Global mineral companies attributes and corporate governance

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Abstract

This paper analyses the relationship between the *attributes* of Global minerals companies and corporate governance. This is achieved by augmenting and comparing the corporate governance ratings of mineral companies in South Africa to that of the mineral companies world wide. The results show that 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 no statistically significant difference in corporate governance between the minerals companies operating in South Africa and those operating in other parts of the world. The results have also 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 paper, nevertheless, recommends continued encouragement of good corporate governance to all companies, including those in the minerals industry, given the devastating consequences of the recently experienced corporate scandals.

JEL Classification: C13, D22, G30, L70
Keywords: Global minerals companies, Corporate governance, Companies attributes

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Introduction

Global corporate environments and structures can vary in substantive ways despite the generally universal business objectives. Different corporate governance models have, thus, been developed in different parts of the world, according to the Organisation Economic Cooperation and Development (OECD) (2015). These models were developed based on, inter alia, the influence of national economic and social specific conditions, as contends Ross (2024). According to Chen (2023) and Byrne (2024), the dominant models in contemporary corporations include the Anglo-Saxon model, the Continental model and the Japanese model. The Anglo-Saxon model is oriented toward the stock market, while the Continental and Japanese models focus on the banking and credit markets, according to Ross (2024). In addition, the Japanese model is the most concentrated and rigid, while the Anglo-Saxon model is the most dispersed and flexible. Glassman (2005), Ungureanu (2012), Chen (2023), survey different models of corporate governance, while Morck (2005) and Naciri (2008) provide the theoretical perspective on corporate governance models.

South Africa pursues a distinctive set of corporate governance practices in the form of the Institute of Directors South Africa (IODSA) (2016) King IV report, which is anchored in the Companies Act, the Financial Markets Act and the Johannesburg Stock Exchange (JSE) (2024) memorandum of incorporation. Corporate governance embraces rights and equitable treatment of shareholders and other stakeholders of 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 involved companies such as Steinhoff, Venda Building Society (VBS) bank, Johannesburg Consolidated Investments (JCI) and Gupta family linked companies, among others, while international corporate scandals include the Enron's accounting fraud and risky business practices at Lehman Brothers that contributed to the recent Global financial crisis and the sovereign debt crisis.

The agency theory of corporate governance is used to understand the relationship between the attributes of minerals companies and corporate governance. Significant contributions to the agency problem include Coase (1937), Jensen and Meckling (1976), Fama and Jensen (1983b), Fama and Jensen (1983a) as well as 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, while cross country studies can be found in Bruno and Claessens (2010) as well as Adel et al. (2019) .

This paper analyses the relationship between the *attributes* of Global minerals companies and corporate governance. This is achieved by comparing the corporate governance ratings of mineral companies in South Africa to that of the mineral companies world wide. A sample of companies in the minerals sector is, thus, augmented with a sample of minerals companies in other parts of the world. The relationship between corporate governance of this population of companies is then analysed against a set of attributes that comprise the sampled companies' geographical location, market value, market performance, financial performance and transparency using Analysis of Covariance (ANCOVA). According to Chen (2023), Ross (2024) and Byrne (2024), 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

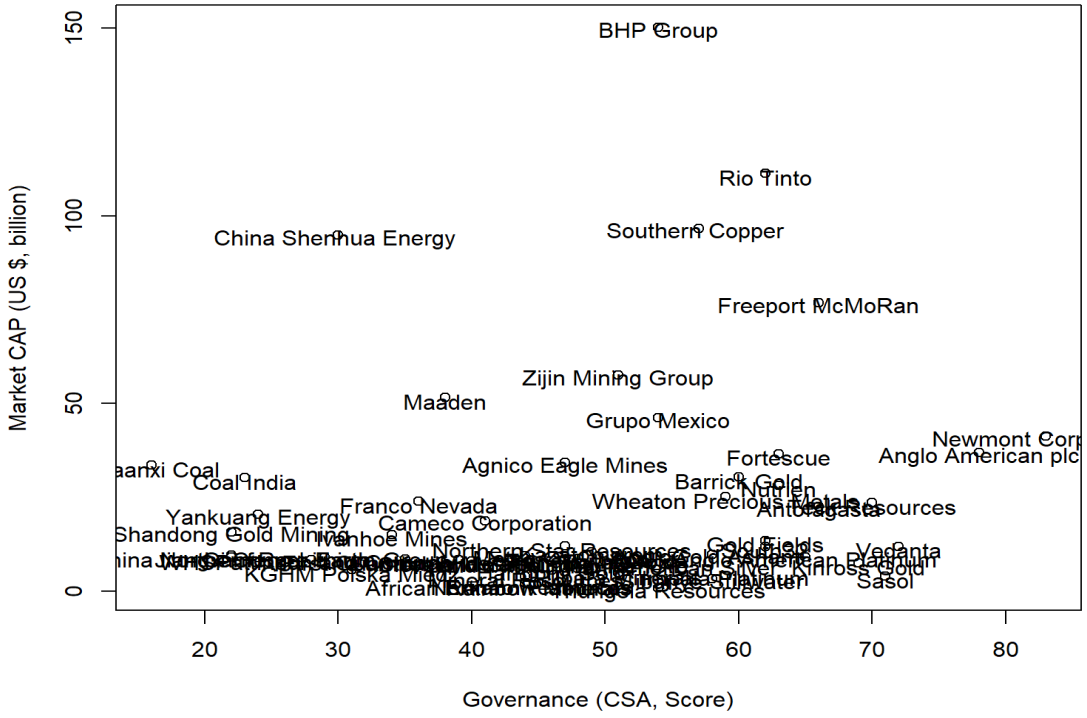
$$Y_i = \alpha + \beta_{Xi} \sum_{j=1}^{n} X_{ij} + \beta_{Di} \sum_{j=1}^{n} D_{ij} + \epsilon_i \tag{1}$$

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 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 of geographical location. Geographical location measure, denoted Country DM, distinguishes between the minerals companies in South Africa and those that operate in other parts of the world.

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 geographical location, market value, market performance and financial performance was sourced from Yahoo Finance's Financial Data & Stock Exchanges Performance Dashboard. The data was accessed during the month of April, 2024. Selected variables on the companies attributes are depicted in Figure 1. All the 57 sampled companies are listed on stock exchanges around the world. 16 of the minerals companies operate in South Africa, while 41 of the sampled companies operate in other parts of the world. Most of the companies in South Africa 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. Geographical location captures the companies location of it's operations and is assigned the value of 1 for companies operating in South Africa 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.

Minerals companies include those that produce gold, coal, iron ore, platinum group metals, copper, chrome, nickel, aluminium and diamonds etc. Companies that operate worldwide, or in other parts of the world other than South Africa, include those in all continents comprising Asia, Africa, North and South America, Europe and Australia. The independent variable, Country 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 shift the outcome. Country DM, which measures the company's geographical location, was assigned a value of 1 for companies operating in South Africa, or companies with operations in countries that include South Africa, 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 geographical location, market value and financial performance that comprise Country DM, Market CAP and ROA, 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 and ROE, 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 0.84048 and 0.78865, respectively. This implies a strong positive linear relationship between corporate governance and the companies' measures of transparency, while the opposite is true for the other variables.

	Corr	Max	Min	Mean	Std dev
Governance	1.00000	83.0000	16.0000	48.8246	15.5427
Country DM	0.32644	1.00000	0.00000	0.28070	0.45334
Market CAP	0.13765	150.220	0.82627	24.0015	29.7487
Shares TTM	-0.10307	1.07750	-0.44190	0.21921	0.32541
ROE	-0.10180	0.52780	-0.52490	0.10165	0.16609
ROA	0.10210	0.27640	-0.12640	0.06437	0.06857
Disclosure REQ	0.84048	99.0000	4.00000	78.2456	19.9582
Disclosure ADD	0.78865	100.000	11.0000	70.4035	24.4554

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 48.8246, as well as the maximum and minimum values of 83.0000 and 16.0000, 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. Country DM, which measures the companies' geographical location, has a maximum value of 1.00000 and a minimum value of 0.00000 given that it is a categorical variable that takes a binary value, 0 or 1, to indicate the presence or absence of categorical effect for the companies that operate in South Africa and companies that operate in other parts of the world. The mean value of Country DM is 0.28070, hence just under a third of the sampled companies operate in South Africa, while the other companies operate elsewhere in the world.

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 24.0015 and 29.7487 billion U.S. dollars, respectively. Disclosure REQ and Disclosure ADD, which are transparency measures, range between 99.0000 and 4.0000 as well as 100.000 and 11.0000, respectively, while their mean vales of the sampled companies are 78.2456 and 70.4035, 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 0.21921 for the sampled companies. ROE and ROA, which are return on equity and return on assets, respectively, were 0.10165 and 0.06437, on average for companies operating in South Africa and those operating in other parts of the world. As discussed, of the 57 sampled minerals companies, 16 companies operations are located in South Africa.

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 geographical location, 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 7.968098 on 49 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 0.7700339, while the Adjusted R Squared is 0.7371815. This means that 77.0 percent of the variability in the dependent variable, corporate governance, is explained by the companies' attributes that include geographical location, market value, market performance, financial performance as well as transparency.

The F statistic is 23.43926 on 7 and 49 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 further show that 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 Country DM, are statistical insignificant. The other regression diagnostics statistics, which assess the validity and reliability of the linear regression model's assumptions, show that the Studentised Breusch and Pagan (1979) test statistic is 8.6648011 with 7 Degrees of Freedom (DF) and a p value of 0.277626. The null hypothesis of no heteroscedasticity is accepted, and as a result, the model residuals are equally spread at 5 percent level of significance.

Goldfeld and Quandt (1965) test statistic is 1.6099976 with 21 and 20 Degrees of Freedom (DF) for the first and second models and a p value of 0.1458947. 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 1.097093, the mean of 2.817384 and the maximum VIF of 3.500883 for the independent variables in the regression model, hence the conclusion is that there is no severe correlation between the predictor variables. Shapiro and Wilk (1965) test statistic is 0.97911719 with a p value of 0.4268847. Therefore, the null hypothesis of the normal distribution of errors is accepted. Ramsey (1969) RESET test statistic is 5.8527438 with 2 and 47 Degrees of Freedom (DF) for the restricted and unrestricted model and a p value of 0.537465. 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 independent variables, Disclosure REQ and Disclosure ADD, are statistically significant at 5 percent level of significance, while the rest of the coefficients, including Country DM, are statistical insignificant. Autonomous corporate governance, measured by the intercept term, is -0.21406 for the sampled companies. This is the corporate governance rating of an average sampled company, holding the independent variables constant, and as a result, in practical terms, the intercept term, in this instance, 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 0.40374 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 0.23399 percent when additional disclosure of the selected set of companies increases by 1 percent. The independent variables that include the companies' geographical location, market value, market performance and financial performance are not statistically significant at 5 percent level of significance, and hence, there is no meaningful relationship between these set of the companies' attributes and corporate governance.

The empirical results have revealed an interesting relationship between corporate governance and the companies' attributes that include geographical location, 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

	Corr	Coeff	Std Error	t value	Pr(> |t|)
Intercept	1.00000	-0.21406	4.55215	-0.04702	0.96269
Country DM	0.32644	2.08132	2.64523	0.78682	0.43518
Market CAP	0.13765	-0.01234	0.03749	-0.32925	0.74337
Shares TTM	-0.10307	0.05891	4.01629	0.01467	0.98836
ROE	-0.10180	-12.6679	15.0361	-0.84249	0.40361
ROA	0.10210	30.4644	34.5674	0.88130	0.38246
Disclosure REQ	0.84048	0.40374	0.08895	4.53872	0.00004***
Disclosure ADD	0.78865	0.23399	0.07038	3.32464	0.00168***

Significance codes: Pr(> |t|) <0.01 '***', <0.05 '**', <0.10 '*'
Residual standard error: 7.968098 on 49 Degrees of Freedom (DF)
Multiple R Squared: 0.7700339, Adjusted R Squared: 0.7371815
F Statistic: 23.43926 on 7 and 49 DF, p value: $1.305225e^{-13}$

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

significant positive relationship with corporate governance, while the companies' attributes that include geographical location, 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 the lack of a statistically significant relationship between corporate governance and companies' specific attributes, including geographical location, market value, 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 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 the 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 Global minerals companies and corporate governance. This was achieved by augmenting and comparing the corporate governance ratings of the minerals companies in South Africa to that of the minerals companies in the other parts of the world. The results have shown that 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 the minerals companies operating in South Africa and those operating in other parts of the world. 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 for the sampled companies. 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 below.

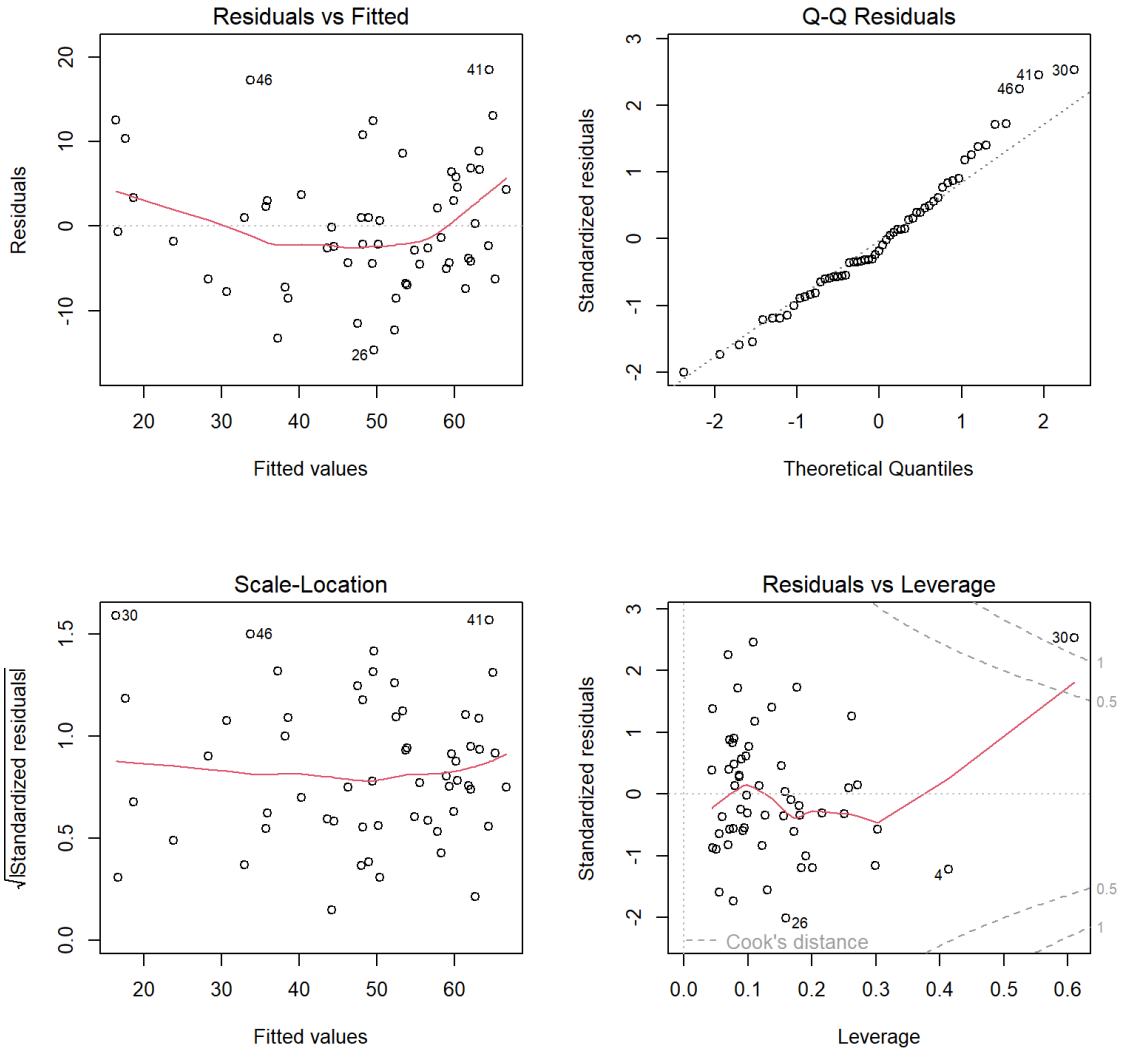
Denotation	Variable	Description
Governance	Corporate Governance	Business ethics, board diversity and shareholder engagement and sustainable finance and reporting etc.
Country DM	Country Dummy	Companies location of operations, assigned a value of 1 for companies operating in South Africa and 0 otherwise
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, **Country DM** is a geographical location 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

The selected model diagnostic statistics are depicted in Figure 2 below and 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