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# EFFECTS OF AUDIT COMMITTEE EXPERTISE AND MEETING ON AUDIT QUALITY OF LISTED CONSUMER-GOODS COMPANIES IN NIGERIA

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**ABSTRACT:** *The study examines the effects of audit committee expertise and meeting on audit quality of listed consumer-goods companies in Nigeria covering a period of eleven (11) years (2006 – 2016). Longitudinal panel research design was adopted for the study. The population of the study consists of the twenty-three (23) listed consumer-goods companies on the floor of Nigerian Stock Exchange as at 31st December, 2016. The census sample size consists of fifteen (15) companies. Eight (8) companies were filtered out of which five (5) companies were listed outside the period of study and three (3) companies were without complete data. Secondary data from published annual financial statements of the sampled companies in Nigeria were used. Descriptive statistics (mean, standard deviation, minimum and maximum) and inferential statistics (correlation and multiple regression) were used for the study. The results show that audit committee expertise and meeting have positive and non significant effects on audit quality of listed consumer goods companies in Nigeria. The study concludes that audit committee expertise and meeting have no significant effect on audit quality of listed consumer-goods companies in Nigeria.*

**KEYWORDS:** Audit committee, Expertise, Meeting, Audit quality, Nigerian Stock Exchange

## INTRODUCTION

Audit committees are regarded as contributing to auditing process since they are established to assist in improving audit quality. Audit committee's primary duties are to oversee the financial reporting, auditing processes and monitor management tendencies to manipulate earnings and other accounting malpractices. Part of the audit committee's attributes to facilitate monitoring activities over the auditor and to ensure greater audit quality are expertise of members and regular meetings of audit committee.

Audit committee expertise is an important attribute in fulfilling its oversight functions and protects shareholders' interests. It is imperative for all members in the audit committee to have some expertise (accounting, finance and supervisory) knowledge in order to understand the challenges of auditing practices. Accounting, finance and supervisory expertise of the members is the ability to contribute to auditing process in order to improve audit quality. Also, audit committees that meet frequently are always up to date on auditing challenges being faced by the auditor, proactive in discharging their oversight responsibilities and ensuring the expected audit quality.

Audit quality is the outcome of an audit conducted in accordance with generally accepted auditing standards to provide reasonable assurance that the audited annual financial statements and related disclosures are presented in accordance with generally accepted accounting



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principles. It is also an indication that these statements are not materially misstated whether due to errors or frauds.

Consumer-goods companies are companies producing consumable products like food, beverages, alcoholic drinks, salt, foam etc that are listed on the floor of Nigerian Stock Exchange. They were formally classified as listed food and beverages companies sector up till end of year 2015. In 2016, the name of the sector changed to listed consumer-goods companies by expanding it from eighteen (18) to the present twenty-three (23) companies that remain listed as at 31st December, 2016 on the floor of Nigerian Stock Exchange. The additional companies are: Unilever Nigeria Plc; P.Z Cussions Nigeria Plc; Nigerian Enamelware Plc; D.N Tyre & Rubber Plc and Vital Foam Nigeria Plc.

The study is conducted to critically examine how audit committee expertise and meeting affect audit quality of listed consumer-goods companies in Nigeria.

There are various studies conducted in Nigeria in relation to this study like Yadirichukwu and Ebimobowei (2013) that focused on audit committee characteristics and timeliness of financial reports, Ndubuisi and Ezechukwu (2017) examine determinants of audit quality, Nwanyanwu (2017) studies audit quality practices and financial reports in Nigeria and Dakata, Hasnah and Delima (2017) study audit committee attendance and earnings management in Nigeria. Hence, this study focuses on effects of audit committee expertise and meeting on audit quality.

On the domain of the study, Yadirichukwu and Ebimobowei (2013) use selected quoted companies in Nigeria, Ndubuisi and Ezechukwu (2017) adopt listed deposit money banks in Nigeria, Nwanyanwu (2017) studies selected audit firms in Nigeria and Dakata, Hasnah and Delima (2017) use listed industrial goods companies in Nigeria. In view of the above, this study uses listed consumer-goods companies in Nigeria.

The period of this study covers eleven (11) years from 2006 – 2016 to reflect current research result in auditing as against five (5) years (2007- 2011) used by Yadirichukwu and Ebimobowei (2013). Ndubuisi and Ezechukwu (2017) cover six (6) years from 2010 – 2015, Nwanyanwu (2017) use year 2017 only while, Dakata, Hasnah and Delima (2017) adopt only three (3) years (2012 – 2014).

It is against this background that the study answers these questions:

a) Does audit committee expertise influences audit quality of listed consumer-goods companies in Nigeria?

b) Does audit committee meeting affects audit quality of listed consumer-goods companies in Nigeria?

The specific objectives of the study are to:

i) examine the effect of audit committee expertise on audit quality of listed consumer-goods companies in Nigeria; and

ii) assess the effect of audit committee meeting on audit quality of listed consumer-goods companies in Nigeria.

The hypotheses formulated for tested in this study are:



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$H_1$: Audit committee expertise has no significant effect on audit quality of listed consumer-goods companies in Nigeria; and

$H_2$: Audit committee meeting has no significant effect on audit quality of listed consumer-goods companies in Nigeria.

Firstly, the study is significant in providing management and board of directors of listed consumer goods companies' opportunities to understand the role of audit committee expertise and meeting in enhancing audit quality. Secondly, the outcome of the study is expected to increase existing knowledge in auditing and show how audit committee expertise and meeting affects audit quality of listed consumer-goods companies in Nigeria. The outcome of the study shall assist in audit committee policy framework in Nigeria.

## LITERATURE REVIEW

Audit committee is a group of persons selected from the members of board of directors and among shareholders also who are responsible for ensuring audit quality of external auditors (Arens, Elder & Beasly, 2009). In his own contributions, Marx (2008) posits that audit committee is a sub–committee of the board of directors that consists of majority of independent non executive directors tasked with an oversight role to assist the directors in meeting their financial reporting, risk management and control and audit related responsibilities. The above concept of audit committee is an indication that the committee is established to improve audit quality.

Audit committee members' financial and accounting expertise is an important attribute for its effectiveness in fulfilling their oversight role of ensuring audit quality. According to Dezoort and Salteerio (2001), audit committee members with previous experiences and knowledge in finance and accounting are more likely to make expert judgments and ensure audit quality. Audit committee's financial and accounting expertise reduce financial restatement or constrains the propensity of management to engage in creative accounting (Xie, Davidson & Dadalt, 2003 and Bedard, Chtourou & Courteau, 2004).

Frequent audit committee meetings with auditors to review their auditing processes and audit reports are to ensure continuous communication between external auditors and audit committee toward audit quality (Habbash, 2010). According to Vafeas (2005) and Persons (2009), frequent audit committee's meetings are significantly related to a lower incidence of financial restatement or fraudulent financial reporting as a reflection of audit quality.

On the concept of audit quality, Schauer (2002) states that higher audit quality increases the probability that the financial statements are more accurately reflect the financial positions and results of operations of the entity being audited. Audit quality would improve the reliability of financial statement information and allow investors to make more precise estimate of the firm's value (Behn, Choi, & Kang, 2008). Audit quality according to Clinch, Stokes and Zhu (2010) is part of the accounting information disclosed. According to Nwanyanwu (2017), audited financial statements should convey accurate and reliable information that are relevant to decision making processes for the benefit of various users of accounting information. All the above definitions of audit quality focus on the accuracy of the information reported by the auditors. In another vein, Chen, Hsu, Huang and Yang (2013) state that audit quality is a function of the auditor's ability to detect material misstatement (technical capabilities) and



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reporting the errors (auditor independence). This definition is comprehensive by looking at audit quality from auditor's technical abilities and independence.

On the empirical studies on audit committee expertise and audit quality, Goodwin-Stewart and Kent (2006) examine whether audit committee expertise is associated with audit quality. The study was conducted in Australia from data collected through questionnaires sent to 401 companies. Ordinary least square (OLS) regression models are used and the study finds that financial expertise of audit committee members was significantly related to audit quality. Besides, Yadirichukwu and Ebimobowei (2013) carry out a study on the effects of audit committee expertise and timeliness of financial reports that reflects audit quality of external auditors. The study was conducted in Nigeria using 35 listed firms from 2007 to 2011. The study uses multiple regression analysis and concludes that audit committee expertise was significantly related to external auditors' audit quality.

Hoitash and Hoitash (2009) study the association between audit committee meeting and audit quality. The study was conducted in Australia and data were collected using questionnaires on 2,393 public companies audited by large and small auditors in the year 2004. The finding reveals that frequency of audit committee meeting is positively associated with audit quality and that strong audit committee might choose to authorize less non- audit services in order to contribute to audit quality. Furthermore, Lifschutz, Jacob and Feldshtein (2010) examine the effect of audit committee meeting on audit quality in large public companies in Israel. The study uses multiple regression analysis on 100 largest public companies on the Tel-Aviv Stock Exchange. The study finds that audit committee meeting is positively and significantly associated with audit quality.

This study is anchored on agency theory that states that interests of the principal and agent vary. As a result, agency theory assumes that the principal can control or reduce this by incurring expenses on activities designed to monitor and limit the self interest activities of the agent. The principal ensures that the agent acts in the interest of the principal by giving him incentives and by monitoring his activities (Bonazzi & Islam, 2007). Establishment of audit committee is part of the measures taken by the board of directors to reduce the self- serving nature of the auditor (agent) by not being independent in carrying out his functions effectively. Audit committee members' expertise and frequency of meetings are to check the activities of the external auditor with the management in order to ensure the expected audit quality.

## METHODOLOGY

This study uses longitudinal panel research design. The population of the study consists of the twenty three (23) listed consumer-goods companies in Nigeria as reported by the Nigerian Stock Exchange (NSE) Fact book as at 31st December, 2016 for a period of eleven (11) years (2006 – 2016). The whole population was adopted for the study but only fifteen (15) companies were used as census sample size as shown in Table 1.



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**Table I: Population and Census Sample Size Frame of the Study**

| S/No | Name | Census Sample | Year of Listing |
|---|---|---|---|
| 1. | Champion Brewery Plc | ✓ | 1983 |
| 2. | Golden Guinea Brewery Plc | | 1979 |
| 3. | Guinness Nigeria Plc | ✓ | 1965 |
| 4. | International Brewery Plc | ✓ | 1995 |
| 5. | DN Tyre & Rubber Plc | | 2001 |
| 6. | Nigerian Breweries Plc | ✓ | 1973 |
| 7. | Nigerian Enamelware Plc | ✓ | 1979 |
| 8. | 7 Up Bottling Company Plc | ✓ | 1986 |
| 9. | Vita Foam Nigeria Plc | ✓ | 1978 |
| 10. | Dangote Sugar Refinery Plc | | 2007 |
| 11. | Flour Mills Nigeria Plc | ✓ | 1979 |
| 12. | Honeywell Flour Mill Plc | | 2006 |
| 13. | P. Z. Cussons Nigeria Plc | ✓ | 1974 |
| 14. | Multi – Trex Integrated Foods Plc | | 2010 |
| 15. | Nascon Allied Industries Plc | ✓ | 1992 |
| 16. | Northern Nigeria Flour Mills Plc | ✓ | 1978 |
| 17. | Dangote Flour Mills Plc | | 2008 |
| 18. | Union Dicon Salt Plc | ✓ | 1993 |
| 19. | U.T.C. Nigeria Plc | | 1972 |
| 20. | Mcnichols Plc | | 2009 |
| 21 | Unilever Nigeria Plc | ✓ | 1973 |
| 22. | Cadbury Nigeria Plc | ✓ | 1979 |
| 23. | Nestle Nigeria Plc | ✓ | 1976. |

Source: N.S.E. Fact Book (2016).

Census samples from the population were selected based on two criteria. Firstly; five (5) companies from the population were removed for not falling within the period of study since they were listed after 1st January, 2006 and secondly, three (3) companies were also dropped due to incomplete data during the period of the study. The census sample size of fifteen (15) consumer-goods companies that were listed as at 1st January, 2006, remain listed as at 31st December, 2016 and having completed data during the period under review were used for the study. Secondary data from published annual financial statements of listed consumer-goods companies in Nigeria were used for the study because the data are reliable and verifiable.

Descriptive statistics (minimum, maximum, mean and standard deviation) and inferential statistics (correlation and regression analysis) were used. The study uses multiple regression technique to determine the effect of audit committee expertise and meeting on audit quality. This technique is used in line with the studies of Hudaib and Haniffa (2011) and Ilaboya and Ohiokha (2014). Hausman specification test was conducted to determine the appropriate regression to use between Fixed Effect (FE) regression and Random Effect (RE) regression. Diagnostic tests (heteroskedasticity test, multicolinearity test and normality test) were carried out to test data quality.

The two models used to test the hypotheses of the study as demonstrated by Ghafran (2013) and Ndubuisi and Ezechukwu (2017) are presented thus:



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**Model 1**

$$AQ1_{i,t} = \beta_0 + \beta_1 ACE_{i,t} + \beta_2 ACM_{i,t} + \beta_3 CS_{i,t} + \beta_4 CC_{i,t} + \mu_{i,t} \quad \text{.....(1)}$$

**Model 2**

$$AQ2_{i,t} = \beta_0 + \beta_1 ACE_{i,t} + \beta_2 ACM_{i,t} + \beta_3 CS_{i,t} + \beta_4 CC_{i,t} + \mu_{i,t} \quad \text{.....(2)}$$

Audit fees and auditor's tenure are used as proxies for dependent variable audit quality. The independent variables are audit committee expertise and meeting, while, control variables include company size and complexity.

AQ1 is measured by the annual audit fees paid (Hoitash and Hoitash, 2009). AQ2 that stand for auditor's tenure is measured by the number of years spent as external auditor to the client. Auditor's tenures of above three years equal one (1) and zero (0) if otherwise as used by Okolie, Izedonmi and Enofe (2013). ACE stands for audit committee expertise is measured by the number of members with financial and accounting expertise over total audit committee members (Bradbury & Cahan, 2009). ACM which is audit committee meeting is measured as number of audit committee meetings per year as used by Singh and Newby (2010). CS stands for company size and is measured by the natural logarithm of company's total assets (Goodwin-Stewart & Kent, 2006 and Amar, 2014). CC that stand for company complexity is measured by total number of manufacturing plants of the companies as used by Singh and Newby (2010). $\beta_0$ stands for intercept; $\beta_{1\text{-}4}$ stands for coefficient of independent variables; $\mu$ stands for error term; i stands for company; and t stands for year.

## RESULTS AND DISCUSSION

This section deals with the presentation, analysis and discussion of results of the processed data collected for the purpose of testing empirically the hypotheses of the study. Results of descriptive statistics, correlation matrix, diagnostic and post estimation tests; regression results and their interpretation for the two models are presented in this section.

Descriptive statistics for all variables (dependent, independent and control) of the study is shown in Table 2.

**Table 2: Descriptive Statistics**

| Variable | Observation | Mean | Std Deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| AQ1 | 165 | 19.163 | 17.777 | 2.2 | 125.95 |
| AQ2 | 165 | 0.703 | 0.458 | 0 | 1 |
| ACE | 165 | 0.561 | 0.162 | 0.17 | 0.83 |
| ACM | 165 | 3.861 | 0.573 | 3 | 5 |
| CS | 165 | 9.576 | 1.995 | 4.220 | 12.815 |
| CC | 165 | 3.279 | 3.169 | 1 | 12 |

Source: STATA 11 Outputs based on study data (See appendix I).

Audit quality (AQ1) measured by audit fees in Table 2 indicate mean value of 19.163; standard deviation value of 17.777; minimum value of 2.2 and maximum value of 125.95. It means on average the audit fees paid by a company was N19.163 million with a close dispersion of



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N17.777 million as standard deviation per listed consumer goods companies in Nigeria. The minimum and maximum audit fees are N2.2 million and N125.95 million respectively.

Audit quality (AQ2) measures by auditors' tenures with dichotomous variables of 0 and 1 showing minimum of three (3) years and above three (3) years respectively. The mean of 0.703 indicates that 70.3% of the auditors of listed consumer goods companies in Nigeria spent above three (3) years in office. Standard deviation of 0.458 indicates little wide dispersion from mean.

On the audit committee expertise (ACE), the mean value of 0.561 is an indication that on the average 56.1% of the audit committee members of listed consumer goods companies in Nigeria has financial expertise with wide dispersion of 0.162 from mean as indicated by standard deviation. ACE has minimum and maximum values of 0.17 and 0.83 respectively. Audit committee meetings (ACM) on the other hand indicate minimum and maximum meetings of 3 and 5 per year respectively. On the average about 4 meetings being held as shown by mean value of 3.861 with standard deviation value of 0.573 indicating wide dispersion from mean.

The control variable of natural logarithm of company size (CS) indicates minimum and maximum values of 4.220 and 12.815 respectively. The mean value of 9.576 and standard deviation value of 1.995 indicates wide dispersion from mean. On the company complexity (CC), the minimum and maximum values are 1 and12 respectively. The mean and standard deviation values of 3.279 and 3.169 show no dispersion from mean.

The association between variables of the study is shown by correlation matrix in Table 3.

**Table 3: Correlation Matrix**

| | **AQ1** | AQ2 | ACE | ACM | CS | CC |
|---|---|---|---|---|---|---|
| AQ1 | 1.0000 | | | | | |
| AQ2 | 0.1035<br>0.1860 | 1.0000 | | | | |
| ACE | 0.0847<br>0.2795 | -0.1078<br>0.1681 | 1.0000 | | | |
| ACM | 0.2337<br>0.0025 | -0.0425<br>0.5876 | 0.0694<br>0.3754 | 1.0000 | | |
| CS | 0.6679<br>0.0000 | 0.0343<br>0.6615 | 0.1035<br>0.1857 | 0.1787<br>0.0216 | 1.0000 | |
| CC | 0.4738<br>0.0000 | -0.0098<br>0.9004 | 0.0214<br>0.7854 | 0.0316<br>0.6868 | 0.4702<br>0.0000 | 1.0000 |

Source: STATA 11 Outputs based on study data (See appendix I).

Based on Pearson Correlation Coefficient of the variables presented in Table 3 at 5% level of significance, AQ1 has positive relationship with AQ2; ACE; ACM; CS and CC which are all significant except with AQ2 and ACE which are not significant as shown by coefficient values of 0.1035; 0.0847; 0.2337; 0.6679; 0.4738 and P values of 0.1860; 0.2795; 0.0025; 0.0000; and 0.0000 respectively. AQ2 on the other hand has positive relationship with CS with coefficient value of 0.0343 and P-value of 0.6615 which is not significant. It also has negative relationships with ACE, ACM and CC as indicated by coefficient values of -0.1078, -0.0425 and -0.0098 which are not significant.



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ACE has positive correlation coefficient values of 0.0694, 0.1035 and 0.0214 with ACM, CS and CC respectively which are not significant as indicated by P values of 0.3754, 0.1857 and 0.7854 to ACM, CS and CC respectively. ACM has positive correlation coefficient values of 0.1787 and 0.0316 with CS and CC respectively which is significant with CS ( P-value 0.0216) but not significant with CC ( P-value 0.6868). CS on the other hand has positive correlation coefficient value of 0.4702 with CC which is significant (P-value 0.0000).

Table 4 shows the values of VIF and 1/VIF of independent and control variables of the study.

**Table 4: Variance Inflation Factor**

| Variable | VIF | 1/VIF |
|---|---|---|
| CS | 1.34 | 0.745192 |
| CC | 1.29 | 0.775415 |
| ACM | 1.04 | 0.962082 |
| ACE | 1.01 | 0.985823 |
| Mean VIF | 1.17 | |

Source: STATA 11 Outputs based on study data (See appendix I).

Variance Inflation Factors (VIF) values which should be between 1 and 4 and tolerance values (1/VIF) of less than 1 test multicollinearity in data. The VIF values of 1.34; 1.29; 1.04 and 1.01 are for variables CS; CC; ACM and ACE respectively. The tolerance values indicate 0.745192; 0.775415; 0.962082 and 0.985823 for CS; CC; ACM and ACE respectively. The VIF mean is 1.17. The VIF and tolerance values indicate that autocorrelation level of the data within the period under review may not have any statistical significant impact.

**Table 5: Shapiro-wilk W Test**

| Variable | Observation | Prob>z |
|---|---|---|
| AQ1 | 165 | 0.00000 |
| AQ2 | 165 | 0.28265 |
| ACE | 165 | 0.24869 |
| ACM | 165 | 0.68273 |
| CS | 165 | 0.00000 |
| CC | 165 | 0.00000 |

Source: STATA 11 Outputs based on study data (See appendix I).

Shapiro–Wilk test in Table 5 for normal data at 5% level of significance indicate z values for all variables. Data sets for AQ2, ACE and ACM were normally distributed as shown by values of Prob>z 0.28265, 0.24869 and 0.68273 respectively which were not significant. On the other hand, AQ1, CS and CC data sets were not normally distributed as indicated by values of Prob>z 0.0000 for the three variables which are significant. The lack of normal distribution of variables data sets call for robustness of regression technique.

The heteroskedasticity test for appropriateness of OLS regression for the study model is shown in Table 6.



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**Table 6: Breusch-pagan / Cook-weisberg Test**

| Variable | Chi2 (1) | Prob>chi2 |
|---|---|---|
| AQ1 | 118.17 | 0.0000 |
| AQ2 | 98.00 | 0.0000 |

Source: STATA 11 Outputs based on study data (See appendix I).

Breusch-pagan / Cook-weisberg test for heteroskedasticity rule of thumb states that data is heteroskedastic when Prob>chi2 value is significant, and there is absence of hettest if the P-value of $Chi^2$ is not significant. Model 1 heteroskedasticity test indicates Chi2 (1) value of 118.17 which was significant with Prob>chi2 value of 0.0000. Hence, the AQ1 data was heteroskedastic. Model 2 heteroskedasticity test shows Chi2 (1) value of 98.00 which was also significant at Prob>chi2 value of 0.0000. In the same vein, AQ2 data was also heteroskedasticity. The results show presence of hettest indicating OLS regressions are not appropriate for the two models.

The Hausman specification tests in choosing between FE and RE for the two models are shown in Table 7

**Table 7: Hausman Specification Tests**

| Model | Chi2 (4) | Prob>chi2 |
|---|---|---|
| AQ1 | 3.10 | 0.5419 |
| AQ2 | 20.08 | 0.0005 |

Source: STATA 11 Outputs based on study data (See appendix I).

Hausman tests were conducted in choosing between FE and RE regressions for the two models. The decision rule indicates that if the value of Hausman P>chi2 is significant FE regression is used. But if otherwise, that is, P>chi2 is not significant RE regression is applied. Model (AQ1) Hausman test reveals Chi2 (4) value of 3.10 with Prob>chi2 value of 0.5419 which is not significant, hence, Random Effect (RE) regression was used. On the other hand, model (AQ2) Hausman test shows Chi2 (4) value of 20.08 with Prob>chi2 value of 0.0005 which is significant. Fixed Effect (FE) regression was adopted.

Model 1 in Table 8 show audit quality (AQ1) measures by audit fees as dependent variable. Independent variables made up of audit committee expertise (ACE) and audit committee meeting (ACM), while control variables include Company Complexity (CC) and natural logarithm of Company Size (CS).

**Table 8: Model 1 RE Regression Result**

| AQ1 | Coefficient | Robust Std. Error | Z | P>\|z\| |
|---|---|---|---|---|
| ACE | 2.377194 | 2.769122 | 0.86 | 0.391 |
| ACM | 2.468495 | 2.042714 | 1.21 | 0.227 |
| CS | 6.236129 | 2.150592 | 2.90 | 0.004 |
| CC | 0.5617678 | 0.6268561 | 0.90 | 0.370 |
| Constant | -53.26092 | 22.90991 | -2.32 | 0.020 |



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| | |
|---|---|
| **$R^2$** | 0.6599 |
| **Adj $R^2$** | 0.4805 |
| **F-Statistics** | 27.29 |
| **Prob>F** | 0.0000 |
| **Hausman Specification Test** | |
| **Chi2 (4)** | 3.10 |
| **P>Chi2** | 0.5419 |

Source: STATA 11Outputs based on study data (See appendix I).

Table 8 shows Hausman specification test value of P>chi2 (4) 0.5419 which was not significant at 5% level of significance, RE regression is the most appropriate for model 1. The RE regression was also robust due to lack of normal distribution of all variables data based on Shapiro-wilk test (See Table 5) conducted.

The robust RE regression result shows multiple coefficient of determination R-squared value of 0.6599 indicating that independent and control variables explained 65.99% of the variations in audit quality (AQ1). In addition, the robust RE was also fitted as evidenced by F-Statistics value of 27.29 with Prob>F value of 0.0000 which was significant at 5% level of significance.

The independent variable ACE of the model has z-value of 0.86 and P>|z| value of 0.391 at 5% level of significance. It means audit committee expertise (ACE) has positive non significant effect on audit quality measured by audit fees in listed consumer-goods companies in Nigeria during the period under review. In the same vein, ACM has z-value of 1.21 with P>|z| value of 0.227 at 5% level of significance. This is an indication that audit committee meeting also has positive non significant effect on audit quality measured by audit fees in listed consumer-goods companies in Nigeria.

Table 9 shows model 2 that has audit quality (AQ2) measured by auditors' tenures as dependent variable. Independent variables include Audit Committee Expertise (ACE) and Audit Committee Meeting (ACM). Control variables are Company Complexity (CC) and natural logarithm of Company Size (CS).

**Table 9: Model 2 FE Regression Result**

| **AQ2** | **Coefficient** | **Robust Std. Error** | **T** | **P>\|t\|** |
|---|---|---|---|---|
| ACE | 2.187781 | 2.824642 | 0.77 | 0.451 |
| ACM | 1.290198 | 1.274868 | 1.01 | 0.329 |
| CS | 7.467178 | 3.208391 | 2.33 | 0.035 |
| CC | -0.3561719 | 2.898209 | -0.12 | 0.904 |
| Constant | -57.38449 | 26.54741 | -2.16 | 0.048 |
| **$R^2$** | | 0.5805 | | |
| **Adj $R^2$** | | 0.4341 | | |



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| | |
|---|---|
| **F-Statistics** | 3.71 |
| **Prob>F** | 0.0291 |
| **Hausman Specification Test** | |
| **Chi2 (4)** | 20.08 |
| **P>Chi2** | 0.0005 |

Source: STATA 11 Outputs based on study data (See appendix I).

The Hausman specification test P>chi$^2$ value of 0.0005 which was significant at 5% level of significance indicated appropriateness of Fixed Effect (FE) regression for model 2 which was robust due to lack of normal distributions of all variables data based on Shapiro-wilk test (See Table 5) for normal data conducted.

The robust FE regression result shows independent variables ACE and ACM t-values of 0.77 and 1.01 respectively that signified positive effects of audit committee expertise and meetings on audit quality. Also ACE and ACM have P>|t| values of 0.451 and 0.329 at 5% level of significance. These are indications that audit committee expertise and meetings have non significant effects on audit quality measured by auditors' tenures in listed consumer-goods companies in Nigeria.

On the test of hypothesis ($H_1$), the findings of the two models show positive and non significant effect of audit committee expertise on audit quality. Therefore, the study has no sufficient evidence to reject the null hypothesis that state, audit committee expertise has no significant effect on audit quality of listed consumer-goods companies in Nigeria. The result did not agree with the studies of Goodwin-Stewart and Kent (2006) and Yadirichukwu and Ebimobowei (2013) but agreed with the study of Rainsbury, Bradbury and Cahan (2009). The positive and non significant effect of audit committee expertise on audit quality may be attributed to lack of accounting expertise by majority members of audit committees of listed consumer-goods companies in Nigeria, as minimum of one member is required to have finance expertise in the committee.

Furthermore, the second findings of the study which are used to test hypothesis ($H_2$) also revealed positive and non significant effect of audit committee meeting on audit quality measured by audit fees and auditors' tenures. Hence, the null hypothesis of audit committee meeting has no significant effect on audit quality of listed consumer-goods companies in Nigeria is hereby accepted. The result agrees with the study of Hoitash and Hoitash (2009) but disagrees with the study of Lifschutz, Jacob and Feldshtein (2010). This is an indication that audit committees' meetings have no significant effect on audit quality of listed consumer-goods companies in Nigeria.

The study is conducted due to wide criticisms on the importance and relevance of audit committee in improving statutory audit quality of public companies in Nigeria. Hence, we undertake to examine the effects of expertise and meeting characteristics of audit committee on audit quality using listed consumer-goods companies in Nigeria as our research domain.

In view of the above findings, this study contributes to debate on how audit committee attributes of expertise and meeting affect audit quality of published financial statements of companies in Nigeria. It is also an indication to regulatory authority for necessary amendment



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to code of corporate governance in Nigeria by improving and setting minimum bench mark of members' qualifications above the present required only financial experience and number of meetings of audit committees respectively. This is to enhance and improve on audit committees contributions to statutory audit quality of listed consumer-goods companies in Nigeria.

## CONCLUSION

The specific objectives of the study are to examine the effect of audit committee expertise on audit quality of listed consumer-goods companies in Nigeria and assess the effect of audit committee meeting on audit quality of listed consumer-goods companies in Nigeria. As a result of the stated objectives, the study concludes that audit committee expertise and meeting have no significant effects on audit quality of listed consumer-goods companies in Nigeria.

## REFERENCES

Amar, A.B. (2014). The effect of independence audit committee on earnings management: The case in French. *International Journal of Academic Research in Accounting, Finance and Management Sciences,* 4(1), 96 – 102.

Arens, A.A., Elder, R.J., & Beasley, M.S. (2009). *Auditing and assurance services: An integrated approach.* (13th ed) New Jersey: Prentice Hall.

Bala, H. (2014). Audit committee characteristics and earnings management of listed foods and beverages firms in Nigeria. (*Unpublished M.Sc Thesis) Ahmadu Bello University, Zaria.*

Bedard, J., Chtourou, S.M., & Courteau, L. (2004). The effect of audit committee expertise, independence, and activity on aggressive earnings management. *Auditing: a Journal of Practice and Theory.* 23(2), 13 – 35.

Behn, B.K., Choi, J., & Kang, T. (2008). Audit quality and properties of analyst earnings forecasts. *Accounting Review,* 83(2), 327 – 349.

Bonazzi, I., & Islam, S.M N. (2007). Agency theory and corporate governance: A study of the effectiveness of board in their monitoring of the CEO. *Journal of Modeling in Management.* 2(1), 7 – 23.

Bouaziz, Z. (2012). The impact of auditor size on financial performance of Tunisian companies. *Paper presented at the faculty of Economics and Management, Sfax University, Tunisia.*

Chen, Y., Hsu, Y., Huang, M., & Yang, P. (2013). Quality, size and performance of audit firms. *The International Journal of Business and Finance Research,* 7(5): 89 – 105.

Clinch, G., Stokes, D.J., & Zhu, T. (2010). Audit quality and information asymmetry between traders. *Accounting and Finance,* 52(3), 743 – 765.

Dakata, M.N., Hasnah, K. & Delima, A.S. (2017). Audit committee attendance and earnings management in Nigeria. *Asian Journal of Multidisciplinary Studies,* 2(3), 47 – 54.

Ghafran, C.M. (2013). Audit committee and financial reporting quality. *(Unpublished Ph.D Dissertation) University of Sheffield.*

Goodwin- Stewart, J. & Kent, P. ( 2006 ). Relation between external audit fees, audit committee characteristics and internal audit. *Accounting and Finance,* 46 (3), 387 – 404.

Gujarati, D.N., & Porter, D.C. (2009). *Basic econometrics, (5th ed).* New York: McGraw Hill.



ISSN 2053-4086(Print), ISSN 2053-4094(Online)

Habbash, M. (2010). The effectiveness of corporate governance and external audit on constraining earnings management practices in the UK *(Unpublished PhD Thesis) Durham University.*

Hoitash, R., & Hoitash, U. (2009). The role of audit committees in managing relationships with external auditors after SOX. *Managerial Auditing Journal.* 24(4), 368 – 397.

Ilaboya, O.J., & Ohiokha, F.I. (2014). Audit firm characteristics and audit quality in Nigeria. *International Journal of Business and Economics Research,* 3(5), 187 – 195)

Liesbeth, B., Ku, L., & Ganesh, K. (2015). The association between audit committee chair characteristics and the financial reporting process. *Paper presented at North eastern University, Arnie Wright.*

Lifschutz, S., Jacob, A., & Feldshtein, S. (2010). Corporate governance characteristics and external audit fees: A study of large public companies in Israel. *International Journal of Business and Management.* 5(3), 109 – 116.

Louwers, J.T., Ramsay, J.R., Sinason, H.D. & Strawser, R.J. (2007). *Auditing and assurance services* Boston: McGraw-Hill.

Marx, B. (2008). An analysis of the development, status and functioning of audit committee at large listed companies in South Africa. *(Unpublished PhD thesis)* University of Johannesburg.

Ndubuisi, A.N. & Ezechukwu, B.O. (2017). Determinants of audit quality: Evidence from deposit money banks listed on Nigerian Stock Exchange. *International Journal of Academic Research in Accounting, Finance and Management Sciences,* 7(2), 117 – 130.

Nwanyanwu, L.A. (2017). Audit quality practices and financial reporting in Nigeria. *International Journal of Academic Research in Accounting, Finance and Management Sciences,* 7(2), 145 – 155.

O'Connor (2006). The impact of board composition and ownership on audit quality: Evidence from large UK companies. *British Accounting Review.* 32, 397 – 414.

Okolie, A.O., Izedonmi, F.O.I., & Enofe, A.O. (2013). Audit quality and accrual – based earnings management of quoted companies in Nigeria. *Journal of Economics and Finance.* 2(2), 7 -16.

Persons, O.S. (2009). Audit committee characteristics and earlier voluntary ethics disclosure among fraud and non – fraud firms. *International Journal of Disclosure and Governance.* 6(4), 284 – 297.

Rainsbury, E.A., Bradbury, M., & Cahan, S.F. (2009). The impact of audit committee quality on financial reporting quality and audit fees. *Journal of Contemporary Accounting and Economics,* 5, 20 – 33.

Ramsay, I. (2001). Independence of Australian company auditors: Review of current Australian requirements and proposal for reform. *Commonwealth of Australian, Canberra Act.*

Salehi, M. (2009). Non audit services and audit independence: Evidence from Iran. *International Business Management,* 4, 142- 152.

Saputra, W. (2015). The impact of auditor's independence on audit quality: A theoretical approach. *International Journal of Scientific and Technology Research,* 4(12), 348-353.

Schauer, P.C. (2002). The effect of industry specialization on audit quality: An examination using bid – ask spreads. *Journal of Accounting and Finance Research,* 10(1), 76 – 86.

Temple, M., Ofurum, C. O.. & Solomon, E. (2016). Audit committee characteristics and quality of financial reporting in quoted Nigerian banks. *International Journal of Advanced Academic Research.* 2(5), 1- 10.



ISSN 2053-4086(Print), ISSN 2053-4094(Online)

Umaru, D. (2014). Audit attributes and financial reporting quality of listed building material firms in Nigeria. *(Unpublished M.Sc Thesis) Ahmadu Bello University, Zaria.*

Vafeas, N. (2005). Audit committee, boards and the quality of reported earnings. *Contemporary Accounting Research.* 22(4), 1093 – 1122.

Xie, B., Davidson, W.W., & Dadalt, P.J. (2003). Earnings management and corporate governance: The role of the board and the audit committee. *Journal of Corporate Finance.* 9(3), 295 – 316.

Yadirichukwu, E., & Ebimobewei, A. (2013). Audit committee and timeliness of financial reports: Empirical evidence from Nigeria. *Journal of Economics and Sustainable Development.* 2(1), 25 -36.



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# Appendix I

```
  ___  ____  ____  ____  ____ (R)
 /__    /   ____/   /   ____/
___/   /   /___/   /   /___/   11.2   Copyright 1985-2009 StataCorp LP
  Statistics/Data Analysis             StataCorp
                                       4905 Lakeway Drive
     Special Edition                   College Station, Texas 77845 USA
                                       800-STATA-PC        http://www.stata.com
                                       979-696-4600        stata@stata.com
                                       979-696-4601 (fax)

Single-user Stata license expires 31 Dec 9999:
       Serial number:  71606281563
         Licensed to:  STATAForAll
                       STATA

Notes:
      1.  (/m# option or -set memory-) 50.00 MB allocated to data
      2.  (/v# option or -set maxvar-) 5000 maximum variables

. edit

. *(8 variables, 165 observations pasted into data editor)

. describe

Contains data
  obs:           165
 vars:             8
 size:         3,630 (99.9% of memory free)
-------------------------------------------------------------------------------
              storage  display     value
variable name   type   format      label      variable label
-------------------------------------------------------------------------------
firm            byte   %8.0g                  Firm
year            int    %8.0g                  Year
aq1             float  %8.0g                  AQ1
aq2             byte   %8.0g                  AQ2
ace             float  %8.0g                  ACE
acm             byte   %8.0g                  ACM
cs              float  %8.0g                  CS
cc              byte   %8.0g                  CC
-------------------------------------------------------------------------------
Sorted by:
     Note:  dataset has changed since last saved


. summarize aq1 aq2 ace acm cs cc

    Variable |       Obs        Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
         aq1 |       165    19.16303    17.77654         2.2     125.95
         aq2 |       165   .7030303     .458314           0          1
         ace |       165   .5614546    .1615068         .17         .83
         acm |       165   3.860606    .5727232           3          5
          cs |       165   9.576046    1.994926    4.219508   12.81486
-------------+--------------------------------------------------------
          cc |       165   3.278788    3.169188           1         12


. swilk aq1 aq2 ace acm cs cc

                    Shapiro-Wilk W test for normal data

    Variable |   Obs       W           V         z       Prob>z
-------------+--------------------------------------------------
         aq1 |   165    0.72446     34.797     8.087     0.00000
         aq2 |   165    0.98981      1.287     0.575     0.28265
         ace |   165    0.98933      1.347     0.679     0.24869
         acm |   165    0.99357      0.812    -0.475     0.68273
          cs |   165    0.93737      7.909     4.712     0.00000
          cc |   165    0.87978     15.182     6.197     0.00000
```



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```
. pwcorr aq1 aq2 ace acm cs cc, sig
```

| | aq1 | aq2 | ace | acm | cs | cc |
|---|---|---|---|---|---|---|
| aq1 | 1.0000 | | | | | |
| aq2 | 0.1035<br>0.1860 | 1.0000 | | | | |
| ace | 0.0847<br>0.2795 | -0.1078<br>0.1681 | 1.0000 | | | |
| acm | 0.2337<br>0.0025 | -0.0425<br>0.5876 | 0.0694<br>0.3754 | 1.0000 | | |
| cs | 0.6679<br>0.0000 | 0.0343<br>0.6615 | 0.1035<br>0.1857 | 0.1787<br>0.0216 | 1.0000 | |
| cc | 0.4738<br>0.0000 | -0.0098<br>0.9004 | 0.0214<br>0.7854 | 0.0316<br>0.6868 | 0.4702<br>0.0000 | 1.0000 |

```
. regress aq1 ace acm cs cc
```

| Source | SS | df | MS | | |
|---|---|---|---|---|---|
| Model | 25668.6946 | 4 | 6417.17365 | Number of obs | = 165 |
| Residual | 26156.1847 | 160 | 163.476154 | F( 4, 160) | = 39.25 |
| | | | | Prob > F | = 0.0000 |
| Total | 51824.8793 | 164 | 316.005361 | R-squared | = 0.4953 |
| | | | | Adj R-squared | = 0.4827 |
| | | | | Root MSE | = 12.786 |

| aq1 | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| ace | 1.64857 | 6.226085 | 0.26 | 0.792 | -10.64733 | 13.94447 |
| acm | 4.002178 | 1.777274 | 2.25 | 0.026 | .4922362 | 7.51212 |
| cs | 4.834089 | .5797546 | 8.34 | 0.000 | 3.689131 | 5.979048 |
| cc | 1.202302 | .3577586 | 3.36 | 0.001 | .4957642 | 1.90884 |
| _cons | -47.44695 | 8.227865 | -5.77 | 0.000 | -63.69618 | -31.19773 |

```
. regress aq2 ace acm cs cc
```

| Source | SS | df | MS | | |
|---|---|---|---|---|---|
| Model | .581774891 | 4 | .145443723 | Number of obs | = 165 |
| Residual | 33.86671 | 160 | .211666937 | F( 4, 160) | = 0.69 |
| | | | | Prob > F | = 0.6019 |
| Total | 34.4484848 | 164 | .210051737 | R-squared | = 0.0169 |
| | | | | Adj R-squared | = -0.0077 |
| | | | | Root MSE | = .46007 |

| aq2 | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| ace | -.315802 | .2240342 | -1.41 | 0.161 | -.7582474 | .1266435 |
| acm | -.0372856 | .0639519 | -0.58 | 0.561 | -.1635844 | .0890132 |
| cs | .0168125 | .0208614 | 0.81 | 0.421 | -.0243867 | .0580117 |
| cc | -.0058401 | .0128733 | -0.45 | 0.651 | -.0312635 | .0195834 |
| _cons | .8824349 | .2960646 | 2.98 | 0.003 | .2977365 | 1.467133 |

```
. vif
```

| Variable | VIF | 1/VIF |
|---|---|---|
| cs | 1.34 | 0.745192 |
| cc | 1.29 | 0.775415 |
| acm | 1.04 | 0.962082 |
| ace | 1.01 | 0.985823 |
| Mean VIF | 1.17 | |

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of aq1

         chi2(1)      =   118.17
         Prob > chi2  =   0.0000


. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of aq2

         chi2(1)      =    98.00
         Prob > chi2  =   0.0000
```



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```
. xtset firm year
       panel variable:  firm (strongly balanced)
        time variable:  year, 2006 to 2016
                delta:  1 unit

. xtreg aq1 ace acm cs cc, fe

Fixed-effects (within) regression               Number of obs      =       165
Group variable: firm                            Number of groups   =        15

R-sq:  within  = 0.2207                         Obs per group: min =        11
       between = 0.5805                                        avg =      11.0
       overall = 0.4341                                        max =        11

                                                F(4,146)           =     10.34
corr(u_i, Xb)  = -0.3045                        Prob > F           =    0.0000

------------------------------------------------------------------------------
         aq1 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         ace |    2.187781   5.346649     0.41   0.683    -8.379046    12.75461
         acm |    1.290198    2.57394     0.50   0.617    -3.796797    6.377192
          cs |    7.467178   1.256279     5.94   0.000     4.984337     9.95002
          cc |   -.3561719   1.212707    -0.29   0.769      -2.7529    2.040556
       _cons |   -57.38449   14.04868    -4.08   0.000    -85.14953   -29.61945
-------------+----------------------------------------------------------------
     sigma_u |  9.7699848
     sigma_e |  10.464624
         rho |  .46571116   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(14, 146) =     6.63                 Prob > F = 0.0000

. est store fe

. xtreg aq1 ace acm cs cc, re

Random-effects GLS regression                   Number of obs      =       165
Group variable: firm                            Number of groups   =        15

R-sq:  within  = 0.2161                         Obs per group: min =        11
       between = 0.6599                                        avg =      11.0
       overall = 0.4805                                        max =        11

                                                Wald chi2(4)       =     61.89
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000

------------------------------------------------------------------------------
         aq1 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         ace |    2.377194   5.290494     0.45   0.653    -7.991985    12.74637
         acm |    2.468495   2.275201     1.08   0.278    -1.990817    6.927807
          cs |    6.236129   .9579748     6.51   0.000     4.358533    8.113726
          cc |    .5617678   .6935996     0.81   0.418    -.7976624    1.921198
       _cons |   -53.26092   11.33571    -4.70   0.000     -75.4785   -31.04334
-------------+----------------------------------------------------------------
     sigma_u |   8.680007
     sigma_e |  10.464624
         rho |  .40758543   (fraction of variance due to u_i)
------------------------------------------------------------------------------

. est store re

. hausman fe re

                 ---- Coefficients ----
              |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
              |       fe           re         Difference          S.E.
--------------+----------------------------------------------------------------
          ace |    2.187781     2.377194      -.1894128        .7728695
          acm |    1.290198     2.468495      -1.178297        1.203589
           cs |    7.467178     6.236129       1.231049        .8127246
           cc |   -.3561719     .5617678      -.9179396        .9947753
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =          3.10
                Prob>chi2 =        0.5419
```



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```
. xtreg aq1 ace acm cs cc, robust re

Random-effects GLS regression                   Number of obs      =       165
Group variable: firm                            Number of groups   =        15

R-sq:  within  = 0.2161                         Obs per group: min =        11
       between = 0.6599                                        avg =      11.0
       overall = 0.4805                                        max =        11

                                                Wald chi2(4)       =     27.29
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000

                                  (Std. Err. adjusted for 15 clusters in firm)
------------------------------------------------------------------------------
             |               Robust
         aq1 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         ace |    2.377194   2.769122     0.86   0.391    -3.050185    7.804572
         acm |    2.468495   2.042714     1.21   0.227    -1.535152    6.472141
          cs |    6.236129   2.150592     2.90   0.004     2.021046    10.45121
          cc |    .5617678   .6268561     0.90   0.370    -.6668476    1.790383
       _cons |   -53.26092   22.90991    -2.32   0.020    -98.16352   -8.358322
-------------+----------------------------------------------------------------
     sigma_u |    8.680007
     sigma_e |   10.464624
         rho |    .40758543   (fraction of variance due to u_i)
------------------------------------------------------------------------------

. xtreg aq2 ace acm cs cc, fe

Fixed-effects (within) regression               Number of obs      =       165
Group variable: firm                            Number of groups   =        15

R-sq:  within  = 0.1217                         Obs per group: min =        11
       between = 0.1775                                        avg =      11.0
       overall = 0.0048                                        max =        11

                                                F(4,146)           =      5.06
corr(u_i, Xb)  = -0.9060                        Prob > F           =    0.0008

------------------------------------------------------------------------------
         aq2 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         ace |   -.3558221   .2292144    -1.55   0.123    -.8088291    .0971848
         acm |    -.128059   .1103465    -1.16   0.248    -.3461418    .0900239
          cs |    .2315311   .0538575     4.30   0.000       .12509    .3379721
          cc |   -.0813544   .0519896    -1.56   0.120    -.1841037    .0213949
       _cons |   -.5532148   .6022761    -0.92   0.360    -1.743521    .6370911
-------------+----------------------------------------------------------------
     sigma_u |    .42144183
     sigma_e |    .44862543
         rho |    .46878737   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(14, 146) =     1.59                 Prob > F = 0.0881

. est store fe

. xtreg aq2 ace acm cs cc, re

Random-effects GLS regression                   Number of obs      =       165
Group variable: firm                            Number of groups   =        15

R-sq:  within  = 0.0244                         Obs per group: min =        11
       between = 0.0003                                        avg =      11.0
       overall = 0.0169                                        max =        11

                                                Wald chi2(4)       =      2.75
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.6007

------------------------------------------------------------------------------
         aq2 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         ace |    -.315802   .2240342    -1.41   0.159    -.7549009     .123297
         acm |   -.0372856   .0639519    -0.58   0.560    -.1626291    .0880579
          cs |    .0168125   .0208614     0.81   0.420    -.0240751    .0577001
          cc |   -.0058401   .0128733    -0.45   0.650    -.0310712    .0193911
       _cons |    .8824349   .2960646     2.98   0.003      .302159    1.462711
-------------+----------------------------------------------------------------
     sigma_u |           0
     sigma_e |   .44862543
         rho |           0   (fraction of variance due to u_i)
------------------------------------------------------------------------------

. est store re
```



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```
. hausman fe re

                 ---- Coefficients ----
                 (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
                  fe           re         Difference          S.E.
-------------------------------------------------------------------------------
         ace    -.3558221     -.315802       -.0400202        .0484555
         acm     -.128059    -.0372856       -.0907734         .089925
          cs     .2315311     .0168125        .2147186        .0496531
          cc    -.0813544    -.0058401       -.0755143        .0503706
-------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       20.08
                Prob>chi2 =      0.0005


. xtreg aq1 ace acm cs cc, robust fe

Fixed-effects (within) regression               Number of obs      =       165
Group variable: firm                            Number of groups   =        15

R-sq:  within  = 0.2207                         Obs per group: min =        11
       between = 0.5805                                        avg =      11.0
       overall = 0.4341                                        max =        11

                                                F(4,14)            =      3.71
corr(u_i, Xb)  = -0.3045                        Prob > F           =    0.0291

                                  (Std. Err. adjusted for 15 clusters in firm)
------------------------------------------------------------------------------
             |               Robust
         aq1 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         ace |   2.187781   2.824642     0.77   0.451    -3.870475    8.246036
         acm |   1.290198   1.274868     1.01   0.329    -1.444121    4.024517
          cs |   7.467178   3.208391     2.33   0.035     .5858648    14.34849
          cc |  -.3561719   2.898209    -0.12   0.904    -6.572211    5.859867
       _cons |  -57.38449   26.54741    -2.16   0.048     -114.323   -.4459453
-------------+----------------------------------------------------------------
     sigma_u |  9.7699848
     sigma_e |  10.464624
         rho |  .46571116   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```



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