:

H₀₁: There is no significant relationship between firm size and cash ratio of quoted conglomerates in Nigeria.

H₀₂: There is no significant relationship between research and development and cash ratio of quoted conglomerates in Nigeria.

H₀₃: There is no significant relationship between leverage and cash ratio of quoted conglomerates in Nigeria.

Review of Related Literature

Cash Holdings

Cash holdings as that amount of cash set aside by an organization or firm to meet up with its financial need. It is useful to firms in cases when financing through external sources is more expensive than internally generated funds. Zhang (2016) defined cash holdings as cash and short term investment to asset. Amahalu and Obi (2020); Amahalu, Okoye and Nnadi (2023) wonder whether cash holdings evolve over the life cycle of the firm. In particular, they argue that young firms actively maintain a target cash ratio while older established firms may adjust their cash holdings more slowly. Cash holding as a vital aspect of any firm helps them maintain optimum liquidity.

Cash Ratio

Cash ratio represents the relationship of cash and current liabilities, indicating part of current liabilities that can be settle immediately. Analyst seldom gives the cash ratio much weight when evaluating the liquidity of a firm because it is not realistic to expect a firm to have enough cash equivalents and marketable securities to cover current liabilities (Amahalu, Ezechukwu & Okudo, 2022). Besides, it is important to emphasize that cash often has a high volatility. It is important to notice that a high cash ratio indicates that the firm is not using its cash to its best advantage; cash should be put to work in operations of the company (Ndum, Okoye & Amahalu, 2019). It is an extreme liquidity ratio since only cash and cash equivalents are compared with the current liabilities. Cash equivalents are assets which can be converted into cash quickly whereas current liabilities are those liabilities which are to be settled within 12 months or the business cycle.

Firm Characteristics

Firm characteristics are a firm's demographic and managerial variables which in turn comprise part of the firm's internal environment. Firm characteristics include firm size, leverage, liquidity, sales growth, asset growth, and turnover. Others include ownership structure, board characteristics, age of the firm, dividend pay-out, profitability, access to capital markets and growth opportunities (Okegbe, Eneh & Amahalu, 2019).

Firm Size

Optimal firm size refers to the speed and extent of growth that is ideal for a specific small business. Optimal firm size is dependent on a variety of internal and external factors (Okudo, Ezechukwu & Amahalu, 2022). Growth of some kind, either in revenues, profits, number of employees, or size of facilities, is essential for almost every business. For many companies competing in rapidly changing industries, expansion (of manufacturing capacity, geographic presence, market share and so on) may be imperative for survival (Egolum, Amahalu & Obi, 2019). But smart growth strategies can be elusive, as many entrepreneurs have learned to their chagrin.

Research and Development

Research and development (R&D) refers to the investigative activities a business conducts to improve existing products and procedures or to lead to the development of new products and procedures. Research and development (R&D) describes activity or expense associated with the research and development of a company's goods or services. R&D expenses are a type of operating expense and can be deducted as such on a business tax return. This type of expense is incurred in the process of finding and creating new products or services (Aruna, Oshiole & Amahalu, 2020). Conglomerates across all sectors and industries utilize R&D to improve on product lines, and corporations experience growth through these improvements and through the development of new goods and services. In general, pharmaceuticals, semiconductor and software/technology companies tend to spend the most on R&D (Okudo & Ndubuisi, 2021).

Leverage

Leverage ratio is a portion of firm assets financed with any type of fixed-charge financing such as debt or leases. Thus, leverage is a tool if prudentially employed increase earnings potential of the residual owners. Okoye, Amahalu, Nweze and Obi (2016), contend that leverage ratio is a measure of potential, rather than actual, capital gain. Therefore, leverage ratio suggest the effects of possible changes in price-pointing out which groups might be vulnerable to, or favoured by price changes of various type. Leverage ratio indicates the firm's risk exposure in meeting debt service charges. A high leveraged firm faces a higher risk that its equity capital can be wiped out when outcomes from its exposure to risky assets are unfavourable (Okudo, Mbonu & Amahalu, 2022). Higher leverage magnifies market risk as leverage firm may be forced to sell assets in order to reduce exposure under adverse market conditions. Thus, firm that is heavily financed by debt offers creditors less protection in the event of bankruptcy.

Cash Holdings and Firm Size

As argued by Rajan and Zingales (1995), because of diversification, larger firms have more stability of cash flow and therefore they have lower probability of being in financial distress. It would be easier for these firms to have access to diversified funding sources, which is often not possible for smaller one. In a similar vein, Eneh, Okegbe and Amahalu (2019) argue that large firms are considered to be more diversified than their small counterparts and in turn less prone to bankruptcy related costs. Consequently, they are less likely to store cash reserves. In line with these arguments, Okudo, Amahalu, Obi & Okafor (2022); Amahalu, Okoye, Obi, and Iliemena (2019) state that big firms are more likely to be able to liquidate part of non-core assets to obtain cash, which reduces the likelihood of encountering financial distress. Contradicting the trade-off view, the pecking order theory affirms that cash holdings increase with firm size, because larger firms are expected to have been more profitable historically and thus accumulated more cash.

Cash Holdings and Research & Development

The tradeoff theory predicts a positive relationship between investment opportunities, as research and development expenditures and cash (Dittmar, Mahrt-Smith & Servaes, 2003). In addition, Dittmar et al., (2003) find that firms with higher level of R&D expenses deflated to sales have higher cash holdings, which supports both the transactions costs and precautionary motives. Moreover, firms with high growth and investment opportunities hold more cash for precautionary reasons. Bates, Kahle and Stulz (2009) found that firms with higher R&D expenditures hold more cash. According to Opler, Pinkowitz, Stulz and Williamson (2001),

R&D expenditures consume cash, but R&D role as proxy for growth opportunities and financial distress could lead to a positive relationship between the cash ratio and R&D expenditures. In contrary, Saddour (2006) predicts a negative relationship between R&D and Cash holdings.

Cash Holdings and Leverage

In line with the transaction cost motive, highly levered firms face high costs when investing in liquid assets and should hence hold less cash (Ferreira & Vilela, 2004). In emerging markets, Abiahu, Egbunike, Udeh, Egbunike and Amahalu (2019) suggest that bankruptcy related costs are also important, since different studies in the emerging market context find evidence for these costs. Further, according to the pecking order theory, cash holdings should decrease with leverage, because if internally generated funds are not sufficient, firms will use its liquid reserves before issuing debt, but if the firm has internal surplus it will pay down its debt (Omojolaibi, Okudo & Shojobi, 2019; Ezechukwu, Amahalu & Okudo, 2022). On the other hand, Jensen (1986)'s free cash flow argument suggests that, payouts, in the form of interest payments, reduce the resources under the management, thereby reducing managers' power and increasing the likelihood of monitoring by the capital markets. However, low leverage firms are less subject to monitoring, allowing for superior managerial discretion.

Theoretical Framework

Trade-off theory

The trade-off theory of capital structure is the idea that a company chooses how much debt finance and how much equity finance to use by balancing the costs and benefits. The classical version of the hypothesis goes back to Kraus and Litzenberger (1973) who considered a balance between the dead-weight costs of bankruptcy and the tax saving benefits of debt. Often agency costs are also included in the balance. This theory is often set up as a competitor theory to the pecking order theory of capital structure (Amahalu, Ezechukwu, Egolum and Obi, 2018). An important purpose of the theory is to explain the fact that corporations usually are financed partly with debt and partly with equity. It states that there is an advantage to financing with debt, the tax benefits of debt and there is a cost of financing with debt, the costs of financial distress including bankruptcy costs of debt and non-bankruptcy costs (e.g. staff leaving, suppliers demanding disadvantageous payment terms, bondholder/stockholder infighting, etc.). The marginal benefit of further increase in debt declines as debt increases, while the marginal cost increases, so that a firm that is optimizing its overall value will focus on this trade-off when choosing how much debt and equity to use for financing.

Pecking Order theory

The pecking order theory of Myers (1984) and Myers and Majluf (1984) asserts that to minimize asymmetric information costs and other financing costs, firms should finance investments first with retained earnings, then with safe debt and risky debt, and finally with equity. Extending this theory to the explanation of the determinants of cash leads to the conclusion that there is no optimal cash level but instead, cash is used as a buffer between retained earnings and investment needs. Under this theory, the cash level would just be the result of the financing and investment decisions. Consequently, when current operational cash flows are enough to finance new investments, firms repay debt, to pay dividends and finally to accumulate cash. When retained earnings are insufficient to finance current investments, firms use the accumulated cash holdings

and, if needed, issue new debt and finally when they get out of their debt servicing capacity they will issue securities.

Empirical Review

Singh and Misra (2019) examined the determinants of the cash-holding levels for the Indian agrarian enterprises during 1995-2016 periods. With the help of weighted least-squares (WLS) regression analysis, the study found evidence that the Indian agro-enterprises with greater lucrative opportunities tend to hold less cash. On the other side, it was found that large agro-enterprises tend to hold some other mode of liquid assets rather than cash. The firms with higher capital expenditure and distributing profits as a dividend were shown to hold more cash. In the analysis, study found supportive evidence of the static trade-off theory of cash holding. In general, transaction motives and precautionary motives also play an important role in explaining the determinants of cash holding levels for Indian agrarian enterprises.

Nnado, Onyeka and Ugwu (2020) examined the empirical relationship between firm size, financial leverage and level of cash and cash equivalents of selected quoted manufacturing firms in the Nigerian Stock Exchange. Ex-post-facto research approach via panel least squares was employed to assess the nature and extent of association between the variables. Data were collated from the audited annual reports of thirty-seven (37) manufacturing firms for the thirteen year period: 2006-2018. Diagnostic tests were carried out on the collated data using Levin-Lin-Chu panel unit-root test which confirmed their stationarity and Westerlund Panel Cointegration Tests that depicted the variables were not cointegrated in the long run. Hypothetical statements tested using panel least squares revealed that while financial leverage (Lev) exerted non-significant negative influence on the firm's level of cash and cash equivalents, natural logarithm of total assets exerted non-significant but positive influence on cash holdings. This implies that firms keeping insufficient liquid assets may be forced to borrow from external sources at exorbitant costs or become illiquid.

Mukhlisin (2020) examined the relationship between earnings quality and cash holdings. The test was conducted on a panel of random effects model data with a sample of 130 non-financial and banking companies listed on the Indonesia Stock Exchange on 910 observations from 2012-2018. The study proved that the earnings quality and expertise of the audit committee had a negative effect on holding cash. The study also found that audit committee expertise can improve earnings quality so that it can strengthen its relationship by holding cash.

Methodology

Research Design

The research design employed in this study is the *ex-post facto* research design.

Population of the Study

The population of the study consists of the six (6) quoted conglomerates in Nigeria from 2002 to 31st December 2021. They include A.G Leventis Nigeria Plc, Chellarams Plc, John Holt Plc, SCOA Nig Plc, Transnational Corporation of Nigeria Plc and UACN Plc. Since the entire population size was utilised in this study then, there is no need for sample size and sampling technique.

Source of Data

The nature of data for this study is essentially secondary data. The scope of this study spanned from 2002-2021 to ensure robustness of the empirical result. Panel data were collected from publications of the Nigerian Exchange Group, Fact books and Annual report and accounts of the sampled firms. The sourced data were in respect to firm size, leverage, research and development, net working capital and capital expenditure.

Measurement of Variables**Table 1: Descriptions of Variables**

S/N	Variables	Definition	Type	Measure
1	FSZ	Firm Size	Independent	Natural logarithm of total asset
2	RAD	Research & Development	Independent	Research and development spending /Sales
3	LEV	Leverage	Independent	Total debt/Total asset
4	CR	Cash Ratio	Dependent	Cash + cash equivalents/Current liabilities
5	NWC	Net Working Capital	Control	Total current assets - Total current liabilities
6	CAPEX	Capital Expenditure	Control	Capital Expenditure/Total assets

Model Specification

The regression model for the hypotheses is as follows:

$$CR_{it} = \alpha + \beta_1 FSZ_{it} + \beta_2 NWC_{it} + \beta_3 CAPEX_{it} + \mu_{it} \quad - \quad - \quad - \quad H_{01}$$

$$CR_{it} = \alpha + \beta_1 RAD_{it} + \beta_2 NWC_{it} + \beta_3 CAPEX_{it} + \mu_{it} \quad - \quad - \quad - \quad H_{02}$$

$$CR_{it} = \alpha + \beta_1 LEV_{it} + \beta_2 NWC_{it} + \beta_3 CAPEX_{it} + \mu_{it} \quad - \quad - \quad - \quad H_{03}$$

Where:

α = Constant term

$\beta_1, \beta_2, \beta_3$ = Beta Coefficients to be estimated

FSZ_{it} = Firm Size for firm i in period t

RAD_{it} = Research and Development firm i in period t

LEV_{it} = Leverage firm i in period t

CR_{it} = Cash Ratio firm i in period t

NWC_{it} = Net Working Capital firm i in period t

$CAPEX_{it}$ = Capital Expenditure firm i in period t

Data Presentation and Analysis**Table 2: Pearson Correlation Matrix**

	CR	FSZ	RAD	LEV	NWC	CAPEX
CR	1.000	-0.149	-0.606	-0.386	0.261	-0.177
FSZ	-0.149	1.000	0.046	-0.006	0.232	0.068
RAD	-0.606	0.046	1.000	-0.200	-0.552	0.283
LEV	-0.386	-0.006	-0.200	1.000	0.241	0.123
NWC	0.261	0.232	-0.552	0.241	1.000	0.013
CAPEX	-0.177	0.068	0.283	0.123	0.013	1.000

Source: E-Views 9.0 correlation output, 2023

Interpretation of Pearson Correlation Matrix

Correlation analysis aids in determining the degree of association between two or more variables. Pearson correlation coefficient was used to assess the strength of direction of the association between the variables. The Pearson correlation analysis reveals that CR correlates negatively with FSZ (-0.149), RAD (-0.606), LEV (-0.386), and CAPEX (-0.177) but correlates positively with NWC (0.261).

Test of Hypotheses**Test of Hypothesis I**

H₀₁: There is no significant relationship between firm size and cash ratio of quoted conglomerates in Nigeria.

H₁: There is significant relationship between firm size and cash ratio of quoted conglomerates in Nigeria.

Table 3 Panel Least Regression analysis showing the relationship between FSZ, NWC, CAPEX and FSZ

Dependent Variable: CR
 Method: Panel Least Squares
 Date: 03/17/23 Time: 16:54
 Sample: 2002 2021
 Periods included: 20
 Cross-sections included: 6
 Total panel (balanced) observations: 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.84763	0.220092	49.28679	0.0000
FSZ	-0.686428	1.269864	-4.540552	0.0000
NWC	0.537952	0.832859	6.000000	0.0000
CAPEX	0.029796	0.063579	0.468649	0.6403
R-squared	0.707774	Mean dependent var	10.95154	
Adjusted R-squared	0.680848	S.D. dependent var	1.267825	
S.E. of regression	1.280972	Akaike info criterion	3.369450	
Sum squared resid	170.6526	Schwarz criterion	3.468788	
Log likelihood	-177.9503	Hannan-Quinn criter.	3.409728	
F-statistic	64.71602	Durbin-Watson stat	1.328643	
Prob(F-statistic)	0.000000			

Source: E-Views 9.0, Regression Output 2023

Interpretation of Regression Result

In table 3, a panel least square regression analysis was conducted to test the relationship between cash ratio and firm size. Adjusted R squared is coefficient of determination which tells us the variation in the dependent variable due to changes in the independent variable. From the findings in the table 4.3, the value of adjusted R squared was 0.681, an indication that there was variation of 68.1% on firm size due to changes in FSZ, NWC and CAPEX. This implies that only 68.1% changes in firm size of conglomerates could be accounted for by FSZ, NWC and CAPEX, while 31.9% was explained by unknown variables that were not included in the model. The probability of the slope coefficients indicate that; $P(x_1 = 0.0000 < 0.05; x_2 = 0.0000 < 0.05; x_3 = 0.6403 > 0.05)$. The co-efficient value of; $\beta_1 = -0.686428$ for FSZ implies that CR is negatively related to FSZ, though statistically significant at 5%.

The linear regression model becomes;

$$CR = 10.84763 - 0.686428FSZ + \mu$$

The implication is that, for there to be a unit/one naira increase in CR there will be 0.686428 multiplying effect decrease of FSZ. The Durbin-Watson Statistic of 1.328643 suggests that the model does not contain serial correlation. The F-statistic of the FSZ regression is equal to 64.71602 and the associated F-statistic probability is equal to 0.000000, so the null hypothesis was rejected and the alternative hypothesis was accepted.

Table 4: Output of Hausman Test

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	8.547801	3	0.0346

Source: E-Views 9.0 Hausman Output, 2023

The rule for Hausman test is as follows:

- If the p value $> \alpha = 0.05$ then the variable does not have a significant effect (Accept H_0).
- If the p value $< \alpha = 0.05$ then the variable have a significant effect (Accept H_1)

Interpretation of Post Regression Analysis

From the Hausman test result in table 4.7, the p-value is 0.0346, this is statistically significant at the conventional level of 0.05. Thus, the Fixed Effect Model (FEM) is more appropriate than the Random Effect Model (REM) in ascertaining the relationship between firm size and cash ratio of quoted conglomerates in Nigeria at 5% level of significance.

4. Test of Hypothesis II

H₀₂: There is no significant relationship between research and development and cash ratio of quoted conglomerates in Nigeria.

H₂: There is significant relationship between research and development and cash ratio of quoted conglomerates in Nigeria.

Table 5: Panel Least Regression analysis showing the relationship between CR, NWC, CAPEX and RAD

Dependent Variable: CR

Method: Panel Least Squares

Date: 03/17/23 Time: 17:02

Sample: 2002 2021

Periods included: 20

Cross-sections included: 6

Total panel (balanced) observations: 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.563827	0.081015	6.959511	0.0000
RAD	-0.098783	0.467433	-4.211332	0.0000
NWC	0.118313	0.306573	3.385920	0.0003
CAPEX	0.038083	0.023403	2.627260	0.0067
R-squared	0.827753	Mean dependent var		0.664055
Adjusted R-squared	0.781293	S.D. dependent var		0.471453
S.E. of regression	0.471522	Akaike info criterion		1.370633
Sum squared resid	23.12266	Schwarz criterion		1.469971
Log likelihood	-70.01419	Hannan-Quinn criter.		1.410911
F-statistic	66.98955	Durbin-Watson stat		1.786808
Prob(F-statistic)	0.000000			

Source: E-Views 9.0, Regression Output 2023

Interpretation of Regression Analysis

This study adopts panel data which has the advantage of combining both time-series and cross sectional dimensions of the six conglomerates for this research. The value of Adjusted R-squared showed that 78.1% of the total variation in dependent variable is explained by independent variable to the determination of cash ratio while the remaining 21.9% is caused by other explanatory factors outside this model and this is captured by the error term. The coefficient result shows that RAD ($\beta_1 = -0.098783$) is negatively related with CR, while NWC ($\beta_2 = 0.118313$) and CAPEX ($\beta_3 = 0.038083$) are positively related with CR. The probability value of the slope coefficients indicate that $P(x_1 = 0.0000 < 0.05; x_2 = 0.0003 < 0.05; x_3 = 0.0067 < 0.05)$. This implies that CR has a significant negative relationship with RAD; a significant positive relationship with NWC and CAPEX. Since the result of the Prob(F-statistic) of 0.000000 is less than the critical value of 5% significance level, leading to the conclusion that there is a significant negative relationship between research and development cash ratio of quoted conglomerates at 5% level of significance, hence, H_1 is accepted.

Table 6: Output of Hausman Test

Correlated Random Effects - Hausman Test

Equation: Untitled

Test period random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	8.540087	3	0.0357

Source: E-Views 9.0 Hausman Output, 2023

Interpretation of Post Regression Analysis

From the Hausman test result in table 6, the p-value is 0.0357, this is statistically significant at the conventional level of 0.05. Thus, the Fixed Effect Model (FEM) is more appropriate than the Random Effect Model (REM) in analysing the relationship between research and development and cash ratio of quoted conglomerates in Nigeria at 5% level of significance.

Test of Hypothesis III

H₀₃: There is no significant relationship between leverage and cash ratio of quoted conglomerates in Nigeria.

H₃: There is significant relationship between leverage and cash ratio of quoted conglomerates in Nigeria.

Table 7: Panel Least Regression analysis showing the relationship between LEV, NWC, CAPEX and CR

Dependent Variable: CR
Method: Panel Least Squares
Date: 03/17/20 Time: 17:08
Sample: 2002 2021
Periods included: 20
Cross-sections included: 6
Total panel (balanced) observations: 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.208010	0.615986	10.07817	0.0000
LEV	-6.203133	3.554049	-7.745371	0.0000
NWC	0.839642	2.330976	0.360211	0.7194
CAPEX	0.003800	0.177942	0.021358	0.9830
R-squared	0.628864	Mean dependent var		5.932171
Adjusted R-squared	0.600850	S.D. dependent var		3.586664
S.E. of regression	3.585140	Akaike info criterion		5.427806
Sum squared resid	1336.736	Schwarz criterion		5.527144
Log likelihood	-289.1015	Hannan-Quinn criter.		5.468084
F-statistic	11.00343	Durbin-Watson stat		1.856522
Prob(F-statistic)	0.000036			

Source: E-Views 9.0 Regression output, 2023

Interpretation of Regression Result

$$CR = 6.208010 - 6.203133LEV + \mu$$

The above model tested the relationship between leverage and cash ratio. The result showed the existence of a significant negative relationship between leverage and cash ratio. This can be seen from the coefficients and probability of t-stat in table 4.13; $\beta_1 = -6.203133$, Prob = 0.0000. The probability of t-statistics for leverage is lower than the acceptable 5%. Furthermore, the Adjusted R-squared which is the coefficient of determination shows the magnitude of variations caused on cash ratio by the explanatory variables (LEV, NWC and CAPEX) to be 0.601. This indicates that about 60.1% variation in leverage is attributed to the influence of the explanatory variables (LEV, NWC and CAPEX) while the remaining 39.9% is caused by other explanatory factors outside this model and this is captured by the error term. Thus, the result indicates that leverage

has a strong negative relationship with cash ratio, since the adjusted R^2 is above 50% at about 60.1%, the stated independent variable in the model is good enough to explain cash ratio. The significance level is 0.0000; this in essence shows that there is a significant relationship between the variables.

Table 8: Output of Hausman Test

Correlated Random Effects - Hausman Test

Equation: Untitled

Test period random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	10.87143	3	0.0244

Source: E-Views 9.0 Hausman Output, 2023

Interpretation of Post Regression Analysis

From the Hausman test result in table 4.8, the p-value is 0.0244, this is statistically significant at the conventional level of 0.05. Thus, the Fixed Effect Model (FEM) is more appropriate than the Random Effect Model (REM) in examining the relationship between leverage and cash ratio of quoted conglomerates in Nigeria at 5% level of significance.

Findings, Conclusion and Recommendations

Findings

Based on the analysis of data, the following findings were derived:

- i. There is a significant negative relationship between firm size and cash ratio of quoted conglomerates in Nigeria at 5% level of significance.
- ii. There is a significant negative relationship between research and development and cash ratio of quoted conglomerates in Nigeria at 5% level of significance.
- iii. There is a significant negative relationship between leverage and cash ratio of quoted conglomerates in Nigeria at 5% level of significance.

Conclusion

This study focused on the relationship between firm characteristics and cash holdings of quoted conglomerates in Nigeria for a period of twenty years (2002-2021). Data obtained from secondary sources were analyzed in relation to the objective of the study. Based on the inferential statistical analysis of the data and the findings there from, the study concluded that there is a negative and significant linear relationship between firm size and cash holdings; a negative and significant relationship between research and development and cash holdings; a negative and significant relationship between leverage and cash holdings at 5% significant level respectively. Conclusively, there is a negative relationship between firm characteristics and cash holdings of quoted conglomerates in Nigeria.

Recommendations

- i. In order to reverse the inverse the relationship between firm size and cash holdings, conglomerates are expected to accumulate more cash to enable them have more flexibility in their financial policies in supportive of the pecking order theory.

- ii. Since there is a negative relationship between research and development and cash holdings, this study recommends that conglomerates should invest more in research and development in order to generate more cash and grow the business.
- iii. Conglomerates should prefer to fund themselves with resources generated internally before resorting to the market. However, the findings also support the precautionary motive for cash holdings as predicted by tradeoff theory in order to safeguard the firms against potential concerns of having to suffer potential losses from forced sale of assets to obtain cash.

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