

## **CASH HOLDINGS AND FINANCIAL PERFORMANCE OF LISTED MANUFACTURING FIRMS IN NIGERIA: A QUANTILE REGRESSION ANALYSIS.**

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### **ABSTRACT**

Listed manufacturing firms around the world hold substantial volume of cash and studies of the effect of cash holdings have consistently yielded mixed results. This study contributed to the literature by utilizing quantile regressions to assess the effect of cash holdings on financial performance of manufacturing firms listed on the Nigerian Exchange Group (NGX) from 2011 to 2024. The sample of the study comprised of 20 Consumer Goods and Industrial Goods manufacturing firms. The study sourced data from the annual reports of the sampled firms and Daily Official List of NGX. It measured cash holdings as cash plus marketable securities deflated by total assets and used return on assets as the proxy for financial performance. Pecking Order Theory and Free Cash Flow Theory constituted the theoretical anchor of the study. Findings revealed that cash holdings have positive effect on financial performance but the level of significance varied across the quantiles. The study recommended that firms should pay close attention to the level of cash holdings at various quantiles. It suggested further studies using more than one proxies for cash holdings and financial performance respectively.

**Keywords:** Cash holdings, financial performance, manufacturing firms, quantile regressions

**JEL Classification Code:** M41, G32

## **1. INTRODUCTION**

According to the Irrelevance Theory (Modigliani & Miller, 1958), cash holdings is irrelevant to the value and performance of a firm under perfect capital market conditions. However, subsequent developments in corporate finance theories with regard to transaction costs, information asymmetry, and agency costs and various other financial restrictions (Jensen & Meckling, 1976; Myers & Majluf, 1984) suggest that in the presence of market frictions, cash holdings may affect corporate performance.

In a bibliometric analysis of cash holdings literature involving 874 studies published from 1947 to 2020 published in Scopus indexed journals, Khatib et al. (2022) observed that in the past two decades, corporates around the globe have substantially increased their cash holdings. The literature posits that firms maintain cash for three main motives: These are the transaction motives, precautionary motives, and speculative motives (Keynes, 1936). The ultimate objective of holding cash is to enhance firm performance and value. Several studies have been conducted to explore the effects of cash holdings on firm performance. The empirical results remain inconclusive (Amess et al., 2015). Some studies established positive association between cash holdings and financial performance (Chen, 2008; Chang et al. 2017; Chang & Noorbakhsh, 2006; Dittmar et al., 2003; Frésard & Salva, 2010; Mikkelsen & Partch, 2003; O'Brien & Folta, 2009; Pinkowitz et al., 2013; Palazzo, 2012; Yilmaz & Samour, 2024). Others unveiled negative association (Ameer, 2012; Dittmar & Mahrt-Smith, 2007; Gao et al., 2013; La Rocca & Cambrea, 2019; Luo & Hachiya, 2005; Tran, 2020). Yet others found curvilinear association (Harford et al., 2008; Martínez-Sola et al., 2013; Wellalage et al., 2023) or no association. This could be due to methodology employed especially the estimation techniques.

A common methodological approach mainly used in prior studies “is that inferences are based on estimates of how cash holdings relate to the conditional mean of the firm performance distribution” (Armstrong et al., 2015). This stems mainly from models based on ordinary least square properties. While such models can conveniently address the issue of nature of relationship based on the conditional mean function; it fails to address the issue of cash holdings at various quantiles.

Therefore, an approach which specifies varying changes in the conditional distribution of financial performance may provide additional insight. This study, therefore, sought to fill the gap in the literature by analyzing the effect of cash holdings on firm financial performance at varying quantiles from a developing country perspective. Put differently, the objective of this study is to investigate the effect of cash holding on financial

performance of listed manufacturing firms in Nigeria at varying quantiles. Accordingly, this study raised the following null hypothesis.

H<sub>01</sub>: Cash holding has no significant effect on financial performance of listed consumer goods and industrial goods manufacturing firms in Nigeria at all quantiles.

## **2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT**

### **2.1 Conceptual Review**

#### **2.1.1 Cash Holdings**

Cash holdings form a substantial part of corporate assets of firms listed in the consumer and industrial goods sectors of the Nigerian Exchange Group. Cash is a strategic asset (Kim & Bettis, 2014). The literature presents three broad motives for holding cash. These are the transaction motives, precautionary motives, and speculative motives. Under the transaction motives, a firm holds cash to pay for routine transactions (operational needs) such as payment of employees' salary, suppliers and creditors. It is a fact that there is a mismatch between cash inflows and cash outflows thereby necessitating holding cash to make it possible to promptly meet unexpected contingencies (precautionary reasons) and to minimize the costs of raising external funds (Keynes 1936) and / or costs of premature liquidation by defaulting on its financial obligations. Under the speculative motive, a firm holds certain level of cash to take advantage of future profitable investment opportunities. If a firm fails to hold cash for speculative purpose, it will face the costs of forgoing future profitable investments.

#### **2.2. Financial Performance**

Firms have set objectives which if attained will enhance the wealth of shareholders and even stakeholders. Firm financial performance is a measure of the capability and ability of a company to efficiently exploit the available resources in its primary mode of operations to achieve the set objectives. It is a measure of the financial well-being of the firm over a defined period of time arising from a firm's policies and operations and is usually expressed in monetary terms (Fatihudin & Mochklas, 2018; Paul & Jiasmin, 2022). Similarly, Gartenberg *et al.* (2019) stated that financial performance indicates the performance of an organization quantified in monetary terms, reveals the general health of the firm in sustaining its operations. The literature classifies financial performance into two categories viz: market-based and accounting-based categories (Fatihudin & Mochklas, 2018; Kiel & Nicholson, 2003). Market based measures of financial performance are measures of market value and prospects of the firm based on the operations of the firm. Some examples of market-based indicators include earnings per share, dividend per share, stock returns, stock volatility, and share prices. market-to-book ratio. Accounting-based

measures of financial performance are measures extracted by analyzing data contained in financial statements. They include such ratios as return on assets, return on equity, return on investment, and net profit margin. This study applied accounting-based measure - Return on Assets - which is one of the most widely used financial performance metrics indicates how efficiently management is using assets of the firm to generate profit.

## **2.3 Theoretical Review**

### **2.3.1 Pecking order theory.**

The study employed Pecking Order Theory and Free Cash Flow Theory to clarify the relationship that exists between the level of cash holding and financial performance of firms. According to the pecking order theory credited to Myers and Majluf (1984), firms should strive to minimize the cost of financing by prioritizing their financing choices. Pecking Order Theory argues that retained cash holdings provides a quick way to fund profitable investment opportunities thereby reducing the marginal cost of liquid asset shortage and costly external financing arising from information asymmetries. It therefore predicts a positive effect of cash holdings on financial performance (Ogundipe et al., 2012). It suggests that firms should firstly use their retained earnings when investing, then borrow from outside and finally issue stocks (Ghosh et al., 2017).

### **2.3.2 Free Cash Flow Theory**

Jensen (1986) proposed Free Cash Flow Theory, arguing that cash is central to the agency conflict between managers and shareholders. Conflict of interest exists in the agency relationship between managers and shareholders (Jensen & Meckling, 1976). Managers have strong incentives to accumulate large pool of cash because of the relative ease with which cash can be expropriated or used for empire building, both of which are detrimental to shareholders' wealth. Shareholders therefore prefer low cash level or where large cash exists, it should in the absence of projects with positive net present value and it should be distributed as dividends to the firm's shareholders or used for stock repurchases. Empirical studies found that in the presence of severe agency conflict, investors discount cash holdings more heavily (Dittmar & Mahrt-Smith, 2007; Frésard & Salva, 2010; Pinkowitz et al., 2006).

## **2.4 Empirical Review**

In order to ascertain the impact of cash holdings and board governance characteristics on companies' performance (return on assets, and return on equity), Ali et al. (2024) analyzed a sample consisting of 52 non-financial firms listed on the Egyptian Stock Exchange's EGX100 index, covering the period from 2013 to 2019 and having 364 firm-

year observations. The study employed pooled ordinary least squares and two-step system GMM estimations to test the formulated research hypotheses and further supported it with firm fixed-effects regression for robustness. It uncovered a significant positive impact of cash holdings, board size, board gender diversity, and board meeting frequency on companies' performance, but a significant negative impact of board members independence on performance.

Yilmaz and Samour (2024) studied the effect of corporate cash holdings on financial performance in 11 Middle Eastern and North African countries using data that covered 536 non-financial firms for the 2006–2020 period. The study used fixed- and random-effects testing models. It employed return on assets, return on equity, earnings before interest, and the tax margin as the indicators of financial performance. Controlling for several control variables, namely leverage, firm size, sales growth rate, tangibility, dividend pay-out ratio, and gross domestic product growth rate, the study established that both linear and non-linear models produced significant results for the return on assets and the return on equity, but for the earnings before interest and tax margins, the linear model was insignificant. The study confirmed the existence of a non-linear linkage (an inverted U-shaped pattern) between cash holdings and financial performance.

Özcan (2024) analyzed relationship between the level of cash holding and financial performance by using the financial statement data (1400 observations) of 40 non-financial firms listed in Borsa Istanbul 50 index and operating in eleven different industries: Metal Products, Technology, Wholesale and Retail Trade, Energy, Transportation, Real Estate Investment, Mining, Construction, Telecommunication, and Textile) for the period between 2016 and 2020. The results from fixed effects regressions provided strong evidence that financial performance (return on assets) was positively influenced by cash holdings.

Wellalage et al. (2023) carried out a study to determine the effects of audit quality and firm growth on the relationship between corporate cash holdings and firm performance by using a sample of about 2500 unique non-financial Indian firms from 2000 to 2017. Using the dynamic panel generalized method of moment (GMM) approach on 51,388 firm-year observations, the study provided evidence showing that cash holdings have an inverse U-shaped (concave) relationship with firm performance measured by return on assets and market to book ratio. This was stronger for firms with higher audit quality than firms with lower audit quality. Findings also showed that firm growth affected the cash holdings and firm performance relationship and the moderating effect of audit quality.

Using a sample that consisted of 105 MNCs, (69 from Germany and 36 firms from Netherlands). Annika (2022) assessed the effect of cash holdings on financial performance in German and Dutch multinationals for a period of 10 years, ranging from 2012 to 2021. The results revealed a negative relationship between cash holdings and financial performance. This is because agency costs are more considerable when pools of cash become larger. Moreover, the relationship was significantly negative in the German subsample, but not in the Dutch subsample.

Zhang et al. (2022) constructed corporate cash holding patterns by combining the two basic characteristics of cash holding level and volatility from Singaporean firms to test the impact of different cash holding patterns on corporate performance. The study adopted the dynamic panel model. Findings revealed that the existence of significant differences in the impact of different cash holding patterns on corporate performance, with the stable and normal-level cash holding pattern having the greatest positive impact, while volatile and low-level cash holding pattern proved to have greatest negative impacts.

Based on ex-post facto research design, Agbata et al. (2021) examined the effect of cash holdings on financial performance of 20 consumer goods manufacturing firms quoted on the Nigerian Stock Exchange as at 31st December, 2018. The study relied on secondary data sourced from the annual reports of the quoted consumer goods firms and employed multiple regressions in hypotheses testing. The study discovered a strong negative relationship between cash to book value of assets and net profit margin but no significant effect on net profit margin, gross profit and Tobin's Q.

In a bid to ascertain the impact of corporate cash holdings on firm performance and the moderating effect of quality of national governance in Middle East and North African emerging markets, Jabbouri and Almustafa, (2021) employed data from 414 non-financial firms listed on the stock markets of twelve countries (Saudi Arabia, United Arab Emirates, Qatar, Oman, Kuwait, Morocco, Egypt, Jordan, Bahrain, Tunisia, Algeria and Lebanon) between 2004 and 2018. The study applied dynamic fixed effect regressions on an unbalanced panel of 2,337 firm-year observations in the empirical analysis. It reported a significant positive relationship between corporate cash holdings and firm performance, with more pronounced effect observed in countries with strong national governance and more developed institutional settings.

Yun et al. (2021) explored the effect of cash holdings on financial performance and how firm specific factors shaped the relation. The study period stretched from 2003 to 2016.

The sample consisted of consists of 2,575 non-financial firms in China. The study measured financial performance using return on assets in the primary analysis and return on equity and market to book ration and Tobin's Q in the robustness check. It applied OLS, fixed-effect model and GMM. Findings revealed that cash holdings have a positive effect on financial performance and this was strongly moderated by firm-specific factors such as ownership structure and corporate governance.

Alnori (2020) studied the relationship between corporate cash holdings and financial performance using 129 non-financial firms listed on Saudi Arabia's primary stock market over 2005–2016. From the Osiris database the study generated an unbalanced panel with a total of 1,012 firm-year observations and analyzed the data by implementing static (i.e. pooled ordinary least squares) and dynamic (i.e. system generalized method of moments) specifications. Findings showed a significant positive on firm performance whose proxies were return on assets and return on equity. Nonetheless, after using a non-linear specification, the study found empirical evidence showing that the relationship between firms' cash holdings and performance was non-linear and exhibited an inverse U shape. The non-linear relationship revealed that for firms with lower cash holdings, the effective was positive, but for firms with high levels of cash holdings, the effect was negative. Unfortunately, the study did not specify what constituted low/high levels of cash holdings.

Doan (2020) investigated the impacts of cash holding on financial performance of firms listed in Vietnam between 2008 and 2018. The study built a panel dataset of 2046 firm-year observation and adopted Generalized Method of Moment (GMM) in the empirical analysis. It reported that financial performance (return on assets and return on equity) of sample firms was positively influenced by cash holdings. The study also showed that the control variables - financial leverage, the ratio of tangible assets, firm size, and sales growth – have significant the impact on the firm performance.

La Rocca and Cambrea (2019) investigated the effect of cash holdings on financial performance for a sample of 261 non-financial Italian firms over 36years, from 1980 to 2015. The study proxied financial performance with return on assets and market-to-book ratio. It estimated pooled ordinary least regressions, fixed-effect regressions and system generalized method of moments to validate the formulated hypotheses. It reported a net positive effect and also observed that the linkage was moderated by different factors resulting in change in the sign and intensity of the relationship.

Aslam et al. (2019) empirically evaluated the combined impact of cash holding and corporate governance on the performance of non-financial firms using a sample consisting of 30 Islamic-based firms from Karachi Meezan Index 30 index and 42 non-Islamic firms from Karachi Stock Exchange (KSE) 100 index in Pakistan over the period of 2010–2014. The study applied panel regression (random effect model) to investigate the relationships. The results showed that corporate cash holding has negative and significant relationship with earnings per share and returns on assets (EPS and ROA), while it has a positive and statistically significant relationship with Tobin's Q and market share price (TQ, MSP) in both KMI 30- and KSE 100-indexed firms. In addition, it was found that the poor structure of corporate governance in KMI 30- and KSE 100-indexed firms led to the firms dispelling cash quickly, which significantly reduced the performance of these firms.

Asante-Darko et al. (2018) supplied evidence from Ghana of the effect of ownership management and cash holdings on firm value over the period 2010–2014. The study retrieved data from the Ghana Stock Exchange fact book and the companies' annual report and performed the analysis deploying the seemingly unrelated regressions. The results showed that management ownership has a positive and statistically significant association with firm value. However, a negative association was detected between cash holdings and firm value measured by Tobin's Q.

The empirical study of Vijayakumaran and Atchyuthan (2017) examined the relationship between cash holdings and corporate performance using a panel of 311 firm-year observations retrieved from annual reports of firms in five sectors namely Manufacturing, Hotels and Travels, Food, Beverage and Tobacco, Chemicals and Pharmaceuticals, and plantation listed in the Colombo Stock Exchange (CSE) over the period 2011-2015. It analyzed a panel of 311 firm-year observations using fixed effect estimator. Controlling for unobserved heterogeneity and other firm characteristics, the study found that cash holdings was positively related to firm performance. The study concluded that the positive relation was not explained by Agency Theory but Trade-Off Theory and Pecking Order Theory.

### **3. METHODOLOGY**

The study used ex post facto research design. The sample period covered the years 2011 to 2024. The population of the study consisted of all the 34 firms in the Consumer Goods and Industrial Goods Sector on the Nigerian Exchange Group as at 31<sup>st</sup> December, 2024. Applying Yamane (1967) scientific formula,

$$n = \frac{N}{1 + N(e^2)}$$

the study obtained a sample size of 31 firms. However, due to unavailability of annual reports and missing data, the study excluded firms that did not have all data required for empirical analysis throughout the sample period and got a final sample size of 20. The source of data was the annual reports of the sampled firms.

To validate the formulated hypothesis, the study specified the empirical model thus:

$$FP = f(\text{CASH}, \text{BDN}, \text{FSZ}, \text{SGW}, \text{LEV}).$$

Where: FP = financial performance proxied by return on assets (ROA), BDN = board independence, FSZ = firm size, SGW = sales growth, LEV = leverage. For purpose of estimation, the above functional model was rewritten thus:

$$ROA_{i,t} = \beta_0 + \beta_1 \text{CASH}_{i,t} + \beta_2 \text{BDN}_{i,t} + \beta_3 \text{FSZ}_{i,t} + \beta_4 \text{SGW}_{i,t} + \beta_5 \text{LEV}_{i,t} + \varepsilon_{i,t} \quad (1).$$

In the model, ROA is dependent variable and proxy for financial performance. CASH is the main predictor. BDN, FSZ, SGW and LEV are control variables consistent with the prior literature (Abushammala & Sulaiman, 2014; Ali et al., 2024; Alnori, 2020; Danso et al. 2021; Ebirien & Chukwu, 2024; Jabbouri & Almustafa, 2021; Martínez-Sola et al., 2013; Yun et al., 2021; Özcan, 2024). The subscripts,  $i, t$  denote firm and denotes year respectively.

**Table 1: Measurement of Variables**

Variable	Abbreviation	Computation	Reference Studies
Return on assets	ROA	$\frac{\text{Profit Before Tax}}{\text{Total Assets}}$	Alnori (2020), Andoh et al. (2023), Issa et al. (2021).
Cash Holdings	Cash	$\frac{\text{Cash and Cash Equivalents}}{\text{Total Assets}}$	Ghaly et al. (2015) Jabbouri & Almustafa, (2021), Suherman et al. (2021). Ali et al. (2024).
Board	BDIN	Number of board members	Asante-Darko

independence		that are non-executive and independent divided by total number of board members	et al. (2018), Martínez-Sola et al. (2018), Ebirien & Chukwu (2024)
Firm size	FSZ	Natural logarithm of total assets	Ebirien & Chukwu (2024), Jilani et al. (2023)
Market to Book Ratio	MBR	$\frac{\text{Market value of Equity}}{\text{Total Assets}}$	Jilani et al. (2023)
Leverage	Lev	$\frac{\text{Total Liabilities}}{\text{Total Assets}}$	Ebirien & Chukwu (2024), Jilani et al. (2023)

Source: Authors' Computation, (2025).

#### 4. RESULTS AND FINDINGS

Table 2 presents the descriptive statistics of the study. ROA has a mean of 0.0972545, a standard deviation of 0.1623901 and a variance of 0.0263705. This means, the ROA of the sampled firms deviated from both sides of the mean by 0.1623901, implying, the ROA data values were widely dispersed from the mean. The maximum and minimum values of ROA were 0.7926759 and -0.6888782 respectively. The ROA distribution was negatively skewed with a value of -0.0871165. This shows that, the left tail of the ROA distribution was longer than that of the right tail. In other words, a large portion of the ROA distribution fell on the right side of the normal curve. The kurtosis coefficient of 9.03188 implies, the ROA distribution was not normally distributed.

Further, the sampled firms have a mean CASH of 0.1641791, a standard deviation of 0.1645459 and a variance of 0.0270753. This indicates that, the data values of CASH deviated from both sides of the mean by 0.1641791, implying, the CASH data values were not widely dispersed from the mean. The maximum and minimum values of CASH were 0.7827712 and 0.0018354 respectively. The CASH distribution was positively skewed with a coefficient of 1.602441. This shows that, the right tail of the CASH distribution was longer than that of the left tail. Put simply, a large portion of the CASH distribution fell on

the left side of the normal curve. The kurtosis coefficient of 5.13778 implies, the CASH distribution was of abnormal shape.

**Table 2: Descriptive Statistics**

	Roa	cash	bdin	fsz	mbr	lev
Mean	0.0972545	0.1641791	0.7707517	17.7216	3.995315	0.6300574
Std. Dev.	0.1623901	0.1645459	0.1529181	1.960533	9.039508	0.5320732
Min	-0.6888782	0.0018354	0.1250000	13.22908	0.016668	0.1936196
Max	0.7926759	0.7827712	0.9333333	22.85188	58.70563	6.9066060
Variance	0.0263705	0.0270753	0.0233840	3.843690	81.71270	0.2831018
Skewness	-0.0871165	1.6024410	-1.7313750	-.0566594	3.661326	8.8085650
Kurtosis	9.0318804	5.1377800	7.1286390	2.198890	16.77265	95.172400
q10	-0.0474935	0.0292505	0.5857143	14.93597	0.136968	0.3502418
q25	0.0255243	0.0028657	0.6666667	16.15806	0.292630	0.4389978
q50	0.0912993	0.0999615	0.8235294	17.97624	0.857623	0.5740997
q75	0.1629823	0.2191224	0.8888889	19.08100	2.808316	0.6950951
q90	0.2461030	0.4065393	0.9	20.18631	8.285449	0.8097433
Obs	260	260	260	260	260	260

Source: Authors' Computation, (2025)

**Table 3: Correlation Matrix**

	ROA	CASH	BDIN	FSZ	MBR	LEV
ROA	1.0000					
CASH	0.2636*	1.0000				
BDIN	0.07580	0.1480	1.0000			
FSZ	-0.1430*	-0.2160*	-0.1601*	1.0000		
MBR	0.5647*	0.2062*	-0.0630	-0.1640*	1.0000	
LEV	-0.2117*	0.1270*	-0.0931	-0.0417	-0.0170	1.0000

Source: Authors' Computation, (2025).

The study conducted a bivariate analysis which is basically a correlational analysis and displayed the results in Table 3. The correlational analysis sought to determine the strength and direction of the linear relationship that existed between a pair of variables in the study. Table 3, revealed a significantly positive association between ROA and CASH as well as between ROA and MBR at the 95% confidence interval { $r=0.2636$ ,  $r = 0.5647$ }. The correlation coefficients in Table 3 are generally low suggesting absence of severe multicollinearity. The values of variance inflation factors in Table 4 which do not exceed 10 confirm multicollinearity is not severe (Hair et al. 2010).

**Table 4: Variance Inflation Factor**

Variable	VIF	1/VIF
Cash	1.13	0.887411
fsz	1.09	0.916916
mbr	1.08	0.926553
bdin	1.07	0.933708
lev	1.03	0.966550
Mean VIF	1.08	

Source: Authors' Computation, (2025).

**Table 5: Regression Results**

	Quantile Regressions					OLS	RE
	q10	q25	q50	q75	q90		
CASH	0.0935 (0.1061)	0.0781 (0.0467)	0.1627** (0.0513)	0.1252 (0.1099)	0.3245** (0.1026)	0.1675*** (0.0511)	0.2012*** (0.0505)
BDIN	-9.10622 (0.0663)	0.0308 (0.0342)	0.0827** (0.0284)	0.1697*** (0.0488)	0.1956 (0.0892)	0.0640 (0.0536)	-0.0300 (0.0627)
FSZ	-0.0006 (0.0111)	0.0058 (0.0050)	0.0047 (0.0028)	0.0025 (0.0054)	-0.0041 (0.0035)	-0.0016 (0.0042)	-0.0150* (0.0082)
MBR	0.0077*** (0.0018)	0.0072*** (0.0017)	0.0100*** (0.0013)	0.0106*** (0.0019)	0.0090*** (0.0019)	0.0095*** (0.0009)	0.0097*** (0.0011)

LEV	-0.2804**	-0.1353*	-0.0576	-0.0492	-0.0279	-0.0670***	-0.0670***
	(0.1251)	(0.0710)	(0.0546)	(0.0872)	(0.0689)	(0.0151)	(0.0132)
CONSTANT	0.1888	-0.0371	-0.0792	-0.0459	0.0907	0.0534	0.3569**
	(0.1771)	(0.1127)	(0.0772)	(0.1523)	(0.1013)	(0.0937)	(0.1571)
NO of obs.	260	260	260	260	260	260	260
Pseudo R <sup>2</sup>	0.2057	0.1706	0.2199	0.2524	0.3757		
R <sup>2</sup>						0.3959	
R <sup>2</sup> = within							0.3427
R <sup>2</sup> = between							0.4356
R <sup>2</sup> = overall							0.3714
F(5, 254).						33.30***	
Wald chi2(5)							134.32***
Breusch and Pagan LM Test							185.68***
Hausman Test							26.40***

Source: Authors' Computation, (2025).

Note: The numbers in parentheses are bootstrap standard errors (quantile) and standard errors (OLS and random effect). \*\*\*, \*\*, and\* indicate significance at the 10%,5%, and 1% levels, respectively.

Table 5 reports the results of the estimation of the empirical model specified in Section 3 in order to determine the effect of cash holdings on financial performance. The p-values of F statistic and Wald Chi-squared statistic demonstrated that the model has good fit and is statistically significant in explaining variation in ROA. The explanatory power of the quantile model measured by Pseudo R<sup>2</sup> ranges from 17% to 38% compared to R<sup>2</sup> of 40% and 37% in OLS and RE models respectively. The results of the quantile regressions presented in Columns 1 to 5 of Table 5 reveal that, the effect of cash holdings is conditional on the quantile at which it is estimated. This result confirms Ho<sub>1</sub>. At the lowest quantiles (q10 and q25), the results show insignificant positive coefficients (0.0935 and 0.0781, respectively), suggesting that there is no effect of cash holding on low levels of financial performance. In contrast, the impact of cash holdings on firm financial performance is high and significant at higher quantiles. For instance, at q90, a percentage

increase in cash holdings is associated with 33% increase in firm performance compared to 12% increase at q50. The stronger positive effect of cash holdings for higher performance firms is consistent with liquidity preference theory suggesting that large cash holdings allow firms to pay daily operating needs (transaction cost motive), meet unexpected contingencies (precautionary motive) and fund profitable investment opportunities. without costly external financing (speculative motive) ((Almeida et al., 2004; La Rocca & Cambrea, 2019; Martínez-Sola et al., 2013; Myers & Majluf, 1984)). The result of significant positive relationship aligns with several studies (Abushammala & Sulaiman (2014; Ali et al., 2024; Alnori, 2020; Jabbouri & Almustafa, 2021; Lian & Ma, 2021; Martínez-Sola et al., 2013; Yun et al., 2021; Özcan, 2024)). In contrast, the result fails to support the significant negative relationship documented in previous research (Annika, 2022, Aslam et al., 2019; La Rocca & Cambrea, 2019; Tran, 2020).

At the 75th quantiles, however, the study found a positive coefficient that is statistically insignificant just like at the 10<sup>th</sup> and 25<sup>th</sup> quantile. This suggests curvilinear (concave) relationship consistent with Martínez-Sola et al. (2013) and Wellalage et al. (2023). It is likely that that managerial over-or-underinvestment in cash holdings exist at q75 (Armstrong et al., 2015).

Regarding control variables, the results of OLS and RE regressions as well as quantile regressions documented a significant positive effect of market to book ratio on ROA. The literature has substantial evidence of the existence of significant effect of investment opportunities on financial performance (Akben Selcuk, 2016; Ali et al., 2018; Echeboba & Ananwude, 2016; Fareed et al., 2016; Hikma et al., 2018; Khan et al., 2018; Lazăr, 2016). At the 50<sup>th</sup> and 75<sup>th</sup> quantile, board independence exhibited a significant positive effect on ROA supporting previous studies but at other quantiles, OLS and RE, the effect is not significant. Likely explanation for insignificant effect is that the directors are not independent both in mind and appearance lack expertise, playing a tokenism role only (Shah et al., 2013). Another possible explanation is that a high number of non-executive directors at the 10<sup>th</sup>, 25<sup>th</sup> and 90<sup>th</sup> quantile joined the board during the reign of the incumbent CEO and were likely to feel indebted to the CEO and thus be beholden to the CEO (Bird et al., 2018). Across quantiles firm size has no effect on firm performance contrary to Agbata et al. (2021), Ali et al. (2024), Alnori (2020), and Jabbouri and Almustafa (2021). The results of OLS and RE regressions reported significant negative effect of leverage on ROA consistent with Agbata et al. (2022), Aslam et al. (2019), and Özcan (2024) but quantile regressions showed both significant and insignificant effect

across the quantiles consistent with large evidence of mixed relationship in the empirical literature.

## 5. CONCLUSION AND RECOMMENDATIONS

The study studied the effect of cash holdings on financial performance of listed manufacturing firms in Nigeria over a 14-year period. Distinct from prior studies in Nigeria, the study utilized the quantile approach and reported that the effect of cash holdings on financial performance of listed manufacturing firms in Nigeria was conditional on the quantile at which analysis was performed.

The study provides useful insight to firms on the behaviour of cash holding in relation to financial performance as it compares the results of quantile regressions with OLS and RE analysis. This is a major contribution to the literature on cash holdings from methodological perspective. Therefore, listed manufacturing firms in Nigeria should pay close attention to the cash holdings at different quantiles in their cash holding policy.

The limitations of the study are the use of one measure of cash holdings and financial performance and focusing on only the manufacturing firms in the Consumer Goods and Industrial Goods Sectors of the Nigerian Exchange Group. Future studies can address these limitations.

**Competing Interest:** The authors declare that there is no competing or conflicting interest in this manuscript.

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