Audit Committee Attributes and Asset Fraud Risk: A Fixed-Effects Analysis of Listed Oil and Gas Companies in Nigeria

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ABSTRACT

This study examined the effect of audit committee attributes, specifically size, independence, and gender diversity, on asset fraud risk among listed oil and gas companies in Nigeria. The persistence of asset misappropriation within the sector, despite regulatory reforms such as the Companies and Allied Matters Act (CAMA) 2020 and the Nigerian Code of Corporate Governance (NCCG) 2018, underscores the need to assess whether existing audit committee structures are associated with a lower risk of asset-related irregularities. Anchored on Agency Theory, the study adopted an ex-post facto research design, drawing panel data from ten listed oil and gas firms over the period 2012–2024, yielding 122 firm-year observations. Asset fraud risk was proxied by an accounting-based ratio capturing year-on-year changes in asset composition, with higher values indicating greater potential for asset-related irregularities. A fixed effects regression model was employed to test three hypotheses relating audit committee size, independence, and gender diversity to asset fraud risk. The model produced a within R^2 of 19.59%, indicating that the explanatory variables accounted for approximately one-fifth of the within-firm variation in the risk indicator. However, none of the three attributes (audit committee size, $p = 0.531$; independence, $p = 0.113$; gender diversity, $p = 0.874$) had a statistically significant effect at the 5% level, so all three null hypotheses were not rejected. Given the small sample of ten firms, these results indicate an absence of statistically significant evidence and should not be read as proof that the attributes have no effect. The findings suggest that structural audit committee attributes alone may be insufficient to reduce asset fraud risk in the sector, pointing instead to the importance of enforcement, diligence, and substantive oversight. Because the dependent variable is an accounting-based proxy and not a record of confirmed fraud cases, the findings should be interpreted as indicative. The study recommends strengthening regulatory enforcement and committee diligence beyond structural compliance, and calls for further research using direct measures of detected fraud, broader measures of diversity, additional governance variables, and larger, sector-diverse samples

Keywords: Audit committee size, Audit committee independence, Audit committee gender diversity, Asset fraud risk, corporate governance, Oil and gas companies

INTRODUCTION

Background to the Study

The increasing incidence of corporate fraud, particularly asset misappropriation, has become a significant concern for organizations across both developed and developing economies due to its adverse effects on organizational sustainability, investor confidence, and economic stability. Asset fraud involves the theft, misuse, or unauthorized use of organizational resources such as cash, inventory, equipment, and other valuable assets. Recent global evidence indicates that occupational fraud continues to pose substantial financial and operational

challenges to organizations, with asset misappropriation remaining the most frequently reported category of fraud worldwide (Association of Certified Fraud Examiners [ACFE], 2024). Such fraudulent activities are often perpetrated by employees and corporate insiders who exploit weaknesses in internal control systems and governance mechanisms. The persistence of asset fraud has been associated with weak oversight structures, deficiencies in internal controls, ineffective risk management practices, and inadequate monitoring systems that hinder timely detection and prevention (Accountancy Europe, 2022).

To address the growing threat of fraud, organizations have increasingly relied on corporate governance mechanisms to strengthen accountability and improve oversight functions. Among these mechanisms, the audit committee has emerged as a critical governance structure responsible for monitoring financial reporting processes, overseeing internal control systems, coordinating with internal and external auditors, and ensuring compliance with regulatory requirements. According to Accountancy Europe (2022), effective audit committees play a strategic role in fraud prevention and detection by promoting transparency, strengthening internal controls, and enhancing communication among key governance actors. Consequently, regulatory reforms and corporate governance frameworks across various jurisdictions continue to emphasize the importance of audit committee effectiveness in reducing organizational fraud risks and improving the quality of financial reporting.

Recent empirical studies provide evidence that specific audit committee characteristics significantly influence fraud detection and financial reporting quality. Attributes such as audit committee independence, size, financial expertise, and gender diversity have been identified as critical determinants of effective monitoring and oversight. For instance, Abbas and Yahaya (2023) found that audit committee independence and female representation significantly reduce the likelihood of financial statement fraud among listed firms in Nigeria. Similarly, Trisanti (2023) reported that audit committee independence plays a significant role in mitigating fraudulent financial reporting, while Bii and Kinuthia (2024) found that audit committee size, independence, financial expertise, and gender diversity significantly influence the occurrence of fraudulent financial reporting among listed firms in Kenya. These findings suggest that effective audit committees can serve as a vital mechanism for detecting and preventing fraudulent activities within organizations.

In Africa, the challenge of fraud detection remains particularly acute due to institutional weaknesses, regulatory inefficiencies, inadequate enforcement of governance regulations, and limited monitoring capacity. Fraud-related losses continue to affect organizations across the continent, undermining economic development and stakeholder confidence. Despite ongoing efforts to improve governance practices, many organizations still struggle with weak internal control environments and insufficient oversight mechanisms. The ACFE (2024) reports that organizations with inadequate anti-fraud controls experience higher losses and longer fraud detection periods than organizations with stronger governance structures. Consequently, strengthening audit committee effectiveness has become a major focus of governance reforms across many African countries.

In Nigeria, corporate fraud remains a persistent challenge, particularly within the oil and gas sector, which constitutes one of the most important contributors to national economic growth, foreign exchange earnings, and government revenue. Despite the sector's strategic importance, it continues to face numerous governance-related challenges, including asset diversion, inventory theft, procurement irregularities, unauthorized utilization of corporate resources, and financial reporting manipulation. These challenges have raised concerns among regulators, investors, and other stakeholders regarding the effectiveness of existing corporate governance mechanisms in ensuring accountability and transparency. Consequently, regulatory frameworks such as the Companies and Allied Matters Act (CAMA) 2020 and the Nigerian Code of Corporate Governance (NCCG) 2018 emphasize the importance of audit committees in enhancing oversight, strengthening internal controls, and promoting ethical financial reporting practices.

Notwithstanding these regulatory efforts, evidence from recent studies suggests that fraudulent activities continue to occur among Nigerian listed companies. Abbas and Yahaya (2023) found that audit committee independence significantly reduces financial statement fraud likelihood, whereas audit committee size and meeting frequency exhibit insignificant effects. Similarly, Chukwuma et al. (2025) reported that audit committee independence and financial expertise significantly reduce the likelihood of financial statement fraud among listed deposit money banks in Nigeria, while gender diversity demonstrates no significant effect. These mixed findings suggest that although audit committee characteristics influence fraud detection and prevention, their

effectiveness may vary across sectors, organizational structures, and institutional environments. Consequently, further empirical investigation is necessary to determine which audit committee attributes are most effective in enhancing asset fraud detection, particularly within the Nigerian oil and gas industry.

The persistence of asset fraud among listed oil and gas companies in Nigeria poses a serious threat to corporate accountability, financial reporting credibility, investor confidence, and overall market integrity. Weak fraud detection mechanisms can result in significant financial losses, reputational damage, regulatory sanctions, and reduced stakeholder trust. Given the strategic importance of the oil and gas sector to the Nigerian economy and the inconsistent findings in existing literature regarding the effectiveness of audit committee characteristics, there is a need to examine the role of audit committee attributes in enhancing asset fraud detection within the sector. Therefore, this study seeks to examine the effect of audit committee size on asset fraud risk, investigate the effect of audit committee independence on asset fraud risk, and determine the effect of audit committee gender diversity on asset fraud risk among listed oil and gas companies in Nigeria. The following null hypotheses were formulated and tested:

$H0_1$: Audit committee size has no significant effect on the asset fraud risk of listed oil and gas companies in Nigeria.

$H0_2$: Audit committee independence has no significant effect on the asset fraud risk of listed oil and gas companies in Nigeria.

$H0_3$: Audit committee gender diversity has no significant effect on the asset fraud risk of listed oil and gas companies in Nigeria.

LITERATURE REVIEW

Audit Committee and Asset Fraud Risk

Asset fraud risk refers to the likelihood that organizational assets are stolen, misused, or misappropriated, which may be signalled by abnormal changes in the composition of a firm's assets. Effective governance reduces this risk by strengthening monitoring and the likelihood that irregularities are identified and corrected. Within the framework of corporate governance, the audit committee is a critical monitoring mechanism responsible for overseeing financial reporting, internal controls, risk management processes, and both internal and external audit functions.

According to the Institute of Internal Auditors (2024), audit committees contribute significantly to fraud governance by ensuring that fraud risk management systems are adequately designed and effectively implemented. The committee serves as an intermediary between management, auditors, and the board of directors, thereby enhancing organizational accountability. Consequently, the effectiveness of asset fraud detection depends largely on the quality and characteristics of the audit committee. Attributes such as committee size, independence, diversity, expertise, and diligence have been identified as crucial determinants of effective fraud oversight.

Agency Theory provides a theoretical basis for understanding the role of audit committees in fraud detection. The theory posits that managers may pursue personal interests that conflict with those of shareholders, thereby creating opportunities for fraudulent activities. Effective audit committees help mitigate these agency conflicts through independent monitoring and oversight. Thus, organizations with effective audit committees are expected to exhibit stronger fraud detection capabilities and lower incidences of asset misappropriation.

Audit Committee Size and Asset Fraud Risk

Audit committee size refers to the number of members serving on the audit committee. The relationship between committee size and fraud detection has attracted considerable attention in recent governance literature. Scholars argue that larger audit committees may enhance monitoring effectiveness because they provide a broader range

of expertise, experiences, and perspectives for evaluating organizational risks and identifying fraudulent activities.

Bii and Kinuthia (2024) found that audit committee size exerts a significant effect on fraudulent financial reporting among Kenyan listed firms. According to the authors, larger committees possess diverse competencies that improve oversight functions and facilitate effective monitoring of management activities. Similarly, Hamdan, Mushtaha, and Al Mubarak (2022) reported that larger audit committees contribute positively to financial reporting quality because the presence of more members enhances supervisory effectiveness and improves governance outcomes.

Notwithstanding these benefits, some researchers argue that excessively large audit committees may experience coordination problems, communication barriers, and slower decision-making processes. Alqatamin (2022) noted that larger committees may encounter free-rider challenges whereby certain members depend excessively on the contributions of others, thereby reducing overall effectiveness. Consequently, while larger committee size may improve fraud detection, its effectiveness may depend on maintaining an optimal balance between diversity of expertise and operational efficiency.

Within the Nigerian context, empirical findings remain mixed. Abbas and Yahaya (2023) revealed that audit committee size did not significantly influence fraud likelihood among firms listed on the Nigerian Exchange. Their findings suggest that committee effectiveness may depend more on member quality than on numerical strength. This inconsistency in findings creates the need for further investigation, particularly in Nigeria's oil and gas sector.

Audit Committee Independence and Asset Fraud Risk

Audit committee independence refers to the extent to which committee members are free from management influence, financial interests, and personal relationships that may impair objective judgment. Independence is widely regarded as one of the most important attributes of an effective audit committee because independent members are more likely to challenge management decisions and ensure transparency in financial reporting.

Agency Theory suggests that independent audit committee members reduce agency problems by providing objective oversight and monitoring managerial activities. Consequently, greater independence is expected to improve fraud detection and reduce opportunities for asset misappropriation.

Empirical evidence consistently supports this relationship. Zgarni, Hlioui, and Zainea (2022) found that firms with more independent audit committees exhibit lower levels of earnings manipulation and fraudulent reporting. Likewise, Trisanti (2023) reported that audit committee independence significantly reduces the likelihood of fraudulent financial reporting among manufacturing firms.

In Nigeria, Abbas and Yahaya (2023) found that audit committee independence significantly lowers financial statement fraud likelihood. Similarly, Chukwuma, Abdulkarim, and Abdullahi (2025) reported that audit committee independence significantly reduces fraud risk among deposit money banks in Nigeria. The study concluded that independent members improve monitoring effectiveness by ensuring unbiased scrutiny of financial transactions and management decisions.

Furthermore, Nguyen and Tran (2024) argued that independent committees are more likely to support whistleblowing programs and strengthen fraud risk management frameworks. However, independence alone may not be sufficient for effective fraud detection. Independent members who lack relevant financial expertise may encounter difficulties in identifying sophisticated fraud schemes. Therefore, independence is expected to be more effective when combined with competence and diversity.

Audit Committee Gender Diversity and Asset Fraud Risk

Audit committee diversity refers to the differences among committee members regarding gender, educational qualifications, professional expertise, age, experience, and ethnic backgrounds. Resource Dependence Theory

posits that diverse committees provide broader perspectives, knowledge, and resources necessary for effective organizational decision-making and oversight.

Recent studies increasingly recognize diversity as an important factor influencing audit committee effectiveness. Gender diversity, in particular, has attracted significant scholarly attention because female directors are often associated with enhanced ethical sensitivity, improved diligence, and stronger monitoring behaviour. Although diversity is a multidimensional concept covering gender, professional expertise, education, and ethnicity, this study operationalises it as gender diversity, measured by the percentage of female members on the audit committee

Velte (2023) found that female representation on audit committees improves corporate monitoring effectiveness and strengthens governance quality. Similarly, Rashid and Khan (2022) reported that gender-diverse audit committees are associated with lower incidences of fraudulent financial reporting and greater transparency in financial disclosures.

In Nigeria, Abbas and Yahaya (2023) observed that female membership on audit committees significantly reduces fraud likelihood. The authors argued that female directors tend to exercise greater caution and diligence when reviewing financial information, thereby improving fraud detection capabilities.

Apart from gender diversity, professional diversity has also been linked to effective fraud prevention. Oussii and Boulila Taktak (2023) found that audit committees composed of individuals with varied expertise in accounting, finance, law, and risk management demonstrate superior monitoring effectiveness. Such committees are better positioned to scrutinize complex transactions and identify warning signs of fraud.

However, some studies present mixed findings. Alhababsah (2024) reported that the relationship between diversity and fraud detection varies across industries and organizational environments. Consequently, the effectiveness of diversity may depend on contextual factors such as regulatory frameworks, corporate culture, and governance structures.

Nigerian Evidence on Audit Committees and Fraud Risk

Recent Nigerian studies have highlighted the importance of audit committee characteristics in strengthening corporate governance and reducing fraud risk.

Abbas and Yahaya (2023) investigated the relationship between audit committee characteristics and financial statement fraud likelihood among listed firms in Nigeria. Their findings revealed that audit committee independence and female representation significantly reduce fraud likelihood, while committee size and meeting frequency show insignificant effects.

Similarly, Chukwuma, Abdulkarim, and Abdullahi (2025) found that audit committee independence and financial expertise significantly reduce financial statement fraud among listed deposit money banks in Nigeria. However, gender diversity was found to have no significant influence on fraud likelihood.

These findings suggest that while audit committee independence consistently contributes to fraud reduction, the effects of committee size and diversity remain inconclusive. The inconsistencies provide a strong basis for further investigation, particularly within sectors vulnerable to asset misappropriation such as the Nigerian oil and gas industry.

Empirical Gap

The reviewed literature demonstrates that audit committee size, independence, and diversity influence fraud detection and financial reporting quality. However, findings remain inconclusive across countries, industries, and institutional environments. While some studies report significant positive relationships between audit committee characteristics and fraud risk, others reveal weak or insignificant effects.

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Furthermore, most existing studies focus on financial statement fraud rather than to asset-related irregularities specifically. Limited empirical evidence also exists regarding listed oil and gas companies in Nigeria despite the sector's strategic economic importance and vulnerability to asset diversion, inventory theft, procurement fraud, and other forms of asset misappropriation. Consequently, there remains a gap in the literature regarding the extent to which audit committee size, audit committee independence, and audit committee diversity influence asset fraud risk among listed oil and gas companies in Nigeria. This study seeks to fill this gap.

METHODOLOGY

Research Design

This study adopts an ex-post facto research design within a quantitative research framework. The design is appropriate because the variables under investigation already exist and cannot be manipulated by the researcher. The study utilizes panel data analysis to examine the effect of audit committee attributes on asset fraud detection among listed oil and gas companies in Nigeria over the period 2012–2024. The ex-post facto design is widely used in accounting, auditing, and corporate governance research because it enables the examination of relationships among historical variables using archival data (Kothari, 2004).

Population, Sample, and Sampling Technique

The population of the study comprises all twelve (12) companies classified under the Oil and Gas sector of the Nigerian Exchange Group (NGX) during the study period. These companies include 11 Plc, Ardova Plc, Capital Oil Plc, Conoil Plc, Eterna Plc, Global Spectrum Energy Services Plc, Japaul Gold & Ventures Plc, MRS Oil Nigeria Plc, Oando Plc, Rak Unity Petroleum Company Plc, Seplat Energy Plc, and TotalEnergies Marketing Nigeria Plc.

A purposive sampling technique was employed to select firms with complete corporate governance and financial disclosure data throughout the study period. To be included in the sample, firms were required to:

Maintain a fully constituted audit committee.

Consistently disclose audit committee characteristics in their annual reports.

Provide sufficient information for the computation of asset fraud detection measures.

Maintain continuous financial reporting during the study period.

Based on these criteria, ten (10) companies were selected for the study. Capital Oil Plc was excluded because of prolonged suspension and discontinuous disclosures, while Oando Plc was excluded due to extensive corporate restructuring that could impair longitudinal comparability. The final sample represents approximately 83% of the study population and generated 122 firm-year observations for analysis as shown in Table 1 below.

Table 1: Sample Composition

S/N	Company	Years Covered
1	11 Plc	2012–2024
2	Ardova Plc	2012–2024
3	Conoil Plc	2012–2024
4	Eterna Plc	2012–2024
5	Global Spectrum Energy Services Plc	2017–2024
6	Japaul Gold & Ventures Plc	2012–2024

7	MRS Oil Nigeria Plc	2012–2024
8	Rak Unity Petroleum Company Plc	2013–2024
9	Seplat Energy Plc	2014–2024
10	TotalEnergies Marketing Nigeria Plc	2012–2024

Source: Researchers, 2026

Total Sample Size: 10 Companies (122 Firm-Year Observations)

The resulting panel is unbalanced because some firms entered the dataset after 2012 due to listing and disclosure availability.

Sources and Method of Data Collection

The study relies exclusively on secondary data obtained from the audited annual reports and financial statements of the sampled firms. The reports were sourced from company websites, the Nigerian Exchange Group (NGX), and other publicly accessible financial databases.

Data relating to audit committee size, audit committee independence, and audit committee diversity were extracted from corporate governance disclosures contained in the annual reports. Financial data required for the computation of asset fraud detection, firm size, and leverage were obtained from the statement of financial position and accompanying notes to the accounts.

The use of audited annual reports enhances the reliability, objectivity, and consistency of the data used in the study.

Variable Measurement

The study employs one dependent variable, three independent variables, and two control variables as shown in Table 2 below.

Table 2: Variable Definition and Measurement

Variable	**Definition**	**Measurement**
Asset Fraud Risk (AFR)	Accounting-based indicator of potential asset-related irregularities; higher values indicate greater risk	Asset Fraud Risk Ratio (year-on-year change in asset composition, adapted from Beneish's (1999) Asset Quality Index)
Audit Committee Size (ACS)	Number of members serving on the audit committee	Total number of audit committee members
Audit Committee Independence (ACI)	Degree of independence of audit committee members	Ratio of independent members to total committee members
Audit Committee Gender Diversity (ACGD)	Gender diversity within the audit committee	Percentage of female members on the audit committee
Firm Size (FSIZE)	Magnitude of firm operations	Natural logarithm of total assets
Leverage (LEV)	Extent of debt financing	Total debt divided by total assets

Source: Researchers, 2026

Measurement of Asset Fraud Detection

Asset fraud risk (AFR) is measured using an Asset Fraud Risk Ratio, a simplified adaptation of the Asset Quality Index of Beneish (1999):

$AFR_{it} = [(TA_{it} - CA_{it}) / TA_{it}] \div [(TA_{i,t-1} - CA_{i,t-1}) / TA_{i,t-1}]$

where TA is total assets and CA is current assets. The numerator is the proportion of non-current assets in total assets in year t, and the denominator is the same proportion in the previous year. A value above 1 indicates that the share of non-current assets has risen relative to the previous year, which may signal the deferral or capitalisation of costs or other irregularities in asset reporting. Higher values therefore indicate greater potential asset fraud risk. The measure is an accounting-based proxy for potential asset-related irregularities and does not record confirmed or detected fraud cases.

Measurement of Asset Fraud Detection

Asset fraud detection is measured using the Asset Fraud Detection Ratio:

AFDit=(TAt−1TAt−1−CLt−1)(TAtTAt−CAt)

AFDit=(TAt−CAtTAt)(TAt−1−CLt−1TAt−1)AFD_{it} = \frac{\left(\frac{TA_t - CA_t}{TA_t}\right)} {\left(\frac{TA_{t-1} - CL_{t-1}}{TA_{t-1}}\right)}

Where:

TATA = Total Assets

CACA = Current Assets

CLCL = Current Liabilities

This measure captures abnormal changes in the composition of assets and serves as a proxy for potential asset-related irregularities.

Justification of Control Variables

Firm size and leverage are included as control variables because they may independently influence both corporate governance structures and asset fraud detection outcomes.

Firm size, measured as the natural logarithm of total assets, controls for differences in organizational scale. Larger firms generally possess more sophisticated internal control systems, greater regulatory scrutiny, and stronger governance mechanisms.

Leverage, measured as the ratio of total debt to total assets, controls for the influence of debt financing. Highly leveraged firms are often subjected to increased monitoring by creditors and external stakeholders, which may affect fraud detection practices and reporting behaviour.

Model Specification

To examine the effect of audit committee attributes on asset fraud detection, the study specifies the following econometric model:

$AFR_{it} = \beta_0 + \beta_1 ACS_{it} + \beta_2 ACI_{it} + \beta_3 ACGD_{it} + \beta_4 FSIZE_{it} + \beta_5 LEV_{it} + \mu_i + \varepsilon_{it}$

where:

- AFR_{it} = Asset Fraud Risk of firm i in year t

- ACS_{it} = Audit Committee Size
- ACI_{it} = Audit Committee Independence
- $ACGD_{it}$ = Audit Committee Gender Diversity
- $FSIZE_{it}$ = Firm Size (natural logarithm of total assets)
- LEV_{it} = Leverage (total debt divided by total assets)
- μ_i = unobserved firm-specific effect, absorbed by the fixed-effects estimator
- ε_{it} = error term

Data Analysis Technique

The study employs panel data regression techniques to analyse the relationship between audit committee attributes and asset fraud detection. Panel data analysis combines cross-sectional and time-series observations, thereby improving estimation efficiency and controlling for unobservable firm-specific characteristics.

Descriptive statistics are first used to summarize the characteristics of the variables. Correlation analysis is then conducted to examine the preliminary relationships among the variables and identify potential multicollinearity concerns.

For the regression analysis, both Fixed Effects (FE) and Random Effects (RE) models are estimated. The Hausman Specification Test is employed to determine the most appropriate estimator. A significant Hausman test result supports the Fixed Effects model, while an insignificant result supports the Random Effects model.

To ensure the reliability and robustness of the estimated models, diagnostic tests are conducted for:

Multicollinearity using the Variance Inflation Factor (VIF);

Heteroskedasticity;

Serial correlation; and

Stationarity of panel data variables.

All statistical analyses are performed using STATA version 14.0.

Justification of Methodological Choices

The methodological choices adopted in this study are informed by the objectives of examining the effects of audit committee size, audit committee independence, and audit committee diversity on asset fraud detection among listed oil and gas companies in Nigeria.

The ex-post facto design is appropriate because the variables are historical and observable, making experimental manipulation impossible. The use of panel data enhances the study's ability to capture both firm-specific and time-related effects while improving the reliability of the estimated relationships.

Similarly, the purposive selection of firms ensures the inclusion of companies with complete and consistent governance disclosures, thereby enhancing data quality and internal validity. The reliance on audited annual reports further improves the credibility and objectivity of the data used in the study.

Finally, panel regression analysis is suitable because it accounts for unobserved heterogeneity among firms and provides more reliable estimates than purely cross-sectional methods, making it particularly appropriate for corporate governance and fraud-related research.

RESULTS AND DISCUSSION

Data Presentation

This section presents the results of the analysis of the effect of audit committee attributes on asset fraud detection among listed oil and gas companies in Nigeria. The analysis is based on panel data obtained from the annual reports and accounts of the sampled firms covering the period 2012–2024. The section begins with descriptive statistics and correlation analysis, followed by regression results and discussion of findings.

Discussion of Descriptive Statistics

Table 3 presents the descriptive statistics of the variables used in the study based on 122 firm-year observations obtained from listed oil and gas companies in Nigeria.

Asset Fraud Risk (AFR) recorded a mean value of 1.14 with a standard deviation of 0.51. The minimum and maximum values of 0.16 and 3.00 respectively indicate considerable variation in the level of asset fraud risk across firms and over time. The relatively low standard deviation compared to the mean suggests moderate dispersion in the data.

Audit Committee Size (ACS) had an average of 5.5 members, with a minimum of 4 members and a maximum of 8 members. This suggests that most firms complied with corporate governance recommendations regarding audit committee composition. The standard deviation of 1.07 indicates little variation in committee size among the sampled firms.

Audit Committee Independence (ACI) recorded a mean of 39.46%, implying that independent members constituted less than half of the audit committee membership on average. The minimum value of 0% and maximum value of 100% indicate substantial differences in the degree of independence across firms. The relatively high standard deviation of 26.03 further confirms significant variation in audit committee independence within the sample.

Audit Committee Gender Diversity (ACGD) had an average value of 11.37%, indicating relatively low female representation on audit committees. The minimum value of 0% shows that some firms had no female representation, while the maximum value of 50% suggests that a few firms achieved a more balanced gender composition. The standard deviation of 11.16 indicates noticeable variation among firms.

Firm Size (FSIZE) recorded a mean value of 11.9621 with a standard deviation of 1.64. The minimum and maximum values of 8.19 and 15.18 respectively suggest significant differences in the size of the sampled firms. This variation is expected given the differences in operational scale among oil and gas companies.

Leverage (LEV) had a mean value of 28.28% and a relatively large standard deviation of 36.57. The minimum value of 0.27% and maximum value of 222.18% indicate substantial differences in financing structures across firms. The high dispersion suggests that some firms relied heavily on debt financing, while others maintained relatively low debt levels.

Overall, the descriptive statistics reveal considerable heterogeneity among the sampled firms, particularly in terms of audit committee independence, leverage, and firm size. Such variability supports the suitability of panel data analysis, as it enables the study to capture firm-specific differences and changes over time.

Table 3: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
AFR	122	1.14	0.52	0.16	3.00
ACS	122	5.54	1.07	4.00	8.00

ACI (%)	122	39.46	26.03	0.00	100.00
ACGD (%)	122	11.37	11.16	0.00	50.00
FSIZE	122	11.96	1.64	8.19	15.18
LEV	122	28.28	36.57	0.27	222.18

Source: Researchers, 2026

DISCUSSION ON DIAGNOSTIC TESTS

Table 4 presents the diagnostic tests conducted to assess the suitability and reliability of the panel data model employed in this study. These tests include the Hausman specification test, multicollinearity test, heteroskedasticity test, serial correlation test, and panel unit root test.

The Hausman Specification Test was conducted to determine the most appropriate estimation technique between the Fixed Effects and Random Effects models. The null hypothesis states that the Random Effects model is appropriate. However, the Hausman test result reported in the study produced a probability value less than 0.05, leading to the rejection of the null hypothesis and the selection of the Fixed Effects model. This suggests that firm-specific effects are correlated with the explanatory variables and should therefore be controlled for using the Fixed Effects estimator.

The Variance Inflation Factor (VIF) test was employed to examine the presence of multicollinearity among the explanatory variables. The test assumes that there is no serious multicollinearity when VIF values are below the conventional threshold of 10. The results indicate that all variables recorded acceptable VIF values, suggesting the absence of severe multicollinearity. Therefore, the independent variables can be included simultaneously in the regression model without compromising the reliability of the coefficient estimates.

The Modified Wald Test for Groupwise Heteroskedasticity was conducted following the fixed-effects estimation. The null hypothesis states that the error terms are homoskedastic across firms. The result supports the null hypothesis, indicating that the variance of the residuals is constant across the sampled firms. This implies that heteroskedasticity is not a major concern in the estimated model.

The Wooldridge Test for Serial Correlation was used to determine whether first-order autocorrelation exists in the panel data. The null hypothesis states that there is no first-order serial correlation. The result supports the null hypothesis, indicating that the residuals are not serially correlated over time. Consequently, the model does not suffer from autocorrelation problems that could bias standard errors and statistical inference.

Finally, the Fisher-type Panel Unit Root Test was employed to assess the stationarity properties of the variables. The null hypothesis states that all panels contain unit roots. The test results showed evidence of unit roots in the variables, implying the presence of non-stationarity. This finding suggests that caution should be exercised when interpreting long-run relationships among the variables and that appropriate panel data estimation procedures should be adopted to address potential stationarity concerns.

Overall, the diagnostic test results indicate that the selected Fixed Effects model is appropriate for the analysis. Furthermore, the absence of serious multicollinearity, heteroskedasticity, and serial correlation problems enhances the reliability and robustness of the estimated regression results.

Table 4: Stata Commands for the Diagnostic Tests

Test	**Stata 14 command**	**Null hypothesis**
Hausman	xtreg afr acs aci acgd fsize lev, fe then estimates store fe; same with re and estimates store re; then hausman fe re	Random effects is appropriate

Multicollinearity (VIF)	regress afr acs aci acgd fsize lev then estat vif	No serious multicollinearity (all VIF below 10, mean close to 1)
Groupwise heteroskedasticity (modified Wald)	ssc install xttest3; after the fixed-effects model, xttest3	Homoskedastic errors across firms
Serial correlation (Wooldridge)	ssc install xtserial; xtserial afr acs aci acgd fsize lev	No first-order autocorrelation
Stationarity (Fisher-type unit root)	xtunitroot fisher afr, dfuller lags(1); repeat for each variable	All panels contain unit roots

Source: Researchers, 2026

Regression Results and Discussion

Table 5 presents the fixed-effects regression results examining the effect of audit committee characteristics on asset fraud detection among listed oil and gas companies in Nigeria. The model is based on 122 firm-year observations from 10 firms and produced a within R^2 of 19.59%, indicating that the explanatory variables jointly explain approximately 19.6% of the variation in asset fraud detection within firms over time. The choice of the fixed-effects estimator was justified by the Hausman test result ($\chi^2 = 20.58$; $p = 0.0379$), which rejected the null hypothesis that the random-effects model was appropriate.

Audit Committee Size (ACS) recorded a positive coefficient of 0.0429, suggesting that an increase in audit committee membership is associated with a marginal increase in asset fraud detection. However, the relationship is statistically insignificant ($p = 0.531$), indicating that audit committee size does not significantly influence asset fraud detection among the sampled firms. This finding suggests that merely increasing the number of committee members may not necessarily translate into more effective fraud detection mechanisms.

Audit Committee Independence (ACI) exhibited a negative coefficient of-0.0047 and was also statistically insignificant ($p = 0.113$). Although independence is expected to enhance monitoring and oversight functions, the result implies that the proportion of independent members on the audit committee does not significantly affect asset fraud detection within the sector. The negative sign may indicate that independence alone is insufficient to improve fraud detection without adequate expertise, industry knowledge, and active participation of committee members.

Audit Committee Gender Diversity (ACGD) had a positive coefficient of 0.0006, but the effect was highly insignificant ($p = 0.874$). This finding suggests that gender diversity within audit committees does not significantly contribute to asset fraud detection among the sampled firms. One possible explanation is the relatively low average level of female representation (11.37%), which may not be sufficient to substantially influence committee decisions and oversight outcomes.

Regarding the control variables, Firm Size (FSIZE) recorded a negative coefficient of-0.0704 and was statistically insignificant ($p = 0.366$), indicating that differences in firm size do not significantly explain variations in asset fraud detection. Similarly, Leverage (LEV) showed a very small positive coefficient of 0.0004 with a p-value of 0.689, suggesting that debt financing does not significantly affect asset fraud detection among the firms studied.

Overall, the regression results reveal that none of the explanatory variables attained statistical significance at the 5% level. Consequently, the study fails to reject all three null hypotheses and concludes that audit committee size, audit committee independence, and audit committee gender diversity do not significantly affect asset fraud detection among listed oil and gas companies in Nigeria. These findings suggest that structural audit committee characteristics alone may be insufficient to enhance fraud detection. Rather, factors such as committee expertise,

diligence, monitoring effectiveness, and enforcement of corporate governance practices may play a more important role in detecting and preventing asset-related fraud.

Table 5: Fixed-Effects Panel Regression Results for the Effect of Audit Committee Attributes on Asset Fraud Detection

Variable	**Coefficient**	**Std. Error**	**p-value**
ACS	0.0429	0.0658	0.531
ACI	-0.0047	0.0027	0.113
ACGD	0.0006	0.0036	0.874
FSIZE	-0.0704	0.0779	0.366
LEV	0.0004	0.0010	0.689
Within R^2	19.59%		
Observations	122		
Number of Firms	10		
Hausman χ^2 (11)	20.58		
Hausman p-value	0.0379		
Preferred Model	Fixed Effects		

Source: Researcher's Computation (2026)

Correlation Analysis

Correlation analysis was conducted to determine the direction and strength of the relationships among the variables included in the study and to assess potential multicollinearity concerns (Table 6).

Table 6: Correlation Matrix

Variables	**AFD**	**ACS**	**ACI**	**ACV**	**FSIZE**	**LEV**
AFR	1.000					
ACS	-0.2380	1.000				
ACI	-0.1181	-0.2123	1.000			
ACGD	0.2373	-0.2950	0.0680	1.000		
FSIZE	-0.4522	0.5612	-0.0284	-0.2999	1.000	
LEV	-0.1762	0.1533	0.0328	0.0041	0.4079	1.000

Source: Researcher's Computation (2026)

The correlation results reveal that Audit Committee Size (ACS) and Audit Committee Independence (ACI) are negatively associated with Asset Fraud Risk (AFR), with coefficients of -0.2380 and -0.1181 respectively.

Conversely, Audit Committee Gender Diversity (ACGD) is positively associated with AFR, with a coefficient of 0.2373.

The correlation coefficients among the explanatory variables are all below the conventional threshold of 0.80, suggesting the absence of severe multicollinearity. Therefore, the independent variables can be included simultaneously in the regression model without causing significant estimation problems.

Diagnostic Test Results

Table 7 presents the diagnostic tests conducted to verify the suitability of the panel data model used in the study. The Hausman Specification Test yielded a chi-square statistic of 20.58 with a probability value of 0.0379. Since the p-value is less than the 5 percent significance level, the null hypothesis that the Random Effects model is appropriate was rejected. Consequently, the Fixed Effects model was selected for the estimation because it adequately controls for unobserved firm-specific characteristics.

The multicollinearity test using the Variance Inflation Factor (VIF) indicated that the explanatory variables did not suffer from serious multicollinearity problems, as all VIF values were below the conventional threshold of 10. Furthermore, the Modified Wald and Wooldridge tests were conducted to assess heteroskedasticity and serial correlation respectively. The results suggested that these problems were not severe enough to invalidate the regression estimates. Finally, the Fisher-type panel unit root test was used to examine the stationarity properties of the variables. Together, these diagnostic checks support the robustness and reliability of the Fixed Effects regression model used in the study.

Table 7: Diagnostic Test Results

Test	**Null Hypothesis**	**Statistic**	**p-value**	**Decision**
Hausman Test	Random Effects model is appropriate	$\chi^2(11) = 20.58$	0.0379	Reject H_0; Fixed Effects preferred
VIF (Mean)	No multicollinearity	Not Reported	N/A	No serious multicollinearity
Modified Wald Test	Homoskedasticity across firms	Not Reported	Not Reported	Homoskedasticity assumed
Wooldridge Test	No first-order serial correlation	Not Reported	Not Reported	No serial correlation
Fisher-Type Unit Root Test	Unit root present	Not Reported	Not Reported	Variables tested for stationarity
Selected Model				**Fixed Effects Model**

Source: Researchers, 2026

Regression Results

Model Selection Test

To determine the most appropriate panel regression estimator, the Hausman Specification Test was conducted (Table 8).

Table 8: Hausman Specification Test

Statistic	**Value**
Chi-square Statistic	20.58
Degrees of Freedom	11
Probability Value	0.0379
Decision	Reject H_0
Preferred Model	Fixed Effects

Source: Researcher's Computation (2026)

The Hausman test produced a chi-square value of 20.58 with a probability value of 0.0379. Since the probability value is less than 0.05, the null hypothesis that the Random Effects model is appropriate is rejected. Consequently, the Fixed Effects model was selected as the preferred estimator because it adequately controls for unobserved firm-specific heterogeneity.

Fixed Effects Regression Results

Table 9 presents the fixed effects regression results examining the relationship between audit committee characteristics and the dependent variable, based on a panel of 10 firms observed over the study period (n = 122). The model yields a within R^2 of 19.59%, indicating that the explanatory variables account for approximately 20% of the within-firm variation in the dependent variable. None of the coefficients audit committee size (ACS), independence (ACI), meeting frequency/expertise (ACGD), firm size (FSIZE), and leverage (LEV) are statistically significant at conventional levels ($p < 0.05$).

Table 9: Fixed Effects Regression Results

Variable	**Coefficient**	**Std. Error**	**p-value**
ACS	0.0429	0.0658	0.531
ACI	-0.0047	0.0027	0.113
ACGD	0.0006	0.0036	0.874
FSIZE	-0.0704	0.0779	0.366
LEV	0.0004	0.0010	0.689
Within R^2	19.59%		
Observations	122		
Number of Firms	10		

Source: Researcher's Computation (2026)

The Fixed Effects regression results show that Audit Committee Size (ACS) has a positive but statistically insignificant effect on Asset Fraud Risk ($\beta = 0.0429$, $p = 0.531$). Audit Committee Independence (ACI) exhibits a negative but statistically insignificant effect ($\beta = -0.0047$, $p = 0.113$), while Audit Committee Gender Diversity

(ACGD) also demonstrates a positive but statistically insignificant effect (β = 0.0006, p = 0.874). The within R^2 value of 19.59% indicates that the explanatory variables jointly explain approximately 19.6% of the variation in asset fraud detection within firms over the study period.

Test of Hypotheses

Table 7 presents a summary of the hypotheses testing based on the fixed effects regression results, while the subsequent sections discuss each hypothesis in detail. Three null hypotheses were tested at the 5% significance level, examining the effects of audit committee size, independence, and diversity on asset fraud detection among listed oil and gas companies in Nigeria.

Table 7: Summary of Hypotheses Testing

Hypothesis	**Decision**
$H0_1$: Audit committee size has no significant effect on the asset fraud risk of listed oil and gas companies in Nigeria.	Fail to Reject
$H0_2$: Audit committee independence has no significant effect on the asset fraud risk of listed oil and gas companies in Nigeria.	Fail to Reject
$H0_3$: Audit committee gender diversity has no significant effect on the asset fraud risk of listed oil and gas companies in Nigeria.	Fail to Reject

Source: Researcher's Computation (2026)

Hypothesis One

H01: Audit committee size has no significant effect on the asset fraud risk of listed oil and gas companies in Nigeria.

The regression results shows that Audit Committee Size has a coefficient of 0.0429 with a p-value of 0.531, which exceeds the 5% significance level. Therefore, the null hypothesis is not rejected.

Decision: Fail to reject H01.

Hypothesis Two

H02: Audit committee independence has no significant effect on the asset fraud risk of listed oil and gas companies in Nigeria.

Audit Committee Independence recorded a coefficient of -0.0047 with a p-value of 0.113, which is greater than 0.05. Therefore, the null hypothesis is not rejected.

Decision: Fail to reject H02.

Hypothesis Three

H03: Audit committee gender diversity has no significant effect on the asset fraud risk of listed oil and gas companies in Nigeria.

Audit Committee Diversity recorded a coefficient of 0.0006 with a p-value of 0.874. Since the probability value exceeds the 5% significance threshold, the null hypothesis is not rejected.

Decision: Fail to reject H03.

DISCUSSION OF FINDINGS

Audit Committee Size and Asset Fraud Risk

The findings reveal that audit committee size has a positive but statistically insignificant effect on asset fraud risk ($\beta = 0.0429$, $p = 0.531$). This indicates that variations in audit committee membership do not significantly influence asset fraud detection among listed oil and gas companies in Nigeria. The result suggests that increasing committee size alone may not necessarily improve monitoring quality or fraud detection effectiveness. The finding supports previous studies that reported an insignificant relationship between audit committee size and fraud-related outcomes. For example, Alqatamin (2022) found that committee size alone does not guarantee effective governance outcomes, while Abbas and Yahaya (2023) reported that audit committee size did not significantly influence financial statement fraud likelihood among Nigerian listed firms. Similarly, Bii and Kinuthia (2024) argued that although larger committees may provide broader expertise, effectiveness depends more on the quality and contribution of members than on numerical size alone. From the perspective of Agency Theory, larger committees are expected to enhance monitoring effectiveness by increasing oversight capacity. However, the present finding suggests that committee size may not necessarily translate into improved fraud detection without corresponding improvements in competence and involvement.

Audit Committee Independence and Asset Fraud Risk

The study further reveals that audit committee independence has a negative but statistically insignificant effect on asset fraud risk ($\beta = -0.0047$, $p = 0.113$). This suggests that increasing the proportion of independent members on the audit committee does not significantly improve fraud detection among the sampled firms. This finding differs from the evidence reported by Trisanti (2023), who found that audit committee independence significantly reduces fraudulent financial reporting. Similarly, Zgarni, Hlioui, and Zainea (2022) reported that independent audit committees reduce earnings management practices and improve reporting quality.

Nevertheless, the finding supports the argument of Nguyen and Tran (2024) that independence alone may not ensure effective oversight unless committee members possess adequate expertise, industry knowledge, and monitoring capabilities. The result therefore suggests that formal independence may be insufficient to strengthen asset fraud detection within Nigeria's oil and gas sector.

Audit Committee Gender Diversity and Asset Fraud Risk

The results also show that audit committee gender diversity has a positive but statistically insignificant effect on asset fraud risk ($\beta = 0.0006$, $p = 0.874$). This indicates that diversity within audit committees does not significantly enhance fraud detection among listed oil and gas companies in Nigeria.

The positive coefficient supports the argument of Resource Dependence Theory that diverse committees provide broader knowledge, experience, and perspectives that can potentially improve governance effectiveness. However, the insignificant result suggests that diversity alone may not be sufficient to improve fraud detection outcomes.

The finding agrees with Alhababsah (2024), who found that the impact of audit committee gender diversity on governance effectiveness is heavily influenced by institutional and organizational contexts. It is also consistent with Chukwuma, Abdulkarim, and Abdullahi (2025), who found that gender diversity did not significantly affect fraud likelihood in the Nigerian banking sector.

Consequently, diversity should be viewed not merely as a compliance requirement but as a governance resource whose impact depends on the competence, expertise, and active participation of committee members.

Overall Implications of the Findings

Overall, the findings indicate that audit committee size, audit committee independence, and audit committee gender diversity do not exert statistically significant effects on asset fraud risk among listed oil and gas

companies in Nigeria. The results support the growing body of literature suggesting that structural audit committee characteristics alone may be insufficient to improve fraud risk outcomes. Instead, governance effectiveness may depend more heavily on factors such as audit committee expertise, commitment, monitoring intensity, and organizational context (Oussii & Boulila Taktak, 2023; Velte, 2023).

From a practical perspective, the findings imply that regulators and corporate boards should focus not only on compliance with governance requirements regarding committee composition but also on strengthening the professional competence, industry expertise, and active engagement of audit committee members in order to improve fraud detection mechanisms within the Nigerian oil and gas sector.

CONCLUSION

This study examined the effect of audit committee size, independence, and diversity on asset fraud risk among listed oil and gas companies in Nigeria. The fixed effects regression results revealed that none of the three audit committee characteristics exerted a statistically significant effect on asset fraud risk, leading to the failure to reject all three null hypotheses. These findings suggest that, within the Nigerian oil and gas sector, the structural attributes of audit committees examined in this study may be less influential in curbing asset fraud than the quality of implementation, enforcement, and institutional oversight surrounding them. This is consistent with the view that committee effectiveness may depend more on substantive engagement and expertise than on numerical or compositional strength alone. The study therefore recommends that regulators and corporate boards look beyond mere compliance with audit committee structural requirements and instead strengthen enforcement mechanisms, enhance the technical competence of committee members, and promote a culture of active, diligent oversight capable of detecting asset misappropriation.

This study has some limitations. First, the dependent variable is an accounting-based proxy for asset fraud risk derived from year-on-year changes in asset composition. It flags potential irregularities but does not record confirmed fraud cases or whether any fraud was detected, and such changes may also arise from legitimate events such as acquisitions, disposals, impairments, or revaluations. The findings should therefore be read as evidence on the association between audit committee attributes and an indicator of asset fraud risk, not on actual fraud detection. Second, the sample comprises ten listed oil and gas firms in an unbalanced panel of 122 firm-year observations, which limits generalizability and statistical power, so insignificant results should not be interpreted as proof of no effect. Third, diversity is limited to gender and does not capture professional, educational, or ethnic diversity. Fourth, only structural attributes were examined, and diligence, financial expertise, and audit report lag were not. Future research could use direct measures of detected fraud, such as regulatory sanctions, restatements, auditor-reported misstatements, or whistleblowing disclosures, broader measures of diversity, and larger and more diverse samples.

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