

Full Length Research Paper

Cash flow effect and financial performance of quoted oil and gas sector 2013-2022: Evidence from Nigeria

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The study aimed to explore the impact of cash flow on the financial performance of publicly listed oil and gas companies in Nigeria. An ex post facto research design was employed for this investigation. The study's focus was on the seven oil and gas companies listed on the Nigerian Exchange Group (NGX) as of December 31st, 2022, which constituted the population and sample due to its manageable size. The time frame of analysis spanned a decade, from 2013 to 2022. The necessary data for the study were sourced from the published annual reports and accounts of the quoted oil and gas companies. Both descriptive and inferential statistical techniques, particularly multiple regression, were employed for data analysis, with a significance level (α) set at 0.05. The findings of the study indicated that cash flow had a significant effect on key financial indicators, including return on assets (Adjusted R2 = 0.767, F-statistics = 13.612, p-value = 0.000), return on equity (Adjusted R2 = 0.266, F-statistics = 3.772, p-value = 0.001), and earnings per share (Adjusted R2 = 0.388, F-statistics = 5.854, p-value = 0.000) for the quoted oil and gas companies in Nigeria. In conclusion, the study established that cash flow played a notable role in influencing the financial performance of the examined oil and gas companies in Nigeria. As a recommendation, the study advised that the management of these companies should prioritize the interests of investors and leverage cash flow management strategies to drive sustainable financial performance.

Key words: Cash flow, Earnings per share, Oil and gas companies, Return on assets, Return on equity.

INTRODUCTION

Background to the study

The financial performance of any organization holds paramount importance for its business continuity and sustainability. The manner in which a company manages

its resources ultimately determines the nature of its performance, whether it is short-term or long-term (sustainable). A firm's performance carries implications

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for investor interest and shapes the perception it fosters among the public (Ironkwe and Wokoma, 2017). A company that exhibits a positive profitability trend and robust liquidity position signals a promising future for shareholders, employees, potential investors, governmental bodies, and the environment. Companies with strong track records yield favorable returns for investors, maintain employee salaries, meet tax obligations to the government, and fulfill corporate social responsibilities within the communities they operate in (Joseph and Chiemeka, 2020). Performance serves as a guiding factor for investors in deciding where to deploy their investible funds.

The financial performance of a company hinges on the management's proficiency in leveraging available resources to achieve the maximization objectives of investors (Salami et al., 2019). This objective encompasses not only profit maximization but also fulfilling other obligations, such as corporate social responsibility, employee compensation, tax remittance, and ensuring business continuity.

Financial performance can be evaluated through various metrics including sales growth, cost minimization, profitability, return on assets, return on equity, earnings per share, Tobin's Q, dividend per share, and market price per share (Etim et al., 2020). Cash flow stands as a pivotal element in elevating a company's financial performance. Effective cash flow management entails allocating financial resources across different investment segments. Decisions must be made about allocating funds to operational activities, investment ventures, and financing endeavors, all with the overarching goal of achieving the company's objectives (Olaoye et al., 2019). The cash flow cycle encompasses operational, investment, and financing activities, as well as the current ratio. A company that adeptly manages this complex interplay can achieve strong performance, attracting investors and fostering a positive public image. A company's management should know how to allocate its financial resources to achieve good performance that is sustainable for the company and its stakeholders. It is inappropriate for a company to commit short term fund to a long term project to avoid business failure and eventual closure of the company (Taouab and Issor, 2019; Kadioglu et al., 2017). A proper treatment of cash flow along with other management activities in its business lines will determine its business and financial success while a company with poor management of its cash flow may suffer poor performance such as low sales, high cost, high debt, loss, low return on assets, poor return on equity, low or negative earnings per share, low Tobin's Q or falling market price per share (Nangih et al., 2020).

Oil and gas sector is a critical sector that impacts every aspect of world's economy. The price of oil is the basis for other commodities. The sector is a major foreign earner for every country that has it. Oil remains the major source of energy for the global economy and it accounts

for 3% of world's economy. The United States of America (USA) is ranked as the top producer of oil in the world. The top five oil producers in the world after USA are Canada, Columbia, Mexico, Russia, and Saudi Arabia. Nigeria cannot boast of meaningful results achieved from its oil success. Nigeria is the top oil producer in Africa and is ranked 11th among the oil producers in the world. The National Bureau of Statistics reported that Nigeria recorded 5.67% annual contribution of oil to aggregate GDP in 2022 against 7.24% achieved in 2021. Nigeria is considered as a mono-product economy due its major dependence on oil and gas for its earning. Oil and gas accounted for 90% of export income in the first quarter of 2022 and 85% of government revenue. Available figures from Q4 2018 revealed that Nigeria's oil and gas contribution to GDP has not crossed 9%.

Cash flow is very critical in managing a company's financial performance. A company may be profitable and not liquid. This can result where there is much sales credit without corresponding collection. There will be no fund to finance production and other lines of business hence imminent collapse will result. This was the case with Singer Company Limited located in Ibadan, manufacturer of sewing machine, where the company extended sales credit to customers without appropriate documentation of the customers (Appah et al., 2021). The customers could not be traced to collect the credit sales and this led to the collapse of the company. The sales had been captured to generate profit but there was no cash to turn over the activities of the company for business continuity. There would be no cash to pay dividend from the profit and tax on profit declared. A company should be able to balance its receivables and payables to ensure a sustainable business.

Nangih et al. (2020) in their study revealed that cash flows from operating and investing activities had a negative insignificant relationship with profitability while financing activities had a positive significant effect on firm performance in the oil and gas sector. Nwarogu and Iorlombagah (2017) also showed a negative relationship on cash flow and return on assets and return on equity but there was a positive relationship between cash conversion cycle, cash holding and return on assets of quoted firms in Nigeria. Some studies were carried out on working capital management and financial performance of listed Oil and Gas companies in Nigeria which include Aitimou and Aniche (2020), Ironkwe and Wokoma (2017), Salami et al. (2019), Etim et al. (2020) Other studies carried out on cash flow and performance of companies are: Al-Zobi and Dhaimesh (2021), Aguguom (2020), Nwaiwu and Oluka (2017), Yazan et al. (2017), Hayek (2018), Abdullahi et al. (2020). Studies on cash flow, cash management, and liquidity management from other authors covered other sectors such as manufacturing, public construction, food and beverages sector in Kenya, Ghana, India, Jordan, Turkey, and Saudi Arabia.

The study was carried out with the aim of contributing

to literature in this area in Nigeria and other places. There are few studies (Nangih et al., 2020 was the only paper found which wrote cash flow management and financial performance of quoted oil and gas firms in Nigeria) in this area hence this paper will fill a gap and add value to the academic and industry. None of the papers reviewed made use of the theory adopted for this paper (Miller and Orr Model of Cash Management) hence the paper will fill a theoretical gap in this area. The paper considered the current list of quoted oil and gas sector in Nigeria as at 31st December, 2022.

LITERATURE REVIEW

Conceptual review

Financial performance

Financial performance is referred to as the ability of an organization to generate income from its daily operations in a particular period, this is measured as net income in relation to assets or equity provided or outstanding shares provided by the owners of the of the business. Financial performance can be measured in two ways either accounting-based or market-based. Accounting-based measures include return on assets, return on equity, sales growth while market-based measures include Tobi's Q, market return, market price per share (Sulaiman et al., 2019; Abubakar et al., 2020). Accounting measures reflect historical or short-term performance of a firm but the market-based measures show the long-term or future performance (Abubakar et al., 2020).

Return on assets (ROA)

This is a performance metric that measures the efficiency of a company's assets used in generating revenue. This is the division of net income by total assets (Aguguom, 2020; Ironkwe and Wokoma, 2017).

Return on equity (ROE)

This is a performance metric that measures the profitability of a company by its equity. Divide net income by shareholders' equity to arrive at this figure (Abdullahi et al., 2020).

Earnings per share (EPS)

This is a company's profit earned divided by the outstanding shares of its common stock.

Cash flow statements

Financial statements had been prepared on accrual basis

to forecast share performance (income statement and changes in financial position) since the development of financial markets between 1920 and 1970s (Al-Zobi and Al-Dhaimesh, 2021). This position changed when companies went bankrupt despite positive results from their financial statements. It was believed that accrual basis gave opportunity to manipulate financial performance to attract investors. As a result of this challenge, FAS issued a Statement of Financial Accounting Standards No, 95 which made it mandatory for companies to include statement of cash flows in place of listing changes in equity.

International Accounting Standards Committee (IASB) issued a revised IAS 7 (Statement of Cash Flows) to replace Statement of Owner's equity issued in 1977. This was made mandatory for companies to prepare and include statement of cash flows as an addition to other financial statements to provide information on the operating, investment, and financing activities of a company on a cash basis. Useful information about cash receipts and payments is obtained from statement of cash flows by the users of financial statements (Kasmiati and Santosa, 2019).

The dynamics of cash flow are captured on the statement of cash flow in three headings; cash flows from operating activities, cash flows from investing activities, and cash flows from financing activities (Ryu and Jang, 2004). Some studies have shown that the statement of cash flows is very critical as it provides vital information that is not available from income statement and financial position. The cash flow is a reflection of the market value of a company.

Operating cash flow (OCF)

This is the amount of cash generated by a company's normal business operations (Liman and Mohammed, 2018). It reveals whether a company can produce enough funds to sustain and expand its business activities; otherwise, capital expansion may necessitate outside funding. The operating activity head includes cash flows related to producing and selling the company's product or service which starts with payments for merchandise, material and ends with the collection of the proceeds from sales within the reporting period (Nangih et al., 2020; Al-Zobi and Al Dhameish, 2021).

Financing cash flow

The financing activity head includes cash flow information from the issuance and settlement of, or reacquisition of, a firm's debt and equity securities. This reflects the company's capital structure as it contains financing policy for equity, short term debt and long term debts (Nangih et al., 2020; Utomo and Pamungkas, 2018).

Investing cash flow (ICF)

The investing activity head includes cash flow information from the purchase of operating assets, debt and equity security investments, and their financial investments forming the foundation of operations (Setyawati, 2018; Gathu, 2018). The investing activity can be broken down into (i) cash flows from property, plant, and equipment (operating) transactions, and (ii) cash flows from other (non-operating) investing activities. Increased cash flow from investing activities is an indication of disposal of long term assets or other investments while the lower cash flow is an indication of increased growth and profits (Al-Zobi and Al Dhameish, 2021).

Cash flow activities and return on assets

The relationship between cash flow activities and return on assets from prior studies suggest mixed results. The studies of Musah and Kong (2019), Liman and Mohammed (2018), Appah et al. (2021), Aguguom (2020), Nwaiwu and Oluka (2017), Soet et al. (2018), Gathu (2018), Rahman and Sharma (2020) revealed that cash flow activities had positive significant effect on return on assets. Nangih et al. (2020), Salami et al. (2019), Aitimon and Aniche (2020), Bingilar and Oyadonghan (2014), Abdullahi et al. (2020) revealed negative impact of cash flow on return on asset.

Cash flow activities and Return on equity

The relationship between cash flow activities and return on equity showed mixed results. The studies of Musah and Kong (2019), Abdullahi et al. (2020), Rahman and Sharma (2020) had a positive significant effect on return on equity. The studies of Nwarogu and Iorlombagah (2017), Ironkwe and Wokoma (2017) showed a negative relationship between cash flow activities and return on equity.

Cash flow activities and Earnings per share

Only few studies revealed results on the relationship between cash flow activities and earnings per share. Ironkwe and Wokoma (2017) revealed a neutral significant relationship between cash flow activities and earnings per share.

THEORETICAL REVIEW

Miller and Orr model of cash management

Miller and Orr (1966) propounded cash management

model. The model assumes that a firm's cash flow is stochastic, which means that different amounts of cash are paid out at different times. It is assumed that changes in cash balance occur at random. It enables modern businesses to manage their cash while accounting for fluctuations in daily cash flow. Businesses use this model to plan their cash balance between the upper and lower limits. Companies only buy or sell marketable securities if their cash balance equals or exceeds any of the following: When a company's cash balance reaches a certain threshold, it purchases a certain number of sellable securities to help it return to the desired level. If the company's cash balance falls below a certain threshold, it will sell its sell-able securities to raise the necessary funds (Li et al., 2020).

The cash management model developed by Miller and Orr was predicated on the following assumptions: (i) the average value of the distribution of net cash flows is usually assumed to be zero. It is also understood that the standard deviation of the net cash flow distribution exists cash flow distribution is normal. The Miller-Orr model holds the assumptions that I the daily interest received on the transaction is consistent (Alvarez and Lippi, 2017), (ii) the transaction cost is continuous and independent of transaction size (Baik et al., 2016) (iii) the lead time in securities trading is insignificant, and (iv) the cash balance will increase or decrease by a certain amount (Gathu, 2018). Equational representations in Miller and Orr model of cash management (Gathu, 2018):

Target cash balance (Z):

Where TC denotes the transaction cost of purchasing or selling securities.

V = daily cash flow variance

r denotes the daily return on short-term investments.

L denotes the minimum cash requirement.

The following equation determines the upper limit for the cash account (H):

$$H = 3Z - 2L$$

Since it allows cash flows to fluctuate randomly between the lower and upper limits, this theory is more realistic and superior to the Baumol model. Financial managers need items below in using the model (Li et al., 2020):

1. Identifying the estimated prices that could be used for trading the saleable securities
2. Determination of minimum cash balance for the business
3. Review of interest rate
4. Computation of standard deviation of regular cash flows

The theory applies to businesses with volatile cash inflows and outflows. It allows for the setting of lower and upper cash balance limits, as well as the determination of the target cash balance. Companies can effectively plan

and manage their cash (Li et al., 2020). The theory is applicable to this study considering the fund movement in achieving the company's objectives.

Empirical review

Cash flow statement as part of financial statements includes cash flow from operating activities, cash flow from investing activities, and cash flow from financing activities. Previous studies that have reviewed the variables are looked at:

Odo and Udodi (2022) examined the influence of cash management on financial performance of selected manufacturing companies in Nigeria. Ex post facto research design was used hence data for the study were drawn from the annual reports of the 26 sampled companies out of population of 55 listed manufacturing companies in Nigeria. The panel least square regression was used to analyze the data. The findings showed a positive significant effect of cash management on return on assets and Tobin's Q but it had a negative insignificant effect on return on equity.

Mukadar et al. (2021) examined the effects of cash flow, funding, and investment on financial performance of mining companies in metal and other mineral sub sector listed on Indonesia Stock Exchange. Ex post facto research design was used. The population of the study covers all the mining companies listed on Indonesia Stock Exchange as at 331st December 2019. There were 7 companies considered for the sample, these companies were listed on Indonesia Stock Exchange, they had data for the variables considered for the study in the published annual reports. SmartPLS was used to analyze the data. The results revealed that operating cash flow and Funding cash flow had a positive insignificant effect on the financial performance of mining companies in the metal and other mineral sub-sectors listed on the Indonesia Stock Exchange. Investing cash flow had a positive significant effect on financial performance of mining companies in the metal and other mineral sub-sectors listed on the Indonesia Stock Exchange.

Appah et al. (2021) examined cash flow accounting and corporate financial performance of listed consumer goods in Nigeria. The study used ex post facto and correlational research designs respectively. 23 firms were selected out of 25 firms in the industry with the use of Taro Yamene formula. Data was obtained from the annual reports of the sampled firms listed on the Nigerian Exchange (NGX). Descriptive and inferential statistics were employed for data analysis. The findings showed a positive significant effect of operating cash flow, financing cash flow, and firm size on profit after tax of listed consumer goods industry but investing activities and financial leverage showed a negative significant effect. The study concluded that cash accounting influenced the corporate financial performance of consumer goods firms

in Nigeria.

Rahman and Sharma (2020) examined the cash flows and financial performance in the industrial sector of Saudi Arabia. Ex post facto research design was adopted. Annual reports of sampled companies from insurance and manufacturing sectors were used. The results showed a positive significant effect of operating cash flows on return on assets and return on equity respectively.

In another study, Nangih et al. (2020) examined cash flow management and financial performance of quoted oil and gas firms in Nigeria. Ex post facto research design was adopted. Multiple regression and correlation techniques were adopted to analyze data obtained from the annual reports of sampled oil and gas firms quoted on the Nigerian Exchange as at 31st December 2018. The results showed a negative insignificant effect of operating and investing cash flows on profitability. In the same vein, financing activities showed a positive significant effect on firm performance. This reflected increase in stock volatility and higher returns.

Musah and Kong (2019) examined the relationship between cash flows and financial performance of firms listed on Ghana Stock Exchange. Ex post facto research design was adopted. Data were obtained from annual reports of sampled firms. The results showed that cash flows had positive significant effect on return on asset but it had positive insignificant effect on return on equity. Gathu (2018) examined the influence of cash flows from investing activities on returns of shareholders in listed manufacturing and allied companies in Kenya. Primary and secondary data were adopted for the study using questionnaire and annual reports of sampled manufacturing and allied firms in Nairobi; with a population of 227 Finance and Accounting staff of the listed manufacturing and allied firms in Nairobi Kenya. Stratified sampling was adopted to take a sample of 54 respondents for the study. SPSS was used to process the collected data. The study showed a positive significant effect of cash flow investing activities on shareholders' returns ($t=3.8499$; $p<0.05$). Cash flow from investing activities is very critical in determining dividend payment to shareholders especially if there is need to decide on project expansion.

Nwaiwu and Oluka (2017) examined cash flow accounting and financial performance of quoted companies in Nigeria in relation to IFRS. Ex post facto research design was used. Annual reports of sampled companies were used to provide data for the study. The findings revealed that cash flow accounting had a positive impact on financial performance of quoted companies in Nigeria.

CONCEPTUAL FRAMEWORK

The conceptual framework of the study is shown in Figure 1.

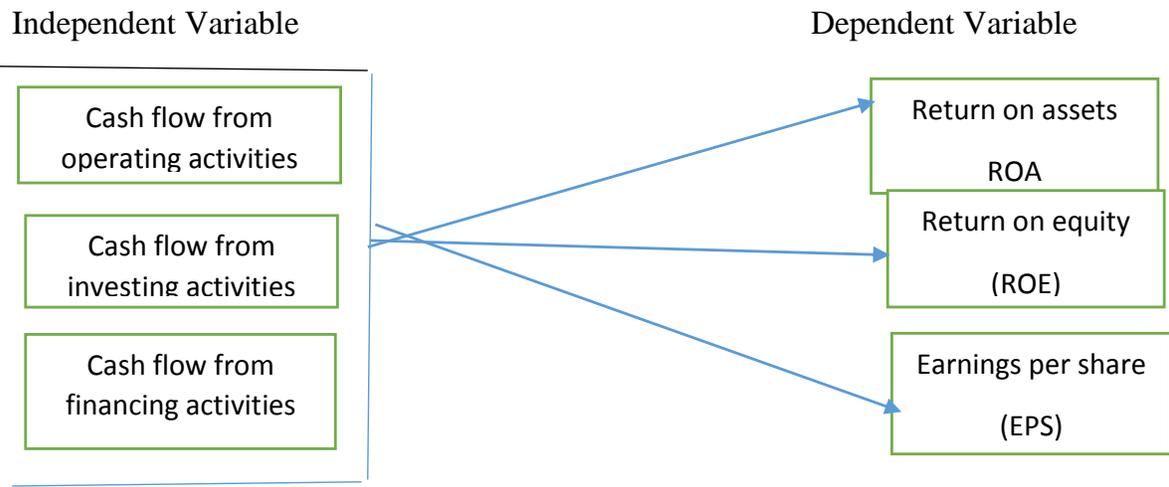


Figure 1. Conceptual framework. Source: Researcher’s computation (2023).

METHODOLOGY

The research design used for this study is ex-post facto. The data were derived from the secondary source of sampled oil and gas companies quoted on the Nigerian Exchange (NGX). The annual reports of quoted oil and gas companies were reviewed for the period 2013-2022 (ten years). The population of the study comprises eight (8) quoted oil and gas companies in Nigeria on the Nigerian Exchange (NGX) between 31st December 2013 and 31st December 2022 (a period of ten years). Two firms were not included in the list of eight companies, they are 11 Plc and Oando Plc. 11 Plc was delisted from the Exchange in May 2021 while Oando did not provide annual reports for 2019 through 2022. Seplat was an addition considering their listing on the Exchange from 2013. The seven (7) quoted oil and gas companies made use of are: Ardova Plc, Conoil Plc, Eternaoil Plc, Japaul Gold and Ventures Plc, MRS Oil Plc, Seplat Petroleum Plc, Total Nigeria Plc.

The period 2013 was chosen with the aim of capturing Seplat Petroleum Plc which is missing in most literature on oil and gas sector in Nigeria (Abdullahi et al., 2020; Ironkwe and Wokoma, 2017; Nangih et al., 2020; Nwarogu and Iombagah, 2017; Hayek, 2018; Yazan et al., 2017; Nwaiwu and Oluka, 2017; Al-Zobi and Al-Dhaimesh, 2021; Aguguom, 2020). Seplat Petroleum is a key player in the industry that should not be missed out. The year 2022 was chosen to ensure currency of data used for the study which will also provide up to date information to readers and users of this report. A ten year period ending on the current is sufficient to capture sufficient information required for the study.

The study used simple random sampling technique in selecting the sample to give opportunity of being selected by every company in the population. The selection was also dependent on the availability of annual reports and accounts of the target companies in the population. The sample was arrived at using Taro Yamane formula for the companies in oil and gas industry as shown below:

$$n = N / (1 + (N * e^2))$$

$$n = 8 / (1 + (8 * 0.05^2))$$

$$n = 8 / (1 + (0.02)) = 8 / 1.02 = 7.84$$

Sample size required for the study is 7.84 out of eight quoted oil and gas companies in Nigeria. Oando Plc was not included due to non-availability of annual reports up to date.

The study made use of data obtained from the annual reports and accounts of the sampled oil and gas companies in Nigeria for the periods under review (2013-2022). The choice of oil and gas sector was as a result of scanty studies in this area and the importance of the sector to Nigeria’s economy. Descriptive statistics and regression analysis, where Pooled regression with Fixed and Random Effects, were adopted for the study analysis. The study used multiple regressions for the analysis with the aid of E-views package.

The model specification of the study is represented below following balanced panel data of Ordinary Least Square (OLS):

$$ROA = f(CFF, CFI, CFO) \tag{Equation 1}$$

$$ROE = f(CFF, CFI, CFO) \tag{Equation 2}$$

$$EPS = f(CFF, CFI, CFO) \tag{Equation 3}$$

$$ROA_{it} = \alpha_0 + \beta_1 CFF_{it} + \beta_2 CFI_{it} + \beta_3 CFO_{it} + e_{it} \tag{Model 1}$$

$$ROE_{it} = \alpha_0 + \beta_1 CFF_{it} + \beta_2 CFI_{it} + \beta_3 CFO_{it} + e_{it} \tag{Model 2}$$

$$EPS_{it} = \alpha_0 + \beta_1 CFF_{it} + \beta_2 CFI_{it} + \beta_3 CFO_{it} + e_{it} \tag{Model 3}$$

Where:

ROA_{it} = Return on assets ROE_{it} = Return on equity EPS_{it} = Earnings per share

CFF_{it} = Cash flow Financing activities CFI_{it} = Cash flow Investing activities CFO_{it} = Cash flow operations

α₀ = intercept e_{it} = error term β₁ - β₃ =

Coefficient of independent variables

i = Firm t = time

RESULTS, INTERPRETATION, AND DISCUSSION

Descriptive analysis

Descriptive statistics

The mean value for the data set of return on equity is 31.91, the standard deviation is 170.65. Standard deviation measures the extent of dispersion from the mean which suggests some levels of fluctuation in the

Table 1. Descriptive statistics.

Variable	CFF	CFI	CFO	EPS	ROA	ROE
Mean	-5.613550	-0.071056	7.123096	3.251726	2.894918	31.91172
Median	-3.525000	-1.710000	6.405000	1.410000	2.839650	8.987968
Maximum	43.27000	240.0000	34.43000	49.66000	176.2700	1099.683
Minimum	-212.0800	-35.78000	-27.20000	-50.00000	-71.36000	-230.3800
Std. Dev.	27.62943	30.19034	11.71551	11.04367	24.93896	170.6496
Observations	70	70	70	70	70	70

Source: Researcher's computation (E-View 2023).

data distribution. A low standard deviation suggests closeness of data points to the mean while a high standard deviation indicates that the data points are spread over a large range of values. The difference between the minimum value of -230.38 and the maximum value of 1099.68 shows the extent to which oil and gas companies in Nigeria vary from each other in return on equity (ROE) (Table 1).

The mean value for the data set of return on assets (ROA) is 2.89, the standard deviation is 24.94. The difference between the minimum value of -71.36 and the maximum value of 176.27 shows the extent to which oil and gas companies in Nigeria vary from each other in return on assets (ROA). The mean value for the data set of Operating Cash flow (CFO) is 7.12, the standard deviation is 11.72. The difference between the minimum value of -27.20 and the maximum value of 34.43 shows the extent to which oil and gas companies in Nigeria vary from each other in Operating cash flow (CFO). The mean value for the data set of investing cash flow (CFI) is -0.07, the standard deviation is 30.19. The difference between the minimum value of -35.78 and the maximum value of 240.00 shows the extent to which investing cash flow (CFI) of oil and gas companies in Nigeria vary from each other. The mean value for the data set of financing cash flow (CFF) is -5.61, the standard deviation is 27.63. The difference between the minimum value of -212.08 and the maximum value of 43.27 shows the extent to which financing cash flow (CFF) of oil and gas companies in Nigeria vary from each other. The mean value for the data set of Investing cash flow (CFI) is -0.071, the standard deviation is 30.19. The difference between the minimum value of -35.78 and the maximum value of 240 shows the extent to which oil and gas companies in Nigeria vary from each other in Investing cash flow (CFI).

Test of hypotheses

Ho₁: Cash flow has no significant effect on return on assets of quoted Oil and gas companies in Nigeria.

Ho₂: Cash flow has no significant effect on return on equity of quoted Oil and gas companies in Nigeria.

Ho₃: Cash flow has no significant effect on earnings per share of quoted Oil and gas companies in Nigeria.

Interpretation of results

$$ROA_{it} = \alpha_0 + \beta_1 CFF_{it} + \beta_2 CFI_{it} + \beta_3 CFO_{it} + e_{it} \quad (\text{Model 1})$$

$$ROA_{it} = 3.575 + 0.005 CFF_{it} + 0.777 CFI_{it} - 0.083 CFO_{it} + e_{it} \quad (\text{Model 1a})$$

Model One in Table 2 examined the effect of cash flow on return on asset of quoted oil and gas firms in Nigeria. Table 2 showed a positive insignificant effect of financing cash flow on return on assets ($\beta = 0.005$, $p = 0.980$). The positive value of its coefficient implies that a unit of CFF introduced will lead to a marginal increase of 0.01% in return on asset. Investing cash flow has a positive and significant effect on Return on asset ($\beta = 0.777$, $p = 0.0002$). The positive value of its coefficient implies that a unit of CFI will lead to a 0.777 percent increase in Return on asset. The regression estimates results also revealed that Operating cash flow has a negative insignificant effect on ROA ($\beta = -0.084$, $p = 0.651$). The negative value of its coefficient implies that a unit of CFO introduced will lead to a 0.08 decrease in Return on asset. At a 5% level of significance, F-statistics of 13.61, the p-value is 0.000 which is less than the adopted level of significance. Therefore the study rejected the null hypothesis which states that Cash flows have no significant effect on return on assets of quoted oil and gas firms in Nigeria. The alternate hypothesis was accepted which states that Cash flows have significant effects on return on assets of quoted oil and gas firms in Nigeria. This result is consistent with the *a priori* expectation of this model. The Adjusted R² showed 0.767 which reflects that independent variables (CFO, CFF and CR) accounted for 76.7% of changes in return on asset while only 23.3% were changes outside the independent variables..

$$ROE_{it} = \alpha_0 + \beta_1 CFF_{it} + \beta_2 CFI_{it} + \beta_3 CFO_{it} + e_{it} \quad (\text{Model 2})$$

$$ROE_{it} = 36.96 + 0.421 CFF_{it} + 3.486 CFI_{it} - 0.342 CFO_{it} + e_{it} \quad (\text{Model 2a})$$

Table 2. Result on Regression Equation of ROA.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.575406	1.919975	1.862214	0.0683
CFF	0.005182	0.208774	0.024822	0.9803
CFI	0.777284	0.193700	4.012814	0.0002
CFO	-0.083695	0.183741	-0.455505	0.6507
R-squared	0.827715	Mean dependent var		2.894918
Adjusted R-squared	0.766909	S.D. dependent var		24.93896
S.E. of regression	12.04040	Akaike info criterion		8.040601
Sum squared resid	7393.538	Schwarz criterion		8.650906
Log likelihood	-262.4210	Hannan-Quinn criter.		8.283022
F-statistic	13.61233	Durbin-Watson stat		1.189323

Source: Author's computation (E-view output 2023).

Table 3. Result on Regression Equation of ROE.

Dependent Variable: ROE				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	36.96044	22.38568	1.651075	0.1039
CFF	0.421207	2.161893	0.194832	0.8462
CFI	3.485887	2.088260	1.669278	0.1003
CFO	-0.342065	1.924039	-0.177785	0.8595
R-squared	0.361362	Mean dependent var		31.91172
Adjusted R-squared	0.265566	S.D. dependent var		170.6496
S.E. of regression	146.2452	Akaike info criterion		12.94001
Sum squared resid	1283260.	Schwarz criterion		13.26122
Log likelihood	-442.9004	Hannan-Quinn criter.		13.06760
F-statistic	3.772210	Durbin-Watson stat		2.544984
Prob(F-statistic)	0.000820			

Source: Author's computation (E-View output 2023).

Model Two in Table 3 examined the effect of cash flow on return on equity of quoted oil and gas firms in Nigeria. Table 3 showed a positive and insignificant effect of financing cash flow on return on equity ($\beta = 0.421$, $p = 0.846$). The positive value of its coefficient implies that a unit of financing cash flow (CFF) will lead to a 0.421 percent increase in Return on equity. The table also revealed that Investing cash flow had a positive and insignificant effect on return on equity ($\beta = 3.486$, $p = 0.100$). The positive value of its coefficient implies that a unit of investing cash flow (CFI) will lead to a 3.486 percent increase in return on equity. The regression estimates results also revealed that Operating cash flow had a negative and insignificant effect on ROE ($\beta = -0.342$, $p = 0.859$). The negative value of its coefficient implies that a unit of operating cash flow (CFO) will lead to a 0.342 percent decrease in return on equity. At a 5% level of significance, F-statistics of 3.772, the p-value is

0.001 which is less than the adopted level of significance. Therefore the study rejected the null hypothesis which states that Cash flows have no significant effect on return on equity of quoted oil and gas firms in Nigeria. The alternate hypothesis was accepted which states that Cash flows have significant effects on the return on equity of quoted oil and gas firms in Nigeria. This result is consistent with the *a priori* expectation of this model. The Adjusted R^2 showed 0.2656 which reflects that independent variables (CFF, CFI and CFO) accounted for 26.56% of changes in return on equity while 73.54% of changes on return on equity were outside the independent variables..

$$EPS_{it} = \alpha_0 + \beta_1 CFF_{it} + \beta_2 CFI_{it} + \beta_3 CFO_{it} + e_{it} \quad (\text{Model 3})$$

$$EPS_{it} = 2.647 - 0.054 CFF_{it} + 0.004 CFI_{it} + 0.042 CFO_{it} + e_{it} \quad (\text{Model 3a})$$

Table 4. Result on Regression Equation of EPS.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.646670	1.322779	2.000840	0.0499
CFF	-0.054135	0.127747	-0.423766	0.6733
CFI	0.004381	0.123396	0.035504	0.9718
CFO	0.042324	0.113692	0.372268	0.7110
R-squared	0.467557	Mean dependent var		3.251726
Adjusted R-squared	0.387691	S.D. dependent var		11.04367
S.E. of regression	8.641695	Akaike info criterion		7.282638
Sum squared resid	4480.734	Schwarz criterion		7.603852
Log likelihood	-244.8923	Hannan-Quinn criter.		7.410228
F-statistic	5.854239	Durbin-Watson stat		2.604906
Prob(F-statistic)	0.000008			

Source: Author's computation (E-View output 2023).

Model Three in Table 4 examined the effect of cash flow on earnings per share of quoted oil and gas firms in Nigeria. Table 4 showed a negative and insignificant effect of financing cash flow on earnings per share ($\beta = -0.054$, $p = 0.673$). The negative value of its coefficient implies that a unit of financing cash flow (CFF) will lead to a 0.054 percent decrease in Earnings per share. The table also revealed that investing cash flow had a positive and insignificant effect on Earnings per share ($\beta = 0.004$, $p = 0.972$). The positive value of its coefficient implies that a unit of investing cash flow introduced (CFI) will lead to a marginal increase of 0.004 percent in Earnings per share. The regression estimates results also revealed that Operating cash flow had a positive and insignificant effect on EPS ($\beta = 0.042$, $p = 0.711$). The positive value of its coefficient implies that a unit of operating cash flow (CFO) will lead to a marginal increase of 0.042 percent in Earnings per share of quoted oil and gas companies in Nigeria. At a 5% level of significance, F-Statistics = 5.854, p -value = 0.000 which is less than the adopted level of significance. Therefore the study rejected the null hypothesis which states that Cash flows have no significant effect on Earnings per share of quoted oil and gas firms in Nigeria. The alternate hypothesis was therefore accepted which states that Cash flows have significant effects on Earnings per share of quoted oil and gas firms in Nigeria. The Adjusted R^2 showed 0.3877 which reflects that independent variables (CFF, CFI and CFO) accounted for 38.77% of changes in earnings per share and 61.23%.of changes in earnings per share were outside the independent variables.

Discussion of findings

The regression results in model one investigated the relationship of cash flow effects and Return on asset of quoted oil and gas firms in Nigeria and found out that

Cash flow activities (CFF, CFI, and CFO) had a significant effect on the Return on asset of quoted oil and gas firms in Nigeria (F-statistics = 13.612, p -value = 0.000). The individual results for each variable revealed that the three cash flow measures (CFF, CFI, and CFO) from the regression had a mixed result. CFF had positive and insignificant effect. CFI had positive and significant effect while CFO had negative and significant relationship with Return on assets. This result agreed with the prior study of Odo and Udodi (2022) which reported a positive significant effect of cash management on return on assets. The works of Musah and Kong (2019), Soet et al. (2018), and Aguguom (2020) which reported a positive significant effect of cash flows on return on assets are in tandem with this study. The work of Aitimon and Aniche (2020) also supported this work which showed that average collection period had positive significant effect on return on assets. The work of Ironkwe and Wokoma (2017) reported a positive significant effect of financing activities on return on assets which was not in agreement with this study where financing activities was negative and significant on return on assets. Same was the result of Rahman and Sharma (2020) which reported a positive significant effect of operating cash flow on return on asset as against the negative significant effect on return on assets reported by this study.

The regression results in model two investigated the relationship of cash flow effects and return on equity of quoted oil and gas firms in Nigeria and found out that cash flows (CFF, CFI, and CFO) had a positive significant effect on the return on equity of quoted oil and gas firms in Nigeria. The individual results for each variable revealed that the three cash flow measures (CFF, CFI, and CFO) of regression results showed mixed results. The three independent variables statistically had insignificant effect on return on equity. CFF and CFI had positive effect on return on equity but CFO had negative effect. This result is in tandem with the reports of Li et al.

(2020) which showed a positive insignificant influence on return on equity (ROE). Li et al. (2020) also reported a negative insignificant effect of liquidity management which supported this study that showed negative and insignificant effect of CFO. The result of Musah and Kong (2019) showed that cash flows had positive and insignificant effect on return on equity which is not in tandem with this study. The work of Soet et al. (2018) was also not in agreement with this study, it reported a positive insignificant effect operating cash flow on return on equity. Ironkwe and Wokoma (2017) reported a negative insignificant effect of financing activities on return on equity which is not in agreement with this study that reported a positive and insignificant effect of financing activities on return on equity. The study of Rahman and Sharma (2020) showed a positive significant effect of operating cash flow on return on equity which is not in tandem with this study that showed a negative and insignificant effect of operating cash flow on return on equity.

The regression results in Model Three investigated the relationship of cash flow effects and Earnings per share of quoted oil and gas firms in Nigeria and found out that cash flows (CFF, CFI, and CFO) had a positive significant effect (F-statistics = 5.854, p-value = 0.000) on Earnings per share of quoted oil and gas firms in Nigeria. The individual results for each variable revealed that Investing cash flow and Operating cash flow (CFI and CFO) of regression results were positive and insignificant while financing cash flow was negative and insignificant on Earnings per share. This study is in tandem with the study of Nwaiwu and Oluka (2017) which reported that cash flow accounting had a positive impact on the financial performance of quoted companies in Nigeria. This result is in tandem with the study of Ironkwe and Wokoma (2017) which showed an insignificant effect of financing policies on earnings per share. Mukadar et al. (2021) had positive insignificant effect of operating cash flow on the financial performance of mining companies in Indonesia which is in tandem with this study but their report on financing cash flow showed a positive insignificant result with the financial performance which is not in agreement with this study. The study of Bingilar and Oyadonghan (2014) agreed with this study where operating cash flow had positive effect on earnings per share. Bingilar and Oyadonghan (2014) did not agree with this study in significance of operating cash flow on earnings per share as this study showed that operating cash flow was not significant on earnings per share. Bingilar and Oyadonghan (2014) was not in tandem with this study on the effect of financing cash flow on financial performance where they reported a positive and significant effect on financial performance but this study showed that financing cash flow was negative and insignificant on earnings per share. The study of Nangih et al. (2020) reported that financing activities had a positive and significant effect on firm performance unlike

the results shown by this report with a negative and insignificant effect on earnings per share. Nangih et al. (2020) also revealed a negative effect of operating cash flow on profitability which is not in agreement with this study that showed a positive effect of operating cash flow on earnings per share.

Implications

Cash flow as an important as of a business needs to be looked into by the managers of oil and gas sector in Nigeria as identified in this study. Financing Cash flow had negative insignificant effect on return on asset and earning per share. This may put investors on enquiry whether they continue to invest in such business. This effect can also affect the price performance of oil and gas stocks on the trading floors of Nigerian Exchange Group. The finance managers of oil and gas companies need to review their financing strategy to improve the return on assets of their businesses to attract investors and improve their stock price performance. This also suggests that assets do not justify the finance incurred on it. Operating cash flow had a negative effect on return on equity with a statistical insignificance. Operating cash flow is an important aspect of cash flow that keeps the business alive but it did not impact the return on equity. Investors may not be encouraged to increase their investment in oil and gas industry. This may also discourage potential investors from investing their investible funds in oil and gas industry. The study revealed that there are other factors industry managers need to address to improve their profitability and returns to various stakeholders. This is due to Adjusted R^2 squared generated on each hypothesis (ROA – 0.767; ROE – 0.313; EPS – 0.388) that revealed the changes caused by the independent variables on each of the dependent variables. The industry managers should consider government policy, exchange rate fluctuations, corruptive practices, economic, social, and technological factors outside the independent variables used for this study. The industry needs to be turned around to contribute more to the country's gross domestic product (GDP) as seen in other oil rich countries. Nigeria seems to have the lowest contribution to GDP among the oil producing exporting countries (OPEC) despite its position as the largest oil producer in Africa. There is potential to increase its contribution to GDP if the barriers are worked on.

Conclusion

From this study, it was concluded that:

1. Financing cash flow and Investing cash flow had positive effect on return on asset of quoted oil and gas companies in Nigeria. Financing cash flow had

insignificant effect while investing cash flow showed a statistical significant effect on return on assets of quoted oil and gas companies in Nigeria. This showed a mixed result of independent variables on the return on assets. This implies that these variables had an inverse relationship with return on asset. Good management of investing capital improves return on asset of quoted oil and gas companies in Nigeria with significant effect.

2. Operating cash flow had negative and insignificant effect on return on assets. This implies an inverse relationship of operating cash flow with return on assets. Their introduction to the company's operations did not improve return on assets which an investor should pay attention to.

3. Financing cash flow and Investing cash flow had positive and insignificant effect on return on equity of quoted oil and gas companies in Nigeria. This implies that application of financing cash flow and investing cash flow had an impact on return on equity of quoted oil and gas companies in Nigeria though no statistical significance was achieved.

4. Operating cash flow was negative and insignificant on return on equity of quoted oil and gas companies in Nigeria. This implies that operating cash flow did not improve the return on equity of shareholders of quoted oil and gas companies in Nigeria.

5. Financing cash flow revealed a negative and insignificant effect on earnings per share of quoted oil and gas companies in Nigeria. This implies that introduction of financing cash flow did not add value to the earnings per share performance of quoted oil and gas companies in Nigeria. This has an implication for the stock of oil and gas shares on the capital market.

6. Investing cash flow and Operating cash flow had positive and insignificant on Earnings per share of quoted oil and gas companies in Nigeria. This implies that Investing cash flow and operating cash flow had a direct relationship with earnings per share of quoted oil and gas companies in Nigeria. The introduction of investing cash flow and operating cash flow showed a marginal improvement in earnings per share of these oil and gas companies in Nigeria.

Recommendations

In view of analysis and findings carried out on this study, we recommend that:

1. The managers of oil and gas companies should pay attention to operating and financing cash flows which had negative impact on performance of these oil and gas companies. Some of these companies had low and negative ROA, ROE and EPS between 2013 and 2022.

2. The industry managers may seek further training on fund management to improve the returns of their shareholders. The investors should seek training on financial management to understand the basics in annual

reports and accounts of the companies they invest in. This will help them understand how their investment is performing.

3. The finance managers of these oil and gas companies should regularly review their cash flow position to identify its impact on their financial performance. This will help attract investors to the companies.

Research limitation

The following are the identified limitations in the course of carrying out the information:

1. The cost of obtaining data is enormous for an ex post facto research which constituted a strain on researchers to bear considering the present economic challenges in Nigeria.

2. The source of data slows down the research work when you want to use current data for the study but you have to wait for the release of annual reports and accounts. In some situations, it is difficult to obtain some companies' data which frustrates researcher's efforts.

Suggestion for future research

The following points could be valuable for guiding further research in this area:

1. There is a need for additional research in this field, particularly considering the limited existing studies conducted in Nigeria.

2. To comprehensively understand the performance of the oil and gas industry, it's worth considering the introduction of additional variables that could potentially influence its performance.

3. Recognizing the significance of cash flow as a critical factor affecting various industries, it's recommended to extend the study to other vital sectors such as manufacturing and services.

4. The establishment of a research repository is advisable, which would allow researchers to access data easily for their studies, minimizing unnecessary challenges. This repository would streamline the process of data collection for various research works.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests

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