Minerals companies attributes and corporate governance

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Abstract

This paper analyses the relationship between the *attributes* of minerals companies and corporate governance in South Africa. This is achieved by augmenting and comparing corporate governance ratings of companies in the minerals sector to that of the companies in the other sectors of the economy. The results show that autonomous corporate governance as well as the measures of transparency, namely required disclosure and additional disclosure, of the sampled companies have a statistically significant positive relationship with corporate governance. The results have also shown that the companies' attributes that include economic activity, market value, market performance and financial performance do not have a statistically significant relationship with corporate governance. The paper, nevertheless, recommends continued encouragement of good corporate governance to all companies, including companies in the minerals sector, given the devastating consequences of the recently experienced corporate scandals.

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Introduction

Corporate governance embraces the rights and equitable treatment of shareholders and other stakeholders of the business, integrity and ethical behavior as well as disclosure and transparency of companies, according to the Organisation Economic Cooperation and Development (OECD) (2015). Corporate scandals, which can occur on evidence of unethical behaviour, negligence or interference by third parties, have adversely impacted many companies, according to the Conmy (2022) and Corporate Finance Institute (CFI) (2022). Corporate scandals in South Africa related to inadequate governance and accountability structures involved companies such as Steinhoff, Venda Building Society (VBS) bank, Johannesburg Consolidated Investments (JCI) and Gupta family linked companies that include Oakbay Resources and Energy and Trillian Capital Partners, among others. Worldwide, corporate scandals involving Enron's accounting fraud in 2001 resulted in one of the world's largest bankruptcies, while the risky business practices at Lehman Brothers contributed to the Global financial crisis and the sovereign debt crisis.

The agency theory of corporate governance is used to understand the relationship between the Minerals companies' attributes and corporate governance. Significant contributions to the agency problem include Coase (1937), Jensen and Meckling (1976) as well as Fama and Jensen (1983b) and Fama and Jensen (1983a) and Jensen (1986). According to the agency theory of corporate governance, the agent represents the principal, inspired by the incentive contracts, which can include share ownership, stock options or a threat of dismissal, as contend Jensen and Meckling (1976) and Fama (1980). Concerns regarding governance follow from the potential for conflicts of interests that are a consequence of the misalignment of preferences between the shareholders and upper management, also called the principal–agent problems, and the misalignment of preferences among shareholders, also known as the principal–principal problems. Other stakeholder relations may also be affected and these are coordinated through corporate governance hence corporate governance balances the interests of the stakeholders, as contends Solomon (2020). Phillips (2003) discusses an alternative to the agency theory, namely, the stakeholder theory.

Despite the growing interest in sustainable corporate practices and companies' specific attributes, there is neither a consensus on the nature of the relationship between these two phenomena nor how

this relationship manifests across institutional contexts. The literature on corporate governance in South Africa includes Ntim et al. (2012) and Ntim et al. (2013), Harvey Pamburai et al. (2015), Ioannou and Serafeim (2017) and Johnson et al. (2019), among others. The literature on corporate governance worldwide includes Kyere and Ausloos (2021), Chan et al. (2014), Stuebs and Sun (2015) Liu and Zhang (2017), Dong et al. (2017) as well as Herbert and Agwor (2021) for the United States, United Kingdom, China, Australia and others. Cross country studies include Bruno and Claessens (2010) for the United States, Canada, Europe, East Asia and the Pacific as well as Adel et al. (2019) in the European Union. A stylised fact, based on existing literature, is thus, the existence of no discernible relationship between corporate governance and the companies' specific characteristics that include market and financial performance.

This paper analyses the relationship between *attributes* of minerals companies and corporate governance in South Africa. This is achieved by comparing the corporate governance rating of companies in the minerals sector to that of the companies in the other sectors of the economy. A sample of companies in the minerals sector is, thus, augmented with a sample of companies in the other sectors of the economy. The relationship between corporate governance of this population of companies is then analysed against a set of attributes that comprise the sampled companies' economic activity, market value, market performance, financial performance and transparency measures using an Analysis of Covariance (ANCOVA). According to Chen (2023), good corporate governance, that ensures that companies are run in a manner that is transparent, accountable and ethical, among others, leads to sustainable business success that can benefit all stakeholders, while poor governance can lead to devastating corporate scandals and insolvencies, with devastating consequences to, inter alia, management, shareholders and customers.

The paper is organised as follows. The next section outlines the methodology and presents the data, then is the discussion of the empirical results. Last is the conclusion with recommendations.

Methodology and data

Analysis of Covariance (ANCOVA) is used to study the relationship between the attributes of minerals companies and corporate governance. ANCOVA (Analysis of Covariance) is the econometric methodology that analyses the relationship between a continuous dependent variable and one or more categorical independent variables while adjusting for the effects of one or more covariates. Analysis of Covariance (ANCOVA) can be considered as a combination of ANOVA (Analysis of Variance) and regression analysis, given that it facilitates testing for difference in mean of a variable while controlling for the effects of the other variables. ANOVA (Analysis of Variance) assesses the impact of one or more independent categorical variables on a single, continuous dependent variable. ANOVA (Analysis of Variance) is thus a reduced form version of ANCOVA (Analysis of Covariance), which introduces covariates to adjust the model. A detailed discussion on Analysis of Variance (ANOVA) as well as Analysis of Covariance (ANCOVA) regression models can be found in Gujarati and Porter (2009).

The following generalised Analysis of Covariance (ANCOVA) model is specified

$$Y_i = \alpha + \beta_{Xi} \sum_{j=1}^{n} X_{ij} + \beta_{Di} \sum_{j=1}^{n} D_{ij} + \epsilon_i \qquad (1)$$

where Y_i is a vector of observations of a continuous dependent variable, $\sum_{j=1}^{n} X_{ij}$ is a matrix of independent continuous variables and $\sum_{j=1}^{n} D_{ij}$ is a matrix of independent categorical variables. α is the intercept term, β_{Xi} and β_{Di} are the regression coefficients associated with independent continuous and categorical variables, respectively. The subscript i are vectors that describe the observations of dependent and independent variables, model coefficients and the error term, while j are matrices of independent continuous and categorical variables. ϵ_i is the Independent and Identically Distributed (IID), or White noise, error term. The Analysis of Covariance (ANCOVA) model, thus, expresses the dependent, or response, variable as a function of continuous and categorical independent, or explanatory, variables.

The dependent continuous variable Y_i, denoted Governance, measures corporate governance of the sampled companies. The independent continuous variables $\sum_{i=1}^{n} X_{ij}$ are the sampled companies' measures of economic activity, market value, market performance, financial performance and transparency. Market value measure , denoted Market CAP, is market capitalisation of the sampled companies. Market performance measure, denoted Shares TTM, is the share price of the sampled companies trailing 12 months (TTM), or over a period of one year. Financial performance measures, denoted ROE and ROA, are return on equity and return on assets of the sampled companies, respectively. Transparency measures, denoted Disclosure REQ and Disclosure ADD, are required and additional disclosure rates, respectively. The categorical variables $\sum_{j=1}^{n} D_{ij}$, also known as discrete or dummy variables, are the

sampled companies' measure the economic activity. Economic activity measure, denoted Sector DM, distinguishes between the minerals companies and companies in the other sectors of the economy.

The data on the measures of corporate governance and transparency was sourced from Standards & Poors Global's Corporate Sustainability Assessment (CSA) database. The data on the measures of companies economic activity, market value, market performance and financial performance was sourced from Yahoo Finance's Financial Data & Stock Exchanges Performance Dashboard. The data was sourced during the month of April, 2024. The selected variables on the companies attributes are depicted in Figure 1. All the 42 sampled companies are listed on the Johannesburg Securities Exchange (JSE). 16 of the sampled companies are in the minerals sector, while 26 of the sampled companies are in the other economic sectors, while most of the companies are also a part of the Johannesburg Securities Exchange (JSE) top 40 capitalisation weighted index. The minimum condition for inclusion of companies in the sample was that they have comprehensive Corporate Social Assessment (CSA) information as well as detailed financial information on both Standards & Poors Global's Corporate Sustainability Assessment (CSA) database and Yahoo Finance's Financial Data & Stock Exchanges Performance Dashboard, respectively.
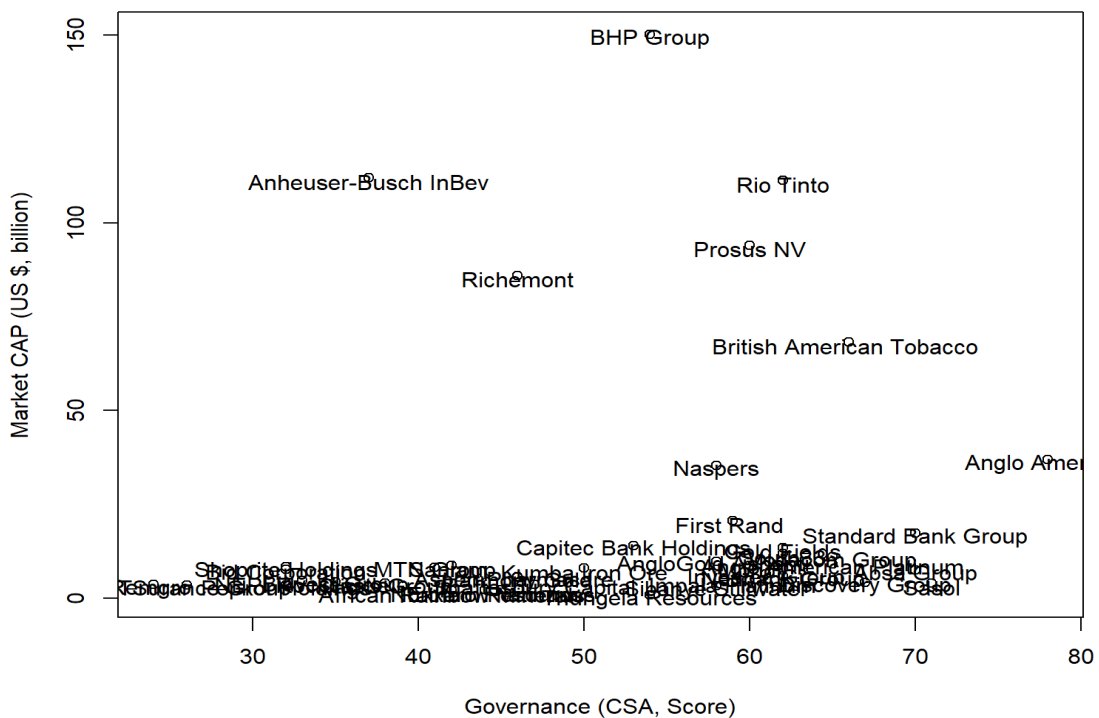
Notes: Data is sourced from Standards & Poors Global and Yahoo Finance. Governance (CSA, Score) is corporate governance Corporate Sustainability Assessment (CSA) Scores of the sampled companies. Market Cap (US $, billion) is the sampled companies market capitalisation in billion U.S. dollars.

Figure 1: Plots of selected variables

Corporate governance is the sampled companies Corporate Sustainability Assessment (CSA) Scores encompassing Business ethics, board diversity and shareholder engagement, risk management as well as sustainable finance and reporting etc. Economic activity captures the companies economic sector or industry and is assigned the value of 1 for companies in the mining industry and 0 otherwise. Market capitalisation is the share price of companies multiplied by the number of shares outstanding, or market value of outstanding shares. Share price is the share price of companies trailing 12 months (TTM), or 12 consecutive months of Share price performance. Return on equity is the companies annual return, or net income, divided by the value of total shareholders' equity. Return on assets is the companies profitability, or net income, divided by the total assets. Required disclose is the information that is required to be included in the companies financial statements. Additional disclose is the voluntary information that is neither required nor mandatory, but may be included in financial statements to provide more details.

Companies in the minerals sector include those that produce gold, coal, iron ore, platinum group metals, chrome, copper, nickel, aluminium and diamonds etc. Companies in the other sectors of the economy, or the economic sectors other than mining, include those in financial services, retailing, agri-

culture, communications, pharmaceuticals, construction, property, transport and distribution etc. The independent variable, Sector DM, was transformed to a nominal scale, also known as indicator, binary, dichotomous, discrete, categorical or dummy, variable to facilitate the Analysis of Variance (ANCOVA) estimation. Dummy variables usually take a binary value, 0 or 1, to indicate the absence or presence of some categorical effect that may be expected to shift the outcome. Sector DM, which measures the company's economic activity, or industry, was assigned a value of 1 for companies in the mining industry, or for companies in the sectors of the economy other than mining and quarrying, and 0 otherwise.

The descriptive statistics of the variables are presented in Table 1. The correlation coefficients, which measure the strength and direction of the linear association between two variables, show a weak positive relationship between the dependent variable, corporate governance, and the companies' measures of economic activity and market value that comprise Sector DM and Market CAP, respectively. The results further show a weak negative correlation between corporate governance and the companies' measures of market performance and financial performance that comprise Shares TTM as well as ROE and ROA, respectively. The results finally show a strong positive correlation between corporate governance and the companies' transparency measures that comprise Disclosure REQ and Disclosure ADD, respectively. The correlation coefficients of required disclosure and additional disclosure are 0.87648 and 0.76306, respectively. This implies a strong positive linear relationship between corporate governance and the companies' measures of transparency, while the opposite is true for the rest of the other variables.

	Corr	Max	Min	Mean	Std dev
Governance	1.00000	78.0000	24.0000	51.7143	13.5849
Sector DM	0.30162	1.00000	0.00000	0.38095	0.49151
Market CAP	0.13928	150.220	0.82627	22.2347	35.8304
Shares TTM	-0.23678	0.83390	-0.37210	0.14319	0.24086
ROE	-0.12916	0.48850	-0.52490	0.13293	0.16450
ROA	-0.22475	0.27640	-0.12640	0.06014	0.06122
Disclosure REQ	0.87648	99.0000	44.0000	80.2381	14.7381
Disclosure ADD	0.76306	100.000	41.0000	74.1905	19.4613

Notes: Data is sourced from Standards & Poors Global and Yahoo Finance. Corr is the correlation coefficient, or the degree of association between Governance and all the variables. Min and Max are the maximum and minimum values of the variables, respectively. Mean is the average value of the variables and Std dev is the standard deviation.

Table 1: Descriptive statistics

The descriptive statistics further show that the dependent variable, Governance, has a mean value of 51.7143, as well as the maximum and minimum values of 78.0000 and 24.0000, respectively. The Standards & Poors Global's Corporate Sustainability Assessment (CSA) score, or rating, is between 0 and 100 for least performing to high preforming companies, respectively. This means that, on average, corporate governance rating of the sampled companies is about the middle point of the Corporate Sustainability Assessment (CSA) rating, while the best and worst corporate governance scores range between the first and third quartiles of the Corporate Sustainability Assessment (CSA) rating. Sector DM, which measures the companies' economic activity, has a maximum value of 1.00000 and a minimum value of 0.00000 given that it is a categorical, or dummy, variable that takes a binary value, 0 or 1, to indicate the presence or absence of categorical effect for the companies in the minerals sector and those in the other sectors of the economy. The mean value of Sector DM is 0.38095, so that just over a third of the sampled companies are in the minerals industry, while the rest of the companies are in the other sectors of the economy.

Market CAP, which measures market capitalisation of the sampled companies, ranges between 0.82627 billion U.S. dollars, for the smallest company, and 150.220 billion U.S. dollars, for the biggest company, while the mean and standard deviation of the companies' market capitalisation are 22.2347 and 35.8304 billion U.S. dollars, respectively. Disclosure REQ and Disclosure ADD, which are transparency measures, range between 99.0000 and 44.0000 as well as 100.000 and 41.0000, respectively, while their mean vales of the sampled companies are 80.2381 and 74.1905, hence the required disclosure is marginally higher compared to additional disclosure. Shares TTM, which is the share price trailing 12 months (TTM), or over a period of one year, shows the average share price growth of 0.14319 for the sampled companies. ROE and ROA, which are return on equity and return on assets, respectively, were 0.13293 and 0.06014, on average for companies in the minerals sector and that of the companies in the other sectors of the

economy. As discussed, out of the 42 sampled companies, 16 companies are from the minerals sector.

Empirical results

The **Analysis of Covariance (ANCOVA)** model was estimated to capture the relationships between the minerals companies attributes and corporate governance, as discussed. The empirical results of the ANCOVA (Analysis of Covariance) model are presented in Table 2. The dependent variable is corporate governance, while the independent variables are the companies' attributes that include economic activity, market value, market performance, financial performance and transparency. The model statistics show that Residual Standard Error (RSE), or the deviation between the regression function and the data set, is 6.20529 on 34 Degrees of Freedom (DF). The coefficient of determination, which measures the goodness of fit, or the predictive ability of the independent variables, shows that Multiple R Squared is 0.82698, while the Adjusted R Squared is 0.79135. This means that 82.7 percent of the variability in the dependent variable, corporate governance, is explained by the companies' attributes that include the companies' economic activity, market value, market performance, financial performance as well as transparency.

The F statistic is 23.21514 on 7 and 34 Degrees of Freedom (DF) with a p value of 0.0000 hence the null hypothesis of the joint insignificance of the regression coefficients is rejected. The regression coefficients of the independent continuous and categorical variables, thus, sufficiently explain the variability in the dependent variable, corporate governance. The variables coefficients statistical significance codes, or p values, are $\Pr(> |t|)$ <0.01 '***', <0.05 '**', <0.10 '*'. The results show that the intercept term and the independent continuous variables, Disclosure REQ and Disclosure ADD, are statistically significant at 5 percent level of significance, while the rest of the coefficients, including Sector DM, are statistical insignificant. The other regression diagnostics, which assess the validity and reliability of the linear regression model's assumptions, show that Studentised Breusch and Pagan (1979) test statistic is 3.95465 with 7 Degrees of Freedom (DF) and a p value of 0.78499. The null hypothesis of homoscedasticity is thus accepted, and as a result, the model residuals are equally spread at 5 percent level of significance.

Goldfeld and Quandt (1965) test statistic is 1.72462 with 13 and 13 Degrees of Freedom (DF) for the first and second models and a p value of 0.16901. The null hypothesis of homoscedastic error terms is accepted, and hence, the residuals are equally spread, as with Studentised Breusch and Pagan (1979) test. Variance Inflation Factors (VIFs), available on request, show the minimum VIF of 1.16846, the mean of 2.01332 and the maximum VIF of 2.73820 for the independent variables in the regression model, hence the conclusion is that there is no severe multicollinearity, or correlation between the predictor variables. Shapiro and Wilk (1965) test statistic is 0.97219 with a p value of 0.39002. Therefore, the null hypothesis of the normal distribution of errors is accepted. Ramsey (1969) RESET test statistic is 0.43732 with 2 and 32 Degrees of Freedom (DF) for the restricted and unrestricted model and a p value of 0.64957. The null hypothesis of no model misspecification is accepted, and hence, the estimated regression model is correctly specified. Examination of Residuals versus Fitted plot and Quantile-Quantile (Q-Q) plot, depicted in Figure 2, shows equal error variances, no outliers and the normal distribution of residuals.

As discussed, the results show that the intercept term and the independent variables, Disclosure REQ and Disclosure ADD, are statistically significant at 5 percent level of significance, while the rest of the coefficients, including Sector DM, are statistical insignificant. Autonomous corporate governance, measured by the intercept term, is -13.4017 for the sampled companies. This is the corporate governance rating of an average sampled company, holding the independent variables constant hence, in practical terms, the intercept does not make economic sense based on the methodology and the context of the data being analysed. Disclosure REQ coefficient shows that the corporate governance rating increases by 0.87648 percent when required disclosure of the selected set of companies increases by 1 percent. Disclosure ADD coefficient shows that the corporate governance rating increases by 0.76306 percent when additional disclosure of the selected set of companies increases by 1 percent. The independent variables that include companies' economic activity, market value, market performance and financial performance are not statistically significant at 5 percent level of significance, as such, there is that there is no meaningful, relationship between these set of companies' attributes and corporate governance.

The empirical results have revealed an interesting relationship between corporate governance and the companies' attributes that include economic activity, market value, market performance, financial performance and transparency. The results have shown that autonomous corporate governance and the measures of transparency, namely required disclosure and additional disclosure, have a statistically significant positive relationship with corporate governance, while the companies' attributes that include economic activity, market value, market performance and financial performance have a statistically insignificant relationship with corporate governance. The results are consistent with the literature as far as

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	Corr	Coeff	Std Error	t value	Pr(> |t|)
Intercept	1.00000	-13.4017	6.39056	-2.09710	0.04350**
Sector DM	0.30162	0.86689	2.66767	0.32496	0.74720
Market CAP	0.13928	0.01146	0.02924	0.39200	0.69751
Shares TTM	-0.23678	2.34478	4.82315	0.48615	0.62998
ROE	-0.12916	11.21782	9.01227	1.24473	0.22174
ROA	-0.22475	-35.8705	24.1069	-1.48797	0.14598
Disclosure REQ	0.87648	0.65399	0.10881	6.01049	0.00000***
Disclosure ADD	0.76306	0.16695	0.07486	2.23029	0.03244**

Significance codes: Pr(> \|t\|) <0.01 '***', <0.05 '**', <0.10 '*'
Residual standard error: 6.20529 on 34 Degrees of Freedom (DF)
Multiple R Squared: 0.82698, Adjusted R Squared: 0.79135
F Statistic: 23.21514 on 7 and 33 DF, p value: $3.26876e^{-11}$

Notes: Data is sourced from Standards & Poors Global and Yahoo Finance. Variables are defined in text. Corr is the correlation coefficient, or the degree of association between Governance and all the variables. Coeff are the regression coefficients. Std Error are the coefficients' standard deviations. t values are individual regression coefficients' t statistics that measure statistical significance. Pr(> \|t\|) is the p value. R Squared is the coefficient of determination. F statistic is the joint, or overall, regression coefficients' statistical significance.

Table 2: Empirical results

the lack of a statistically significant relationship between corporate governance and companies' specific attributes, including economic activity, size, market performance and financial performance, is concerned. As discussed, a stylised fact, which is true in general, but not necessarily in every case, is the existence of no discernible relationship between corporate governance and companies' specific characteristics.

Although the empirical results have shown no statistically significant relationship between corporate governance and the selected set of selected companies' attributes, excluding the companies' transparency measures, comprising required disclosure and additional disclosure, the recommendation is that companies management and government regulators should continue to encourage and endorse of good corporate governance to companies in the minerals sector as well as those in the other sectors of the economy. The recent corporate scandals and the efforts by different institutions, including the Organisation Economic Cooperation and Development (OECD) (2015) Principles of corporate governance, Institute of Directors South Africa (IODSA) (2016) King IV report and the Johannesburg Stock Exchange (JSE) (2024) memorandum of incorporation, are a testament on efforts towards promotion of good corporate governance and will assist companies to avert economic crises as well as guarantee the companies' sustainability.

Conclusion

This paper analysed the relationship between *attributes* of minerals companies and corporate governance in South Africa. This was achieved by augmenting and comparing the corporate governance ratings of companies in the minerals sector to that of the companies in the other sectors of the economy. The results have shown that autonomous corporate governance as well as the measures of transparency, comprising required disclosure and additional disclosure, have a statistically significant positive relationship with corporate governance. The results have also shown no statistically significant difference in corporate governance between companies in the minerals sector and those in the other sectors of the economy. The results have further shown that the companies' attributes that include market value, market performance and financial performance do not have a statistically significant relationship with corporate governance. The results are consistent with the stylised evidence of no discernible, or significant, relationship between corporate governance and the companies' specific characteristics. The paper, nevertheless, recommends continued encouragement and endorsement of good corporate governance to all companies, including those in the minerals industry, given the devastating consequences of the recent corporate scandals.

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Appendix

Appendix 1. Description of the variables

The detailed descriptions of the variables are presented in Table 3 ...

Denotation	Variable	Description
Governance	Corporate Governance	Business ethics, board diversity and shareholder engagement and sustainable finance and reporting etc.
Sector DM	Sector Dummy	Companies economic activity, assigned a value of 1 for companies in the mining industry and 0 otherwise
Market CAP	Market Capitalisation	Share price of companies multiplied by the number of shares outstanding, or market value of outstanding shares
Shares TTM	Share Price	Share price of companies trailing 12 months (TTM), or 12 consecutive months of Share price performance
ROE	Return on Equity	Companies annual return, or net income, divided by the value of total shareholders' equity
ROA	Return on Assets	Companies profitability, or net income, divided by the total assets
Disclosure REQ	Required Disclose	Information that is required to be included in the companies financial statements
Disclosure ADD	Additional Disclose	Information that is not required, but may be included the companies financial statements to provide more details

Notes: Data is sourced from Standards & Poors Global and Yahoo Finance. Governance is corporate governance, Sector DM ia a sector dummy, Market CAP is market capitalisation, Shares TTM is the share price, ROE is return on equity, ROA is return on assets, Disclosure REQ is required disclose and Disclosure ADD is additional disclose.

Table 3: Description of the variables

Appendix 2. Plots of model diagnostics

Selected model diagnostic statistics are depicted in Figure 2 below and they complement model statistics.
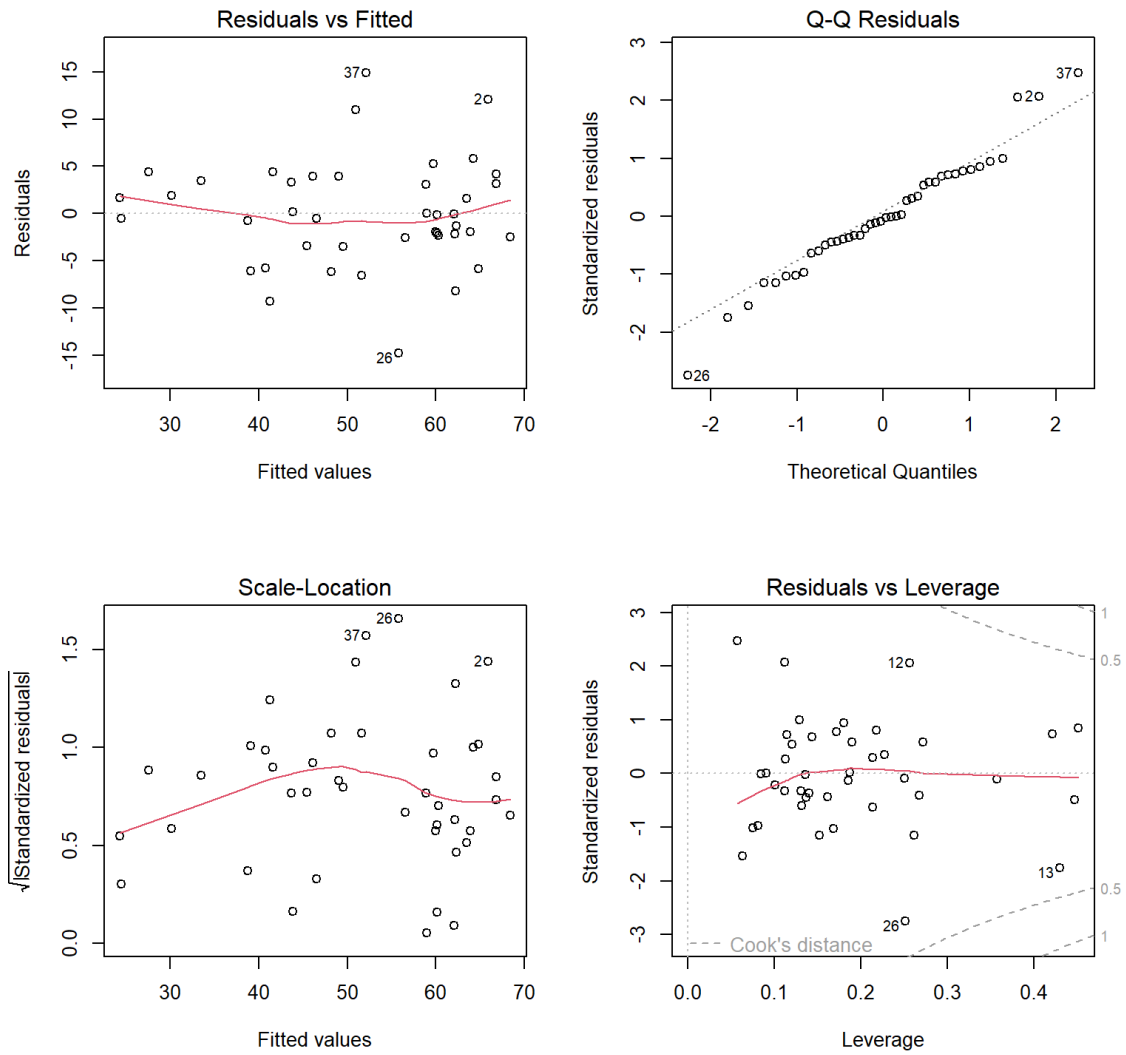
Notes: Data is sourced from Standards & Poors Global and Yahoo Finance. Residuals are the difference between the observed values and the estimated values of the estimated Analysis of Covariance (ANCOVA) model. The model diagnostic statistics assist in detection of non-normality, non-linearity, unequal error variances and outliers in the estimated model.

Figure 2: Plots of diagnostic statistics