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Gearing ratio and operating cash flow performance of quoted manufacturing firms in Nigeria

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Abstract

Purpose: The study examines the effect of gearing ratios on the operating cash flow performance of 36 manufacturing firms listed on the Nigeria Stock Exchange from 2011 to 2018 financial years. The study evaluated the effect of capital gearing, income and the operating gearing ratios on the operating cash flow of quoted manufacturing firms.

Research methodology: The study adopts an ex post facto research design utilizing a final sample of thirty-six (36) purposively selected manufacturing firms quoted on the Nigerian Stock Exchange (NSE). The study utilized financial statement data compiled by MachameRATIOS®. The data were analyzed using multiple regression techniques.

Results: There is a negative effect of capital and income gearing ratio on operating cash flows with the former not significant, and a positive non-significant effect of operating gearing ratio on operating cash flow.

Limitations: The focus on consumer and industrial goods firms limits the generalizability of the study findings to other sectors of the economy. The study did not test for Granger causality.

Contribution: The study contributes to the literature in the context of developing countries, on the importance of monitoring the different gearing ratios, more especially the income gearing ratio to ensure positive cash flow. The findings also confirm that managers from emerging economies can alter business risk to sustain favorable performance. The study has implications for investors assessing investment decisions on the need to be wary of the different market and financial risk profiles computed from the various measures in making informed investment decisions.

Keywords: *Capital Gearing, Income Gearing, Operating Gearing, Operating Cashflow*

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1. Introduction

Finance is vital to the well-functioning of any business enterprise irrespective of its size or the industry where it operates. Finance facilitates a manufacturing firm to undertake its primary task of production while ensuring that the firm has available cash to meet its working capital needs. The two main sources of funds available to any business enterprise are debt and equity. Firms often employ a combination of both for the daily running of the firm and investment. The ability of managers to combine both sources portrays the capacity of enterprises to take advantage of investment opportunities. Therefore, the capital gearing ratio refers to the ratio of total equity to total debt. The higher the ratio is an indicator that the firm has a large amount of debt relative to its equity value. In this study, capital gearing reflects the extent to which a firm's activities are financed from external funds against internal funds. This is often

expressed via the capital gearing ratio which indicates the level of financial risk borne by debt holders and equity holders (Siyanbola, Olaoye, & Olurin, 2015). The age-long seminal studies of Modigliani and Miller (1958) argue that capital structure is irrelevant to firm performance, in the absence of the tax-shield benefit of debt.

The literature on gearing ratios has attracted much attention. The authors have aligned perspectives based on the reported findings. For instance, Jensen and Meckling (1976) argue for a trade-off between both the agency cost of debt and the agency cost of equity; Brander and Lewis (1986) suggest that debt financiers were exposed to limited liability; Jensen (1986) reports a constraining effect of utilizing debt financing. These findings jointly support the positive effect of leverage on performance. However, other prior studies such as Myers (1977) suggest that inferior and ulterior use of debt financing; Titman (1984) supports that debt financing always triggers a negative stakeholder reaction; and, Ghosh (2008) all found evidence to show a negative association between debt financing and firm performance. Capital gearing is the proportion of external funds used in financing a firm (Yusuf, Mwakubo, & Mwakachola, 2019) which varies between 0 to 100% (Myers, 1977). The income gearing ratio measures the extent a firm's operating profits exceed its interest payable while, operating gearing is a measure of the relationship between a firm's fixed costs with its variable costs depicted using numerous variants.

Cash remains vital to the liquidity and well-functioning of any firm. The cash flow from operations is therefore crucial to understanding the ability of a firm to make an investment or meet its maturing debt obligations (Osagie, 2016). The principle guiding the preparation of the SOCF (Statement of Cash Flows) eliminates the ambiguities associated with the accrual nature of the income statement (Osagie, 2016). The cash flows from operations, therefore, remain fundamental to understanding the financial health of the firm.

The manufacturing sector in Nigeria is one of the most promising sectors of employment and economic development. They play an important role in the creation of jobs at comparatively lower per-head expenses and help in the industrialization of a nation. The economic boom recorded in the country is not unconnected to manufacturing. The sector has remained strategically positioned with the potential to absorb more than 60% of jobs, improve per capita income, transform raw materials, improve the country's export, and provide linkages to other key industries.

The recent literature has focused on the gearing ratio and bank performance (Kofoworola, 2022). This paper contributes to the prior literature in the following ways: firstly, by focusing on Nigerian firms, the study provides evidence consistent with a developing country context of the effect of varying gearing ratios on cash flow performance. The unique characteristics of the Nigerian business environment, similar to other emerging economies provide evidence of potential agency conflicts from the uncoupling of control and management in a turbulent environment.

Secondly, the evaluation of financial risk via gearing variants and the consequent effect on firm performance were previously examined extensively in the banking sector (Abdellahi, Mashkani, & Hosseini, 2017; Badawi, 2017; Muriithi, Muturi, & Waweru, 2016). The extension of this evidence to the manufacturing firms provides a second motivation for the study.

Thirdly, the motivation for the current study emanates from the outcome of prior studies conducted on gearing variants and firm performance of manufacturing firms, with scanty evidence on income gearing and operating ratios. The prior literature suggests that different gearing variants would behave relatively differently thereby to determine the casual order of the relationship there is a need for further empirical validation. This paper is an attempt to answer this clarion call from a developing country context.

1.1 Objective of the Study

The main objective of the study is to evaluate the effect of the gearing ratio on the operating cash flow performance of quoted manufacturing firms in Nigeria. The specific objectives of the study are as follows:

1. Evaluate the effect of the capital gearing ratio on the operating cash flows of quoted manufacturing firms.
2. Determine the effect of the income-gearing ratio on the operating cash flows of quoted manufacturing firms.
3. Ascertain the effect of the operating gearing ratio on the operating cash flows of quoted manufacturing firms.

2. Literature review

2.1 Operating Cashflow

Cash is the lifeblood of any business which is vital to the well-functioning of its daily activities (Bland, 2006). Cash refers to money that a business organization or firm can disburse immediately without restriction (Pandey, 2015). Cash includes coins, currencies and cheques held by the firm and balances in its bank account. According to Narkabtee (2000), the "importance of cash flows stems from the relative importance placed by relevant stakeholders on the amount of such disclosed and contained in the published in its financial statements". Cash flow is the net amount of cash and cash equivalents moving in and out of a business. The cash flows of an organization refer to the "pool of funds that the company commits to its fixed assets, inventories, account receivables and marketable securities" (Uremadu, 2004). Cash flow implies the ability to generate cash from all the business activities of an organization, company, firm, or enterprise. It measures management efficiency in turning up cash from organizational resources. The information on the net operating cash flow was retrieved from the statement of cash flows. According to Ji (2019), net cash flow from operations is an indication of the extent to which an entity generates the cash it needs for the repayment of debts, payment of dividends, and other investments. The operating activities are defined by IAS 7 as "the primary income-generating activities of the firms and other similar activities, but exclusive of items related to the investing or financing category". The IAS 7.18 states that a firm may opt to present its operating cash flows in the statement of cash flow (SCF) using either the direct or the indirect method:

a) Direct method - Using this method, the disclosure of the gross cash inflows and outflows of the operating cash flow is done (i.e., gross receipts from customers, payments to suppliers and payments for salaries and wages, payments to the government for taxes)
b) Indirect method - Using this method, basically the profit or loss from the income statement is adjusted upwards or downwards for the effects of non-cash transactions (e.g. depreciation or amortization), the influence of accruals or deferrals of current or past operating cash receipts or payments (i.e., adjusting for net changes in either account receivable or payables), and other items of receipt or expenditure associated with the two other categories: Investing and Financing cash flows.

The statement of cash flow (SCF) is prepared on a monetary basis and shows the movement of cash in and out of the firm (Hamidi, 2014); and, tackles the deficiency of the income statements because they are calculated on an accrual accounting basis (Ball, 2005). SCF enhances the comparability of reported performance across three dimensions: Operating, Investing and Financing by different entities. This is done by eliminating the effects of different accrual income preparation methods treatments for similar transactions or events. A positive cash flow is an indicator that the firm is liquid with the ability to pay for expenses, settle its debt obligations, or even dividend payments to shareholders. A negative cash flow is an indicator that the firm is not sufficiently liquid in the period of assessment (Ogbonnaya, Ekwe, & Uzoma, 2016). A sustained positive cash flow is desirable as it is a safeguard against future financial distress from macroeconomic shocks.

2.1.1 Capital Gearing Ratio and Cash Flow Performance

The capital gearing ratio represents the proportion of external finance used in financing a firm (Kofoworola, 2022; Yusuf et al., 2019). The proportion varies between ≥0 to 100% (Brealey, Myers, Allen, & Mohanty, 2012). Prior studies have documented mixed findings on the effect of capital gearing on variants of firm performance. Using empirical data from India, (Mathur, Tiwari, Ramaiah, & Mathur, 2021), and a sample of BSE 500 the OLS results revealed an inverse relationship between the capital gearing ratio and the firm performance. Another study conducted in India by Panda and Nanda (2018)

used firms from 6 sectors and a non-linear estimation technique. The two-step generalized model of moments (GMM) results showed a convex relationship between working capital financing and profitability for firms in sectors: Chemical, Construction, and Consumer goods; while a concave relationship was found for firms in three sectors: machinery, metal, and textile industries were concave. Seth, Chadha, Ruparel, Arora, and Sharma (2020), using a sample of 563 Indian manufacturing firms from 2008 to 2018 showed a significant relationship between leverage and the cash conversion cycle (CCC). Empirically, Lawes and Kingwell (2012) in Australia found a negative association. The empirical study by Fosu (2013) that studied 257 South African firms using the same GMM procedure found a positive significant relationship between leverage and firm performance. Empirically, the study by Lavorskyi (2013), in Ukraine found an inverse association between capital gearing and operational performance. Rahmawati and Hadian (2022) using a sample of Indonesian consumer goods manufacturing firms, find a negative relationship between debt to equity ratio and share prices. Shabrina and Hadian (2021) also in Indonesia find a negative relationship between debt to equity ratio and dividend payout. In the study from the discussion above, the following hypothesis is formulated for empirical testing:

H_1: There is a significant effect of capital gearing ratio on operating cash flows of quoted manufacturing firms.

2.1.2 Income Gearing Ratio and Cash Flow Performance

The income gearing ratio refers to the ratio extent a firm's operating profits exceed its interest payable. Jensen and Meckling (1976) observed the two main forms of agency costs exist in today's corporations. The first is attributed to the conflict which arises from the perspective of the shareholder-manager on one hand and external equity fund providers. The agents often have the motive to make the most of the utility incentive in the distribution of profits and therefore engage in moral hazard. The second form of agency cost according to Jensen and Meckling (1976) occurs from the conflict of interest between equity owners and debt holders. Using empirical data from 9232 firm-year observations of South Korean listed firms from 2011 to 2018, Ji (2019) analyzed the effect of two distinct income gearing measures, i.e., a cash-based interest coverage ratio (CICR) and the accrual-based interest coverage ratio (AICR) on the financial statement value relevance. The results showed a significant negative effect for CICR while the AICR was positive. Empirically Onuora and Obia (2018), used a sample of seven firms from 2011 to 2015 analyzed the effect of interest coverage ratio on earnings per share. They revealed a negative significant effect of ICR on EPS. The payment of interest decreases the income available to a firm, which invariably affects performance. This is consistent with the study by Fout, Li, Palim, and Pan (2020) who noted that interest gearing is a significant risk factor that may impair a firm's financial performance. By reducing available cash, as previously shown in the study by Nenu, Vintilă, and Gherghina (2018) on the positive relationship between cash and financial performance. Based on the above discussion, the study, therefore, formulates the following hypothesis for empirical testing:

H_2: There is a significant effect of income gearing ratio on operating cash flows of quoted manufacturing firms.

2.1.3 Operating Gearing Ratio and Cash Flow Performance

The operating gearing ratio measures the extent of profitability of a firm after taking due cognizance of its costs. It describes the relationship between fixed (static) operating costs and variable (fluctuating) operating costs. Different authors have utilized varying measures to depict this gearing variant (Nugraha & Bayunitri, 2020). The operating gearing measures the degree of contribution to sales (C/S) ratio, i.e., the extent the firm incurs a combination of "fixed and variable costs" (Siyanbola et al., 2015). They further stated that a high degree of operating leverage, also implies a high breakeven point as the firms must make enough contribution to cover fixed costs before there can be any profit. However, a low degree of operating leverage, means that the breakeven point is also low. Nugraha and Bayunitri (2020) posit that this measure is a risk indicator. The study by Siyanbola et al. (2015) examined the effect of gearing on the performance of firms in Nigeria using survey data from three manufacturing firms established that gearing enabled a firm to compete favorably in a dynamic environment and its effective management can increase the earnings of the firm. They also document evidence of a positive

association between the gearing ratio and the firm's performance. The above foregoing discussion led to the formulation of the following hypothesis for empirical testing:

H_3: There is a significant positive effect of the operating gearing ratio on the operating cash flows of quoted manufacturing firms.

The study employs several variables as controls in the study firm size (SIZE) (Kasasbeh, 2021; Yusuf et al., 2019), Property, Plant and Equipment (PPE) (Yusuf et al., 2019), Leverage (LEV) (Kasasbeh, 2021), Returns on Assets (ROA) (El Mokrani & Alami, 2021), Firm Age (Age) (Kasasbeh, 2021), the financial distress proxied using the Altman's Z-Score (Altman, 1968, 2000). The association between debt and financial distress has been established in prior studies (Brealey et al., 2012). According to Fagbamigbe, Afolabi, and Yusuf (2019), financial distress is a situation where a firm is not able to consistently service its debt obligations (either the payment of interest or long-term payment of principal) to debt financiers. The study by Foo and Pathak (2019), found a positive significant effect of Z-Score on ROE. Leverage has been employed as a CV in the current study (Wahyudi, 2011). The signaling theory suggests that the level of leverage is a signal to future cashflows while the pecking order theory suggests that it is an alternative financing option (Myers, 1977). Using empirical data from Indonesia, Wahyudi (2011) found a negative relationship between cash flows and leverage in contemporary times; while, it turned positive at the intertemporal level. Osagie (2016) using empirical data from 10 Nigerian banks found a negative non-significant effect of age on cash flow.

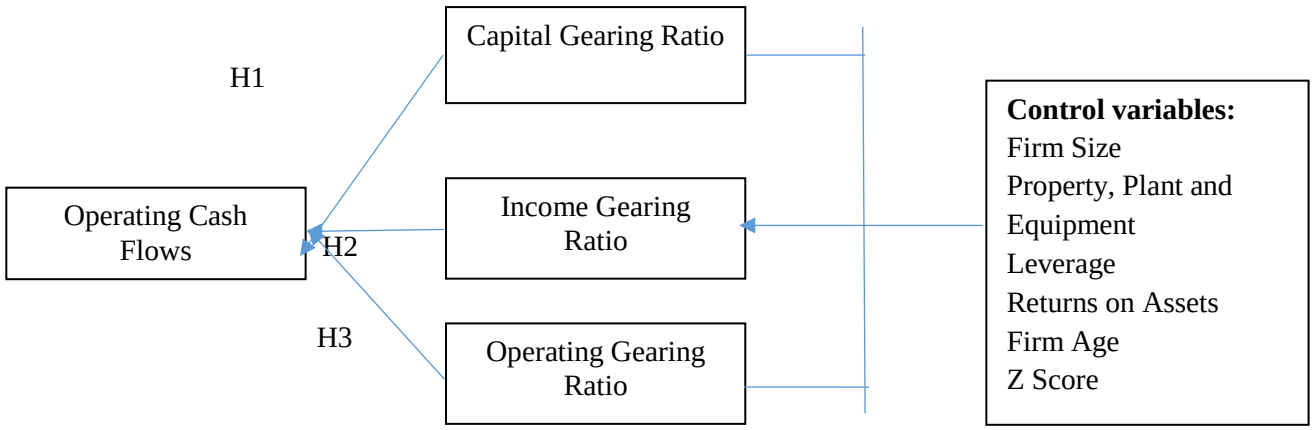

Figure 1: Schematic representation of the relationship between the study variables
Source: Author's Conceptualisation (2020)

The study also employed the accounting-based measure of ROA. As stated by Demsetz and Lehn (1985) the ROA is a current reflection of the state of a business. The ROA has been used in prior studies to determine the association between ROA and financial distress using different variants (Lumbantobing, 2020; Susanti, Latifa, & Sunarsi, 2020). Secondly, the ROA is employed in the current study consistent with Fosu (2013) to mitigate any size or industry bias from the use of sample data of firms from different industries and varying sizes in the results. Using empirical data from Indonesia Lumbantobing (2020) found a positive effect of ROA on financial distress. The positive association is also confirmed in the study by Susanti et al. (2020). The variable SIZE is measured as the logarithmic transformation of total assets which is consistent with prior studies such as Ilaboya and Ohiokha (2016) in Nigeria and Kassi, Rathnayake, Louembe, and Ding (2019) in Casablanca. The literature documents evidence that larger firms are more susceptible to increased monitoring and media attention (Himmelberg, Hubbard, & Palia, 1999). Leverage is also a significant variable as evidenced in several prior studies. Using a sample of Indonesian firms, Liviani and Rachman (2021) documented a positive effect of leverage in Indonesia. Large firms are also expected to utilize more capital gearing. Udoayang, Uwah, and Asuquo using empirical data from 69 firms listed on the Nigerian Stock Exchange found a positive non-significant effect of PPE on ROA. The variable firm age was also utilized as a CV document mixed evidence in the literature. For instance, Ghafoorifard, Sheykh, Shakibaee, and Joshaghan (2014) using evidence from Iran reported a positive association between firm age and firm performance. In the African context, the studies by Ally et al. (2015) in Gideon (2013) in Tanzania also found evidence of a positive

relationship. The positive effect of age was also confirmed in the study by Kassi et al. (2019) in Casablanca.

The study, therefore, makes the following apriori assumptions of the CVs. The variable firm size is expected to have a (+) effect on operating cash flows, this is also expected for the variable PPE (Property, Plant and Equipment) to have a (+) effect on operating cash flows, the variable leverage is presumed to have (-) effect on operating cash flows, the variable of profitability (ROA) is assumed to have (+) effect on operating cash flows, and consistent with prior studies in the African context the variable of firm age is expected to have (+) effect on operating cash flows. The Z-Score is believed to have a (+) effect on operating cash flows in the African context.

2.2 Theoretical framework

The agency theoretical perspective has been employed in studies on gearing variants. The theory is traced to the early works of Berle and Gardiner (1932) but was initially formulated by Ross in the '70s (Ross, 2010). However, the theory became linked to agency costs by Jensen and Meckling (1976). (Jensen & Meckling, 1976) define an agency relationship as an arrangement whereby an individual undertakes on behalf of another to manage the affairs of a firm for a financial remuneration in which the latter delegates some decision-making capability to the former, i.e., referred to as agent". In the business context, agents correspond to managers, whereas principals correspond to shareholders. The delegation of such decision-making capability creates two interrelated problems. First, is the conflict of interest between the principal and the agent with its attendant costs; and, second, the problem of risk sharing as the divergence of ownership and control would also differ the risk preference of the principal and agents from information asymmetry and moral hazard (Eisenhardt, 1989). In a company's environment, DeFond (1992) identified two features of the agency problem; first, divergence in preferences of the manager and owner concerning the manager's actions; and the imperfect observability of the managers' actions by the owner (DeFond, 1992). Agency theory can be applied to any contractual relationships in which the principal and agent have partly differing goals and risk preferences, for example, compensation, leadership, vertical integration, merger & acquisition, and transfer pricing (Eisenhardt, 1989).

3. Research methodology

The study adopts the *ex-post facto* research design based on the fact that the researcher employed historical accounting data to establish the relationship between the independent variables to the dependent variable (Liviani & Rachman, 2021) The final sample comprised consumer goods (21) and industrial goods (15) on the Nigerian Stock Exchange (NSE) at end of the 2018 financial year. The sectors were selected based on the scope and methodological gap which the study intends to fill. This assertion has been clearly stated in the scope and objective of the study. Thus, a total of thirty-six (36) firms were sampled over a period of 8 years, which gave rise to a total of 288 observations deemed sufficient for utilizing the multiple regression techniques. The information used in the study is extracted from annual reports and accounts compiled by MachameRatios® a research database. Annual reports and accounts are widely used publicly available sources of information in studies of a financial nature. The reliability of the data is ensured by the required audit of financial statements as contained in the Companies and Allied Matters Act (CAMA). Pillai and Kaushal (2020), data from large and reputable, e.g., government agencies, quoted companies, etc. are more authoritative in nature, as their continued existence is based on the reputation and credibility of the organization.

3.1 Data Analysis

The data were analyzed using several techniques inclusive of descriptive statistics, such as mean, standard deviation, etc. The correlation matrix analyzed the degree of relationship between the variables. The study employs multiple regression to test the hypotheses. Multiple linear regression is a statistical tool that analyzes the relationship/association between several explanatory variables, i.e., IVs and CVs and their effect on a DV. It does this by estimating coefficients for the equation on a straight line (Hair, Black, Babin, Anderson, & Tatham, 2006). The study following several diagnostic checks used the Panel EGLS (Estimated Generalised Least Squares), to validate the hypotheses. The Panel

EGLS asymptotically is a generalized form that however relaxes some of the assumptions which limit the OLS technique, such as that the errors are homoskedastic and uncorrelated (Kaufman, 2013). The technique employed the period fixed effects specification. Durbin-Watson statistic assesses the degree of autocorrelation between each of the residuals and the residuals corresponding to the immediately previous time (Kochan et al., 2003). The analysis was conducted using the E-Views statistical software.

3.1.1 Model Specification

The development of the model follows several prior literatures (Abdellahi et al., 2017; Badawi, 2017; Enekwe, Agu, & Eziedo, 2014)

$$NOCF_{it} = \beta_0 + \beta_1 CGR_{it} + \beta_2 IGR_{it} + \beta_3 OGR_{it} \beta_4 SIZE_{it} + \beta_5 PPE_{it} + \beta_6 LEV_{it} + \beta_7 ROA_{it} + \beta_8 AGE_{it} + \beta_9 Z\text{-}Score_{it} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where:

NOCF - Net Operating Cash Flows
CGR - Capital Gearing Ratio
IGR - Income Gearing Ratio
OGR - Operating Gearing Ratio
SIZE - Firm Size
PPE - Property, Plant and Equipment
LEV - Leverage
ROA - Returns on Assets
Age - Firm Age
Z-score - Altman's Z-Score

3.1.2 Description of Variables

Dependent variable:		
NOCF	Net Operating Cash Flows	*Osagie (2016)*
Independent variables:		
The indebtedness of a company can be measured by either:		
CGR	Capital Gearing Ratio (Financial risk) *Long-term liabilities* *Long-term liabilities + Shareholders' equity*	*Kofoworola (2022); Yusuf* et al. *(2019)*
IGR	Income Gearing Ratio (Financial risk) Interest charges Profit before interest and taxes	*Jensen and Meckling (1976); Ji (2019)*
OGR	Operating Gearing Ratio (Business risk) *%Δ in profits* *%Δ in sales*	*Nugraha and Bayunitri (2020)*
The higher these gearing ratios are, the more a company is indebted.		
Control variables:		
SIZE	Firm Size	Himmelberg *et al.* (1999)
PPE	Property, Plant and Equipment	*Yusuf* et al. *(2019)*
LEV	Leverage	Wahyudi (2011)
ROA	Returns on Assets	*Fosu (2013)*
Age	Firm Age	*Osagie (2016)*
Z-Score	$1.2*R_1 + 1.4*R_2 + 3.3*R_3 + 0.6*R_4 + 1.0*R_5$ Where: *R_1 = working capital to total assets ratio* *R_2 = retained earnings to total assets ratio* *R_3 = Profit before interest & tax to total assets* *R_4 = market value of equity to book value of total liabilities* *R_5 = Revenue to total assets*	*Altman (1968); Altman (2000).*

Source: Authors compilation from reviewed literature (2022)

4. Results and discussions

Table 1. Descriptive statistics of dependent and independent variables

	NOCF	CGR	IGR	OGR
Mean	4.18E+10	0.205140	0.189808	223.9112
Median	3.30E+09	0.131851	0.000000	0.512615
Maximum	1.06E+12	1.959783	35.68700	25050.21
Minimum	-4.27E+10	0.000000	-49.25174	-1269.389
Std. Dev.	9.52E+10	0.242535	4.904494	2081.973
Skewness	5.372960	2.626109	-0.259528	10.89753
Kurtosis	48.43329	13.64128	56.81172	125.2836
Observations	287	287	287	287

Source: E-Views 9

The table above shows that the mean value of net operating cash flows for the firms included in the sample is $4.18 * 10^{10}$; i.e., on average, the value of net operating cash flows is worth approximately ₦41.8billion; while the maximum value is $1.06 * 10^{12}$, i.e., this is indicative that maximum net operating cash flows were ₦1.06 trillion. The mean value of net investing cash flows for the firms included in the sample is $-6.04 * 10^{9}$; this is suggestive that this is an outflow. Therefore, on average, the value of net investing cash flows is worth approximately ₦60.4 billion outflow by the firms included in the sample. The maximum value is $9.75 * 10^{10}$, this figure is indicative of the fact that the maximum total net investing cash flows were ₦97.5 trillion.

Table 2. Descriptive statistics of selected control variables

	SIZE	PPE	LEV	ROA	AGE	Z_SCORE
Mean	1.39E+11	4.03E+10	1.515614	1.141750	45.13889	-3.823595
Median	3.96E+10	7.04E+09	0.111110	0.035744	51.00000	0.957929
Maximum	2.51E+12	9.17E+11	242.1856	105.4859	95.00000	458.0352
Minimum	1.04E+08	12433326	0.000000	-22.27262	5.000000	-675.4680
Std. Dev.	2.92E+11	1.01E+11	14.60274	8.808381	19.17846	81.43950
Skewness	4.873979	5.327535	15.72506	9.108374	-0.317961	-2.532925
Kurtosis	33.75955	38.43489	258.2148	95.78840	2.816962	42.64543
Observations	288	288	288	288	288	288

Source: E-Views 9

The table above shows that the mean value of firm size for the firms included in the sample is $1.39 * 10^{11}$; i.e., on average, the value of firm size is worth approximately ₦139 billion; the maximum value is $2.51 * 10^{12}$. Therefore, the maximum total firm size was ₦2.51 trillion. The SD indicates that the values are spread out over a large range of values. The mean value of property, plant and equipment for the firms included in the sample is $4.03 * 10^{10}$; i.e., on average, the value of property, plant and equipment is worth approximately ₦40.3 billion; the maximum value is $9.17 * 10^{11}$. Therefore, the maximum value of property, plant and equipment was ₦917 billion. The SD indicates that the values tend to be very close to the mean spread. The average value of LEV was 1.516; indicating that on average the capital structure of the firms included in the sample was approximately 152% financed by Debt. The average value of the ROA of firms included in the sample was approximate 1.142. This suggests that the companies had approximately 114% of returns on the total level of investment generated by returns (PBIT). The average value of firm age for firms included in the sample was approximately 45 years from the date of incorporation of the company; the lowest observed value for firms included in the sample was 5 and the maximum value was for a period of 95 years in existence. The Altman's Z score indicated an average value of -3.824; which is suggestive of a poor state of health among the majority of firms included in the sample.

Table 3. Tests of Normality

	Kolmogorov-Smirnov[a](K-S)			Shapiro-Wilk (S-W)		
	Statistic	df	Sig.	Statistic	df	Sig.
NOCF	.311	287	.000	.480	287	.000
NICF	.322	287	.000	.318	287	.000
CGR	.199	287	.000	.738	287	.000
IGR	.363	287	.000	.323	287	.000
OGR	.486	287	.000	.104	287	.000
SIZE	.317	287	.000	.486	287	.000
PPE	.346	287	.000	.412	287	.000
LEV	.459	287	.000	.069	287	.000
ROA	.458	287	.000	.144	287	.000
Age	.154	287	.000	.939	287	.000
Z-Score	.414	287	.000	.291	287	.000

a. Lilliefors Significance Correction

The K-S and S-W statistics are used to test the normal distribution of a data set. The output scores are shown in Table 3 above, the .000 Sig. values of both statistics are well below the .05 margin of error. However, consistent with other studies the normality assumption of .000 is disregarded as the sample and period utilized are greater than 200 (Field, Miles, & Field, 2012).

Table 4. Correlation analysis for model 1

	NOCF	CGR	IGR	OGR	SIZE	PPE	LEV	ROA	AGE	Z_SCORE
NOCF	1.000000									
CGR	-0.055887	1.000000								
IGR	0.002384	-0.016720	1.000000							
OGR	-0.016554	-0.038851	-0.012970	1.000000						
SIZE	0.411767	0.013183	0.075388	-0.006307	1.000000					
PPE	0.261047	0.062068	0.167038	-0.023725	0.541880	1.000000				
LEV	-0.032944	0.248736	-0.006632	-0.011651	-0.043362	-0.035331	1.000000			
ROA	0.026903	-0.027516	-0.005693	-0.002948	-0.057695	-0.046946	0.190201	1.000000		
AGE	-0.050062	0.128880	-0.071972	0.022545	0.056558	0.070016	-0.119064	-0.114568	1.000000	
Z_SCORE	0.146411	0.048232	0.025890	0.033840	0.460487	0.049292	0.007430	0.109307	0.042760	1.000000

Source: E-Views 9

Where: NOCF is net operating cashflow; CGR is the capital gearing ratio; IGR is income gearing ratio; OGR is operating gearing ratio; SIZE is firm size; PPE is property, plant and equipment; LEV is leverage; ROA is the return on assets; AGE is the firm age; and, Z_SCORE is the Altman's Z-Score.

The existence of high collinearity among the IVs and CVs often leads to wrong estimation signs from implausible magnitudes. This leads to bogus coefficients in the estimated model which causes a bias in the standard errors (Osegbue, Nweze, Ifurueze, & Nwoye, 2018). The results shown in Table 4 show that CGR and OGR are negatively correlated to NOCF; while, IGR is positively correlated to NOCF. The control variables of SIZE, PPE, ROA, and Z_SCORE were weak and positively correlated to NOCF; while LEV and AGE were weak and negatively correlated to NOCF. CGR negatively correlated with IGR and OGR and the control variable ROA. The control variables, SIZE, PPE, LEV, AGE and Z_SCORE were positively correlated to CGR. IGR negatively correlated with OGR and the control variables LEV, ROA, and AGE. The control variables, SIZE, PPE, and Z_SCORE were positively correlated to IGR. OGR negatively correlated with SIZE, PPE, LEV, ROA, and AGE. However, this variable positively correlated with two control variables, AGE and Z_SCORE. As expected, SIZE positively correlated with PPE, AGE and Z_SCORE; and, negatively correlated with LEV and ROA.

PPE negatively correlated with LEV and ROA; and, positively correlated with AGE and Z_SCORE. LEV positively correlated with ROA and Z_SCORE; and, negatively correlated with AGE. ROA is negatively correlated with AGE and positively related to Z_SCORE. AGE positively correlated with Z_SCORE. The Variance Inflation Factor (VIF) was used to test the absence of multicollinearity in our independent variables.

Table 5. Variance Inflation Factor (VIF) test output

	Model 1
Variable	VIF
SIZE	1.96
PPEt	1.54
ZScore	1.41
LEV	1.14
CGR	1.11
IGR	1.10
OGR	1.09
ROA	1.08
Age	1.05
Mean VIF	1.28

Source: STATA ver. 15

Though the absence of clear rules on collinearity, suggests that $VIF_k > 10$ is judged an indicator of high collinearity. However, the empirical results reported in Table 5 show that no value exceeded this threshold. Therefore, no evidence of multicollinearity among the variables. The computed average was also less than 5 while the largest VIF value was 1.96, the study concludes the absence of multicollinearity (Sekaran & Bougie, 2009, p. 316).

4.1 Test of Hypotheses

The research specifically evaluates the model specified below as follows:

$$NOCF_{it} = \beta_0 + \beta_1 CGR_{it} + \beta_2 IGR_{it} + \beta_3 OGR_{it} \beta_4 SIZE_{it} + \beta_5 PPE_{it} + \beta_6 LEV_{it} + \beta_7 ROA_{it} + \beta_8 AGE_{it} + \beta_9 Z\text{-}Score_{it} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

The formulated hypotheses are tested using the Panel EGLS technique. The panel regression analysis output used in evaluating hypotheses one to three is shown and discussed below. The green-shaded region shows the main variables of interest while the corresponding red-shaded spaces show the relevant *p*-values of the corresponding variables. The *p*-values are used for accepting or rejecting the corresponding hypothesis.

Table 6. Regression output for model 1

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.53E+10	2.97E+09	11.87664	0.0000
CGR	-4.40E+09	6.32E+09	-0.695929	0.4871
IGR	-1.29E+09	5.82E+08	-2.213271	0.0277
OGR	289092.1	390922.8	0.739512	0.4602
SIZE	0.120379	0.009029	13.33293	0.0000
PPE	0.071684	0.057242	1.252299	0.2115
LEV	-2.25E+08	35812468	-6.281949	0.0000
ROA	2.60E+08	1.22E+08	2.133612	0.0338
AGE	-2.69E+08	57548067	-4.666157	0.0000
Z_SCORE	-21673710	35365907	-0.612842	0.5405

Effects Specification			
Period fixed (dummy variables)			
Weighted Statistics			
R-squared	0.672021	Mean dependent var	5.96E+10
Adjusted R-squared	0.652585	S.D. dependent var	1.35E+11
S.E. of regression	8.08E+10	Sum squared resid	1.76E+24
F-statistic	34.57640	Durbin-Watson stat	1.049831
Prob(F-statistic)	0.000000		
Unweighted Statistics			
R-squared	0.269908	Mean dependent var	4.18E+10
Sum squared resid	1.89E+24	Durbin-Watson stat	1.501713

Source: E-Views 9

The model shown above shows the dependent variable (DV), i.e., net operating cash flows with three independent variables (IVs): capital gearing ratio, income gearing ratio, and operating gearing ratio. This is in addition to six control variables (CVs) included in the explanatory variable. The R^2 in addition to the adjusted R^2 is used to account for the proportion of variation in the DV which could be attributed to the joint effect of IVs and CVs. Thus, the specified model accounts for approximately 65.2% variation of the DV. The F-statistic checks the statistical significance of the model. The value of the statistic was 34.58 with a *p*-value of 0.0000 which is < than 0.05 margin of error. This means that the hypothesis of all regression coefficients is zero and is rejected. Therefore, the F-statistics value in addition to the adjusted R^2 confirms the statistical properties of the model suggesting evidence of a good model fit and ability to vary reasonably the variation in net operating cash flows.

The model is presented below thus:

$$NOCF_{it} = 3.53 * 10^{10} + (-4.40) * 10^{09} CGR_{it} + (-1.29) * 10^{09} IGR_{it} + 289092.1\ OGR_{it} + 0.1204\ SIZE_{it} + 0.0717\ PPE_{it} + (-2.25) * 10^{08} LEV_{it} + 2.60 * 10^{08} ROA_{it} + (-2.69) * 10^{08} AGE_{it} + (-21673710)\ Z\text{-}Score_{it} + \varepsilon_t \ldots\ldots\ldots\ldots (2)$$

4.1.1 Hypothesis One

H_{01}: There is no significant effect of capital gearing ratio on operating cash flows of quoted manufacturing firms.

The *coefficient* (-4.40 * 10^{09}) and *t-statistic* (-0.696) of the variable of interest (CGR) is negative however as the *p*-value > .05 it was confirmed not statistically significant. This causes a rejection of the alternate hypothesis while the null is accepted; thus, 'there is no significant effect of capital gearing ratio on operating cash flows of quoted manufacturing firms'. The findings support that of Mathur *et al.* (2021) in India; and, empirically using Ukrainian data Lavorskyi (2013) found a negative effect. The evidence is also supported using the Australian dataset by Lawes and Kingwell (2012) found a negative association. Kassi et al. (2019) in Casablanca also found a negative effect of gearing ratio on several alternative proxies (ROA, ROE, PROF) of financial performance. Interestingly, Hidayat and Kurniasih (2022) reported a negative non-significant effect. However, in contrast, Mufidah (2018) reported a positive significant effect of the gearing ratio on Return On Assets (ROA). Also, Seth et al. (2020), in India confirmed a significant relationship between leverage and the cash conversion cycle (CCC). Fosu (2013) in South Africa found a positive significant relationship between leverage and firm performance.

4.1.2 Hypothesis Two

H_{02}: There is no significant effect of income gearing ratio on operating cash flows of quoted manufacturing firms

The *coefficient* (-1.29 * 10^{09}) and *t-statistic* (-2.213) of the variable of interest (IGR) is negative and statistically significant as the *p*-value < .05. The study findings reject the null and accept the alternate hypothesis; thus, 'there is a significant effect of income gearing ratio on operating cash flows of quoted manufacturing firms'. The findings are supported by Ji (2019) in South Korea; while, Onuora and Obia (2018) also found a negative effect of ICR on EPS. The payment of interest decreases the income available to a firm, which invariably affects performance. This is consistent with the notion that interest payments deter cash flow (Fout et al., 2020; Kassi et al., 2019), which presents a significant risk factor for the firm's financial performance.

4.1.3 Hypothesis Three

H_{03}: There is no significant effect of the operating gearing ratio on the operating cash flows of quoted manufacturing firms.

The *coefficient* (289092.1) and *t-statistic* (0.740) of the variable of interest (OGR) were positive which wasn't significant statistically as the *p*-value > .05. This leads to a rejection of the alternate hypothesis while the null is accepted; thus, 'there is no significant effect of operating gearing ratio on operating cash flows of quoted manufacturing firms'. The findings support the study by Hidayat and Kurniasih (2022) which finds a positive significant effect of financing to assets ratio on ROA; and, PRASETIONO (2016) found a positive significant effect of financing to assets ratio on ROA; while, Siyanbola et al. (2015) in Nigeria that showed a positive association between the gearing ratio and the operating cash flow of a firm. A positive association is also found in the study by Akhtar, Ali, and Sadaqat (2011). However, in contrast, the study by Enekwe et al. (2014) reported a negative relationship between the gearing ratio and firm performance proxied as return on assets. Putra (2021), finds that the financing-to-assets ratio had a negative effect on ROA.

Interpreting coefficients of the CVs:
Table 5 reports the significance and signs of the control variables utilized in Model 1, i.e., SIZE, PPE, LEV, ROA, AGE and Altman's Z in the estimation output.

The analytical output showed that SIZE (t = 13.332, p <.05) and ROA (t = 2.134, p <.05) were positive and statistically significant. The latter is consistent with the study by Lumbantobing (2020) on the positive effect of ROA on financial distress. Using data from Indonesia, the positive association is confirmed by Susanti et al. (2020). Ilaboya and Ohiokha (2016) in Nigeria found a positive effect of firm size on a firm's profitability. This is also supported by Kassi et al. (2019).

The variables of LEV (t = -6.282, p <.05) and AGE (t = -4.666, p <.05) were negative and statistically significant. This is supported by Kasasbeh (2021) that found a negative effect of age and leverage on ROA using the GMM estimation technique. Using Nigeria's empirical data (Osagie, 2016) found a negative non-significant effect of age on cash flow; while, Wahyudi (2011) confirmed this relationship in Indonesia. However, in contrast, studies by Ghafoorifard et al. (2014) in Iran reported a positive association while Ally et al. (2015) in Gideon (2013) in Tanzania also found evidence of a positive association between firm age and firm performance. Yet other studies in the Nigerian context, e.g., Aiyegbusi and Akinlo (2016); Ilaboya and Ohiokha (2016) however reported a positive effect of age.

The variable Z_SCORE was negative and non-significant (t = -0.613, p >.05); while, PPE was positive and non-significant (t = 1.252, p >.05). This is in contrast to the study by Foo and Pathak (2019), which documented a positive significant effect of Z-Score on ROE. While the effect of PPE is confirmed by Udoayang et al. using empirical from Nigerian firms found a positive non-significant effect of PPE on ROA.

5. Conclusion

The study evaluated the effect of capital gearing on the operating cash flow information of quoted manufacturing firms in Nigeria. Prior studies have mainly focused on capital gearing neglecting the

income and operating gearing ratios as a result of the alternative funding sources of a business. The study examined the effect of business and financial risk, i.e., capital gearing, income gearing and operating gearing ratios on the cash flow performance of manufacturing firms. The empirical results showed a negative relationship between the capital and income gearing ratio on operating cash flows with the former not significant, and a non-significant positive effect of the operating gearing ratio on net operating cash flows of quoted manufacturing firms (p>.05). The reported empirical findings led the authors to suggest the following recommendations for managers, shareholders and policymakers:

1. Evaluating the earnings potential via the capital gearing ratio: Shareholders (or potential investors) should assess the level of capital gearing of a firm before investment. This is primarily important because of the negative effect of such on cashflows more so on the future investment potential of the firm. The use of debt financing is also contextual such that managers should evaluate the broad economic factors before debt financing decisions;
2. Adequate and proper monitoring of the income gearing ratio of the firm over time is because funds cannot only be used for paying or servicing debt to the detriment of the residual claimants of the firm. To enable such, finance managers should focus on an acceptable threshold for the income gearing ratio;
3. Managers should aim at an improved operating gearing ratio because of its positive beneficial effect on net operating cash flows. More so, the operating gearing ratio is an indicator of the earnings potential and trend of a firm over time, which signals to investors of favorable market performance. This confirms the position of CIMA that managers can utilize this ratio to tweak or readjust their risk profile. This also confirms the importance of this ratio to investors as the first two may be readily ascertainable from published accounts while the actual measures of cost may be internally available to management through management accountants.

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