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ESG investing and the performance of JSE-listed real estate firms: a system GMM approach

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Abstract

Purpose – This study aims to examine environmental, social and governance (ESG) investing and its impact on the performance of Johannesburg Stock Exchange (JSE)-listed real estate firms.

Design/methodology/approach – The study applies the two-step generalised method of moments framework to estimate the parameters of our regression model. Data on ESG scores and financial performance were collected from Bloomberg and Refinitiv Eikon, respectively, while data on macroeconomic factors were collected from the World Bank DataBank. The data collected were for the period of 2013–2022.

Findings – The study reveals that composite ESG has a negative and significant impact on firm value as measured by Tobin's Q. Social sustainability, on the other hand, had a significant and positive impact on both the return on equity and Tobin's Q. Governance had a positive impact on return on assets, whereas environmental sustainability did not have a significant impact on either firm profitability or firm value.

Practical implications – The results reveal that the sustainable scores of real estate firms have a positive association with the performance of listed real estate firms in South Africa and therefore, these firms should continue to pay greater attention to ESG investment during their investment decision-making.

Originality/value – To the best of the authors' knowledge, this study is the first of its kind to examine ESG investment and the performance of JSE-listed real estate firms using ESG data from Bloomberg. The study is expected to increase ESG investment understanding and interest in the property sector of South Africa.

Keywords ESG investment, Real estate firms, Financial performance, Firm value, South Africa, Sustainable investment, System GMM, Emerging markets

Paper type Research Paper

1. Introduction

The Environmental, Social and Governance (ESG) framework has been gradually used and considered by firms when scrutinising investments and has been found to consistently predict their financial performance (Townsend, 2020). As a result, many firms face pressure from stakeholders to publish their stand regarding ESG issues, concerns and their implementation (Andrew, 2020). According to Andrew (2020) and Geiger *et al*. (2013), environmental sustainability refers to how firms minimise the ecological effects of the resources they consume. Social sustainability, on the other hand, has to do with how firms uplift the social well-being of their employees through employment justness, health and safety concerns, reasonable labour processes and diversity as well as policies that impact society as a whole (Andrew, 2020; Mutezo, 2014). Corporate governance or governance sustainability involves

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the instruments, processes and practices of directing and controlling firms (Ng *et al*., 2021; Saleh *et al*., 2017).

Nowadays, responsible investors pay more attention to firms that employ the ESG sustainability framework as they aim for investments to offer wider values and solutions to the challenges that communities face (Talan and Sharma (2019). Capelle-Blancard and Monjon (2012) note that investors are increasingly becoming aware of the broader impact of their investments and so prefer investing in firms that pay serious attention to environmental issues and concerns, labour equity and community to those that do not or worse still those that invest in "sin stocks" such as alcohol, tobacco, gambling and weapons.

The real estate industry, just like other industries, has gradually employed the ESG sustainable investment framework and actively employs this in its decision-making processes. Tarmuji *et al*. (2016) argue that though there is an extensive body of knowledge on this matter, most studies have focused on developed economies (Cajias and Piazolo, 2013; EPRA, 2020; Erol *et al*., 2021; Feng and Wu, 2021; Geiger *et al*., 2016) with much fewer studies focusing on developing and emerging economies (Johnson *et al*., 2019; Zahid *et al*., 2020). In addition, most of the studies in the real estate sector specifically focus on Real Estate Investment Trusts (REITs) (Brounen and Marcato, 2018; Chacon *et al*., 2024; Feng and Wu, 2021; Garcia *et al*., 2019; Geiger *et al*., 2013) while fewer studies include listed non-REITs (Brounen *et al*., 2021; Cajias *et al*., 2014; EPRA, 2020). This study fills this gap by examining the impact of ESG and its individual pillars on the financial performance and market value of real estate firms in general and within an emerging market context. This study is aimed at encouraging emerging market real estate investors and firms to continuously incorporate sustainable investment initiatives as sustainability continues to become a key investment criterion in many industries.

Firms on the Johannesburg Stock Exchange (JSE) are mandated to publish their annual ESG reports to disclose the sustainability issues and concerns in their investments and how they have dealt with these (Johannesburg Stock Exchange, 2023). Notwithstanding the publication of these reports, there are hardly any published empirical findings on how these ESG initiatives impact the performance of these firms. Studies on sustainable investment in South Africa have been mostly qualitative, with most based on surveys and interviews (Giamporcaro, 2011; Giamporcaro and Pretorius, 2012) and literature reviews with thematic content analysis (Ametefe *et al*., 2023; Giamporcaro and Viviers, 2014). Very few studies have been quantitative (Andrew, 2020; Johnson *et al*., 2019; Moloi *et al*., 2024). We, therefore, seek to quantitatively analyse the relationship between ESG sustainability and the performance of real estate firms listed on the JSE. This work is different from Moloi *et al*. (2024) who developed an index of corporate governance from the King III and IV reports and went on to apply ordinary least squares (OLS) regression analysis to investigate the effect of both corporate governance and corporate social responsibility (CSR) on the performance of South African REITs (SA REITs). Our study also differs from Cheruiyot *et al*. (2023) who used publicly available data on green buildings as well as data from the Green Building Council South Africa to investigate the effect of green property portfolios on SA REITs' performance. Our study uses ESG scores from Bloomberg and a two-stage system generalised method of moments (GMM) approach. South Africa has the most advanced stock exchange in Sub-Saharan Africa and since investors have pressured listed firms to publish their sustainability reports, there is a need to investigate how these sustainability initiatives have impacted firm performance.

The paper is organised as follows: Section 1 provides an introduction, Section 2 reviews related literature on the subject matter. Section 3 details the research methodology employed, Section 4 states the results of the study and their interpretation. Section 5 discusses the results, and Section 6 summarises the study and concludes.

2. Literature review

In this section, we review the literature on sustainable investment and how it impacts firm performance.

2.1 Composite ESG and firm performance

Studies on composite ESG scores and firm performance have produced mixed results. Employing country-level data between 2013 and 2017, Ng *et al*. (2020) found a significant positive association between financial growth, financial markets and ESG performance of firms in Asia. This result implies that the growth of financial markets and institutions in Asia influences higher ESG scores which attracts financiers and investors to invest in ESG projects. The study employed pooled OLS, fixed effects regression, two-stage least squares and the GMM to ascertain this positive significance. Feng and Wu (2021) used the Global Real Estate Sustainability Benchmark ESG public disclosure data for REITs around the world from 2019 to 2020 to ascertain the association between ESG disclosure and the value of REIT firms. The study found a positive association, which implies that investors value ESG disclosure. This was evident during the COVID-19 period, where the results revealed that firms with better ESG disclosures had higher market values.

In the Nordic financial industry, Rahi *et al*. (2021) observed a negative impact of composite ESG on the performance of financial sector firms between 2015 and 2019. The study employed both fixed effect regression analysis and the GMM. The authors argue that this negative effect is a result of mandatory sustainability reporting that was introduced in 2017 which could have caused firms to incur a lot of costs in ESG investing (Rahi *et al*., 2021). Similarly, Johnson *et al*. (2019) investigated the link between ESG scores and financial performance measures of listed firms in South Africa. The study found a non-significant association between ESG scores and earnings per share among listed firms in South Africa. This non-significant association could be attributed to the limited ESG disclosures in some industry sectors. Furthermore, Chacon *et al*. (2024) investigated the influence of sustainable investment on the cash flow, valuation and risk of global equity REITs from 2019 to 2021. They found that REITs with higher ESG scores had lower operating cash flows and market values. The study also indicated that REITs with high ESG scores had more volatile returns. The results suggest that firm managers may invest more in ESG initiatives at the expense of shareholders in times of market difficulties. The above literature indicates a gap in ESG investment and performance of firms in Sub-Saharan Africa which this study addresses.

2.2 Environmental sustainability and firm performance

Ahmad *et al*. (2021) found that environmental sustainability had no significant effect on earnings per share and the market value of firms that make up the FTSE350 in the UK between 2002 and 2018. The study employed fixed and random effects regression models in addition to the GMM. Similarly in South Africa, Johnson *et al*. (2019) found a statistically nonsignificant relationship between environmental sustainability and earnings per share firms between 2011 and 2016. They attributed this to the costs of undertaking environmentally sustainable investments, which affect firms' earnings and market value. Furthermore, Masongweni and Simo-Kengne (2024) investigated the impact of ESG on the financial performance of listed firms in South Africa from 2015 to 2020 using fixed and random effects analysis and GMM. It was found that the environmental pillar of sustainability is not significantly related to firm performance. This is because of the poor information disclosure on environmental issues and concerns among some JSE-listed firms as argued by De Villiers and Van Staden (2006) who indicated that firms belonging to industries known for their environmental impacts disclose less of the specific environmental information. On the contrary, Velte (2017) found that the environmental factor is positive and significantly associated with return on assets but not significantly related to Tobin's Q among listed firms in Germany.

Regarding the real estate industry, Bauer *et al*. (2011) argued that most real estate firms just talk about going green but do not walk the talk. According to Eichholtz *et al*. (2012) and Cajias and Piazolo (2013), the industry contributes to 40% of the global carbon emissions. This has drawn the attention of green investment in the industry which incorporates environmental issues and concerns during the investment decision-making process by the investors.

Eichholtz *et al*. (2012) surveyed about 200 property firms globally to investigate their property portfolio's greenness. The study found that the environmental performance of property firms is promising and can be improved. The study also found portfolio greenness to be positively associated with the performance of REITs. This implies that incorporating certified green buildings in REIT portfolios helps to boost operating returns. Similarly, Cheruiyot *et al*. (2023) found portfolio greenness improved REITs' financial performance. Our work is different from Cheruiyot *et al*. (2023) as we use the environmental scores from the Bloomberg ESG database rather than the proportion of a REIT's portfolio that is green. We also use the system GMM technique to determine the impact of environmental as well as the social and governance sustainability metrics of real estate firms on the return on assets, return on equity and Tobin's Q. Furthermore, our study covers all real estate companies, not just those classified as REITs.

2.3 Social sustainability and firm performance

Firms have a responsibility towards not only their investors but also the societies in which they operate (Andrew, 2020; Mutezo, 2014). Studies on the impact of social sustainability on firm performance have, however, produced mixed results. Ahmad *et al*. (2021), for example, found that social sustainability is positive and significantly related to both earnings per share and the market value of UK firms. Similarly, CSR was found to have a positive and significant effect on the value of listed firms in Indonesia (Haryono and Iskandar, 2015) and Korea (Kim *et al*., 2018). Velte (2017) found a positive and significant impact of social sustainability on return on assets but not on Tobin's Q of listed firms in Germany. Among real estate firms, Morri *et al*. (2024) found that social sustainability was not significantly related to the financial performance and value of firms.

In South Africa, Giamporcaro (2011) and Giamporcaro and Pretorius (2012) argue that most firms have demonstrated a commitment to execute socially responsible investments to tackle the socio-economic challenges of apartheid. Apartheid hindered the country's socioeconomic development which resulted in regulatory measures to address the challenges (poverty, HIV/AIDS, unemployment and inequality) that were faced by black people (Johnson *et al*., 2019),. Mutezo (2014) found that socially sustainable investing has a positive and statistically significant impact on earnings per share of firms. The author argued that socially responsible firms reported better financial performance than their counterparts. Similarly, Johnson *et al*. (2019) found that social sustainability has a positive and statistically significant impact on the earnings per share of listed consumer goods firms in South Africa, which implies that firms with higher social sustainability scores generated superior earnings than firms with low social sustainability scores. Furthermore, social sustainability was found to be positive and significantly related to the financial performance of listed firms on the JSE (Masongweni and Simo-Kengne, 2024). According to Kempeneer *et al*. (2021), the social factor of ESG is largely under-conceptualised in the property industry. Socially responsible investment has been argued by Siregar *et al*. (2024) to improve corporate trust and loyalty from customers which improves firm performance. The above literature clearly indicates that no study has been undertaken to examine the effect of social sustainability on the performance of listed real estate firms in South Africa.

2.4 Corporate governance and firm performance

Corporate governance is a structure that directs and controls firms (Malik and Makhdoom, 2016), with an aim of protecting shareholders from self-centred executive directors and managers (Alabede, 2016). Empirical studies have found corporate governance to be positive and significantly related to return on assets but not significantly related to the Tobin's Q of listed firms in Germany (Velte, 2017), positively related to earnings per share but not to the market value of listed firms in UK (Ahmad *et al*., 2021), positively related to the Tobin's Q but not significantly related to the return on assets and return on equity among listed firms in South African (Masongweni and Simo-Kengne, 2024).

Empirical studies on listed real estate firms have centred more on REITs than non-REITs. As stated by Hartzell *et al*. (2008), REITs having stronger governance structures have an impact on their long-term operating performance. Relatedly, Ng *et al*. (2021) found that corporate governance among Hong Kong REITs has a positive and significant impact on their financial performance. Furthermore, Chong *et al*. (2018) found that governance structures among REITs in Asia improved their financial growth. On the contrary, the governance of REITs and non-REITs reduced their value as determined by Tobin's Q (Bauer *et al*., 2010; Sing, 2013), which implies that corporate governance reduces firm value. Similarly, Morri *et al*. (2024) found that corporate governance is negatively related to return on assets but not significantly related to the Tobin's Q of listed European REITs. Furthermore, Moloi and Akinsomi (2020) investigated the relationship between corporate governance and the performance of REITs in South Africa between 2008 and 2017 using the GMM. The study found a nonsignificant effect of the governance structures of REITs on their financial performance. However, Moloi *et al*. (2024) find that corporate governance practices positively influence firm performance. Moloi *et al*. (2024) applied OLS to investigate this relationship. We, on the other hand, use the two-step system GMM to analyse the impact of corporate governance on the performance of the SA-listed real estate. In a nutshell, the literature on the effect of ESG on firm performance both in developed and emerging markets has indicated mixed findings. It is evident that there are still fewer empirical findings on this issue in the property markets of developing countries which could be attributed to the different ESG frameworks, regulations and disclosure in the developed countries, hence this study adds to the empirical evidence, particularly for South Africa's listed real estate sector. To our understanding, this is the first study to tackle the ESG influence on the performance of JSE-listed real estate firms in the country.

2.5 Hypothesis formulation

The review of related literature in the preceding section highlights the mixed findings of studies. Whereas some studies have found a significant positive impact of ESG attributes on firm performance (Cheruiyot *et al*., 2023; Feng and Wu, 2021; Moloi *et al*., 2024; Morri *et al*., 2024; Velte, 2017), other findings have indicated a significant negative impact (Chacon *et al*., 2024; Raimo *et al*., 2021; Sing, 2013). Our study, therefore, formulates the hypotheses below:

H1. There is a positive and significant relationship between composite ESG and firm performance.

H2. There is a positive and significant relationship between environmental sustainability and firm performance.

H3. There is a positive and significant relationship between social sustainability and firm performance.

H4. There is a positive and significant relationship between corporate governance and firm performance.

3. Data and empirical model

This section details the methodology employed by this study by presenting the data that is utilised to answer the research question and present the model for analysing the data.

3.1 Data

We collected ESG scores from the Bloomberg ESG database from 2013 to 2022. We limited the data from 2013 because this is the year the property industry in South Africa was

restructured with the introduction of REITs. Bloomberg provides detailed ESG data on 11 JSE-listed listed real estate firms. The Bloomberg ESG database currently contains data on 11 real estate firms listed on the JSE for at least 5 years. Of the 11 listed real estate firms, 1 firm was a non-REIT, i.e. Real Estate Operating Company. Data for the macroeconomic variables were collected from the World Bank DataBank. Our panel data have a time frame of 10 years (i.e. $T = 10$) and a firm dimension of 11 (i.e. $N = 11$) giving us 110 observations per variable.

Firm financial performance is measured by two accounting-based measures, the return on assets and return on equity (Chen and Xie, 2022; Chininga *et al*., 2023; Tayeh *et al*., 2015). One market-based performance measure (Tobin's Q) was used to assess firm value (Chen and Xie, 2022; Dalal and Thaker, 2019; Mura, 2007). The data for these measures were collected from the Refinitiv Eikon and IRESS financial databases. Return on assets determines a firm's profits generated from its total assets (Azar *et al*., 2018; Delima, 2021). A higher net income is an indication that the assets of the firm are efficiently utilised. The formula for return on assets is:

$$\text{Return on Assets (ROA)} = (\text{Net Income}) / (\text{Total Assets}) \text{ x } 100\%$$

Return on equity evaluates a firm's profitability in relation to the shareholder equity it uses (Azar *et al*., 2018). Thus, a higher return on equity indicates that the firm efficiently generates profit from its shareholder's equity. The formula of return on equity is expressed as:

$$\text{Return on Equity (ROE)} = (\text{Net Income}) / (\text{Shareholder Equity}) \text{ x } 100\%$$

Tobin's Q ratio is defined by Issa and Fang (2019), Azar *et al*. (2018) and Fu *et al*. (2016) as the market value of a firm divided by its book value or total assets replacement cost. It is expressed in the formula below:

$$\text{Tobin's Q} = \text{Enterprise market value} / \text{Total Assets}$$

3.2 Model

This study employs the GMM (Blundell and Bond, 1998) to examine the relationship between sustainability on the one hand and firm financial performance and value on the other. Dwibedi *et al*. (2024) assert that the GMM model is consistent, efficient and adheres to normality since it uses information included in the moment conditions. In addition, the model helps in mitigating the endogeneity problem which emanates from the correlation between the lagged dependent variable and the error term. According to Dwibedi *et al*. (2024), endogeneity occurs when variables influence each other, thereby complicating their causal relationships and leading to biased results. Endogeneity stems from omitted variables, simultaneity, autocorrelation errors and measurement errors.

The application of the GMM model in this study is in line with recent studies such as Abakah *et al*. (2024), Fu and Zhou (2023), Ahmad *et al*. (2021) and (Kong *et al*., 2016). In particular, we apply the two-step system GMM which further caters for endogenous covariates. The system GMM has also been found to be robust with a small sample size, as it displays the best features in terms of small-size bias (Hayakawa, 2015; Soto, 2009).

The following models were explored in this study:

$$y_{it} = y_{it-1} + \beta_1 \text{esg\_score}_{\text{it}} + \beta_2 \text{board\_size}_{it} + \beta_3 \text{logtotal\_assets}_{it} + \beta_4 \text{loggdp\_sa}_{it} + \beta_5 \text{ inflation\_ rate}_{it} + \varepsilon_{\text{it}} \quad (1)$$

$$y_{it} = y_{it-1} + \beta_1 \text{env\_score}_{\text{it}} + \beta_2 \text{board\_size}_{it} + \beta_3 \text{logtotal\_assets}_{it} + \beta_4 \text{loggdp\_sa}_{it} + \beta_5 \text{ inflation\_ rate}_{it} + \varepsilon_{\text{it}} \quad (2)$$

$$y_{it} = y_{it-1} + \beta_1 \text{soc\_score}_{\text{it}} + \beta_2 \text{board\_size}_{it} + \beta_3 \text{logtotal\_assets}_{it} + \beta_4 \text{loggdp\_sa}_{it} + \beta_5 \text{ inflation\_ rate}_{it} + \varepsilon_{\text{it}} \quad (3)$$

$$y_{it} = y_{it-1} + \beta_1 \text{gov\_score\_w}_{\text{it}} + \beta_2 \text{board\_size}_{it} + \beta_3 \text{logtotal\_assets}_{it} + \beta_4 \text{loggdp\_sa}_{it} + \beta_5 \text{ inflation\_ rate}_{it} + \varepsilon_{\text{it}} \quad (4)$$

where

y_{it} = dependent variable (i.e. return on assets, return on equity and Tobin's Q) and

y_{it-1} = lagged dependent variable.

β_0 = intercept coefficient.

$\beta_{1 \ldots \ldots \ldots} \beta_8$ = slope coefficient of independent variables.

$\text{esg\_score}_{\text{it}}$, $\text{env\_score}_{\text{it}}$, $\text{soc\_score}_{\text{it}}$, $\text{gov\_score\_w}_{\text{it}}$, represent, respectively, the explanatory variables of composite ESG, environmental, social and governance scores of firms *i* at time *t*.

$\text{board\_size}_{\text{it}}$ represents the number of board members.

$\text{logtotal\_assest}_{\text{it}}$ is the firm size measured by the natural logarithm of total assets.

loggdp_sa represents the per capita GDP of South Africa.

inflation_ rate_{it} is the country's inflation rate.

ε_{it} represents the error term.

We have conducted a few tests to ensure that the results of our analysis are robust. Both Sargan (1958) and Hansen (1982) tests of over-identifying restrictions were used to evaluate the combined strength of the instruments and to assess the consistency of the estimates of the two-step system GMM model (Masongweni and Simo-Kengne, 2024; Pu, 2023). The Sargan (1958) test's null hypothesis (that the instruments in the model are collectively exogenous) indicates its validity (Dwibedi *et al.*, 2024; Masongweni and Simo-Kengne, 2024). Thus, when the Sargan test *p*-value is more than 0.05, we resolve that at the 5% significance level, the instruments are valid.

To test for autocorrelation, (AR(1)) and (AR(2)), the Arellano–Bond autocorrelation test is run on the first differences. The null hypothesis is that there is no autocorrelation and thus, failing to reject the null hypothesis supports the model (Arellano and Bover, 1995). According to Masongweni and Simo-Kengne (2024), AR(1) usually rejects the null hypothesis because it can detect autocorrelation in the first difference; therefore, the AR(2) test for autocorrelation is preferred.

We also used scatter plots to visually inspect the relationship between the various sustainability metrics and firm performance. The scatter plots, shown in Appendix 3, point to a negative relationship. The Breusch–Pagan test for heteroskedasticity Breusch and Pagan (1979) was also done to check for heteroskedasticity in the data. A *p*-value above 0.05 (0.064) as shown in Appendix 1 was observed, implying that our model does not suffer from the issue of residual heteroskedasticity. Multicollinearity is tested by means of the Variance Inflation Factor (VIF). We obtained a mean VIF of 1.42 shown in Appendix 2, suggesting that there is no concern regarding multicollinearity among our explanatory variables.

4. Results

This section presents the results of the study. The section displays the descriptive statistics results table and the two-step system GMM results tables. In this section, we further interpret the results as indicated in the tables.

Table 1 details the descriptive statistics of all variables in the study, where the composite ESG score shows an average score of 43.5%, the environmental score shows an average of 22.8%, the social average score is 22.1% and the governance score shows an average of 85.1%. This means that governance issues are highly disclosed than environmental and social issues. Both environmental and social pillars have a minimum score of 0% meaning that some firms poorly disclosed their environmental and social issues and activities and issues. The return on assets shows an average return of 3.6%, return on equity shows an average return of 6.7%, while Tobin's Q shows an average ratio of 0.97. The return on assets and return on equity range from negative to positive which means that some firms incur financial losses. Board size shows an average size of 11% members, while the natural log of total assets shows an average of 10.7. The natural log of the gross domestic product per capita shows an average of 9, while the inflation rate shows an average of 5.2%.

The results in Table 2 indicate that only governance sustainability has a significant positive influence on return on assets while composite ESG, environmental and social sustainability attributes have no significant effect on return on assets. Board size was found to have no significant effect on return on assets across all the models. Firm size, i.e. log of total assets, has a significantly negative relationship with return on assets for Model 1, Model 3 and Model 4 (where composite ESG, social and governance sustainability are explanatory variables, respectively). This effect is, however, non-significant for Model 2 (where environmental sustainability is the explanatory variable). GDP positively and significantly influences the return on assets for all models except for Model 4 (where governance sustainability is an explanatory variable), whereas inflation positively and significantly impacts the return on assets for Model 4 only (where governance sustainability is an independent variable). The lagged dependent variable indicates a positive and significant association with return on assets in all models except in Model 4 (where governance is an explanatory variable) which indicates a negative and insignificant association.

The results in Table 3 indicate that only social sustainability has a positive and significant impact on return on equity. Composite ESG, environmental and governance sustainability have no significant influence on return on equity. Similarly, the control variables board size and inflation no significant influence on return on equity. Firm size had a significantly negative effect on the return on equity, while GDP had a significantly positive impact on the return on equity. The lagged dependent variable indicates a significant positive association with return on equity in all models.

Table 1. Descriptive statistics

Variable	Obs	Mean	Std. Dev	Min	Max
esg_score	110.00	43.55	10.79	15.99	67.56
env_score	110.00	22.84	18.25	0.00	70.31
soc_score	110.00	22.11	9.50	0.00	57.07
gov_score_w	110.00	85.13	3.75	80.52	92.50
ret_assets_w	110.00	3.57	2.78	−0.98	8.13
ret_equity_w	110.00	6.70	5.39	−1.68	16.61
tobin_s_q_w	110.00	0.97	0.17	0.72	1.26
board_size	110.00	10.94	1.79	7.00	16.00
logtotal_assets	110.00	10.72	0.81	9.08	12.23
loggdp_sa	110.00	8.80	0.08	8.65	8.92
inflation_rate	110.00	5.17	1.14	3.21	7.04

Source(s): Authors' own work

Table 2. Two-step system GMM results – return on assets

Variables	Model 1	Model 2	Model 3	Model 4
L.ret_assets_w	0.350***	0.350***	0.353**	−0.582
	−0.127	−0.126	−0.145	−0.588
esg_score	0.0461			
	−0.0523			
board_size	0.0655	−0.0491	0.019	0.452
	−0.174	−0.268	−0.223	−0.491
logtotal_assets	−1.121**	−0.758	−0.964***	−2.896**
	−0.457	−0.59	−0.322	−1.244
loggdp_sa	8.294***	9.674***	8.488***	2.633
	−2.974	−3.621	−2.77	−2.634
inflation_rate	0.194	0.159	0.216	0.487*
	−0.182	−0.194	−0.214	−0.249
env_score		0.0147		
		−0.0432		
soc_score			0.0178	
			−0.021	
gov_score_w				0.618**
				−0.252
Constant	−62.14**	−74.93**	−63.56**	−46.51
	−29.7	−36.74	−27.74	−37.65
AR(1)	0.017	0.002	0.007	0.611
AR(2)	0.08	0.086	0.093	0.096
Sargan test	0.999	0.643	0.785	0.172
Hansen test	0.998	0.652	0.788	0.547
Observations	99	99	99	99
Number of comp_id	11	11	11	11
Number of instruments	9	9	9	9

Note(s): Standard errors in parentheses, ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$
Source(s): Authors' own work

Table 4 presents the relationship between the various ESG attributes and firm value, as measured by Tobin's Q. From the results, we see that composite ESG negatively and significantly impacts Tobin's Q. Social sustainability has a positive significant impact on Tobin's Q, while the environmental and governance pillars have a non-significant impact. Board size and inflation had no significant impact on Tobin's Q for all models. Firm size had a positive significant impact on Tobin's Q for Model 1 only (where composite ESG is the explanatory variable). GDP was found to positively and significantly affect Tobin's Q for all the models. The lagged dependent variable indicates a significant positive association with return on equity in all models.

For our robustness tests, we find the AR(2) to be above 0.05 for all models, implying no second-order autocorrelation. Similarly, the *p*-values of the Sargan and Hansen tests of over-identifying restrictions were above 0.05, which confirms that the choice of instruments for the various models was appropriate.

5. Discussion

This paper investigates the relationship between sustainability and the performance of JSE-listed real estate firms using the two-step system GMM model. The study analyses composite ESG and the individual ESG pillars to determine whether they impact firms' financial performance as measured by the return on assets and return on equity as well as firm value, as measured by Tobin's Q.

Table 3. Two-step system GMM results – return on equity

Variables	Model 1	Model 2	Model 3	Model 4
L.ret_equity_w	0.312**	0.301**	0.337*	0.332**
	−0.129	−0.14	−0.175	−0.156
esg_score	0.0729			
	−0.0888			
board_size	0.186	0.123	0.184	0.11
	−0.46	−0.53	−0.458	−0.485
logtotal_assets	−2.258***	−1.922**	−2.704***	−1.995***
	−0.665	−0.955	−0.54	−0.59
loggdp_sa	15.85***	17.59***	13.06***	16.38***
	−3.836	−4.997	−4.415	−3.347
inflation_rate	0.24	0.22	0.15	0.316
	−0.306	−0.305	−0.393	−0.384
env_score		0.0293		
		−0.0747		
soc_score			0.104**	
			−0.0484	
gov_score_w				0.0902
				−0.111
Constant	−117.0***	−132.4***	−86.62**	−128.7***
	−38.37	−51.15	−43.29	−38.06
AR(1)	0.045	0.015	0.034	0.027
AR(2)	0.081	0.102	0.113	0.106
Sargan test	0.954	0.96	0.594	0.945
Hansen test	0.966	0.957	0.616	0.889
Observations	99	99	99	99
Number of comp_id	11	11	11	11
Number of instruments	9	9	9	9

Note(s): Standard errors in parentheses, ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$
Source(s): Authors' own work

5.1 Composite ESG

The study finds that composite ESG has no significant effect on the two financial performance measures, return on assets and return on equity. This finding suggests that ESG investing does not influence the financial performance of listed property firms on the JSE. This finding is supported by Johnson *et al*. (2019) who found composite ESG to have a non-significant effect on the financial performance of listed firms in South Africa. The study findings also indicate that composite ESG negatively and significantly affects Tobin's Q which suggests that the engagement of firms in sustainability activities lowers their value. This effect may be a result of the company executives over-investing in ESG activities at the expense of shareholder returns as well as improving their personal reputation which in turn lowers firm value (Barnea and Rubin, 2010). Our findings are in line with Chacon *et al.* (2024) who found that global equity REITs with higher ESG scores had lower market values. Similarly, Nam *et al*. (2024) found that ESG activities lower firm value among listed firms in Korea, which they attributed to excessive ESG expenditure in the short run. Our findings imply that investors should not prioritise ESG investments since it does not improve firm performance and firm value as well. This is interesting because sustainability is a key agenda in today's world, and it is seen as a driver for investors to invest in corporate entities. Therefore, the onus should be on the directors on the board to effectively monitor management to ensure optimal ESG investments among listed real estate firms, to strengthen firm value. Firms should also endeavour to communicate the rationale and amount of their sustainable investment initiatives. Contrary to our findings, Feng and Wu (2021) found that ESG positively improves firms' market values.

Table 4. Two-step system GMM results – Tobin's Q

Variables	Model 1	Model 2	Model 3	Model 4
L.tobin_s_q_w	0.619**	1.270***	1.624***	1.276***
	−0.275	−0.203	−0.356	−0.148
esg_score	−0.00839*			
	−0.00446			
board_size	0.00561	0.015	0.0252	0.0175
	−0.0109	−0.0153	−0.0187	−0.015
logtotal_assets	0.0541*	−0.00926	−0.0725	−0.0388
	−0.0311	−0.0278	−0.0491	−0.0431
loggdp_sa	0.478***	0.633***	0.711***	0.620***
	−0.162	−0.139	−0.188	−0.166
inflation_rate	0.0021	−0.0117	−0.0158	−0.00378
	−0.00903	−0.00835	−0.0114	−0.00911
env_score		0.000946		
		−0.00222		
soc_score			0.0102*	
			−0.00529	
gov_score_w				0.019
				−0.0222
Constant	−4.138***	−5.888***	−6.543***	−7.126***
	−1.391	−1.269	−1.688	−2.559
AR(1)	0.022	0.097	0.136	0.108
AR(2)	0.465	0.288	0.277	0.285
Sargan test	0.239	0.77	0.677	0.591
Hansen test	0.299	0.833	0.728	0.658
Observations	99	99	99	99
Number of comp_id	11	11	11	11
Number of instruments	9	9	9	9

Note(s): Standard errors in parentheses, ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$
Source(s): Authors' own work

Similarly, Chininga *et al*. (2023) found that composite ESG improves both the financial performance and value of JSE-listed firms.

5.2 Environmental sustainability

Our results indicate that, like composite ESG, environmental sustainability does not significantly impact firm financial performance. This signifies that environmental sustainability initiatives do not significantly influence the financial performance of listed real estate firms on the JSE. This finding is in line with Masongweni and Simo-Kengne (2024) who found no significant effect of environmental initiatives and activities of listed firms on the return on assets in South Africa. To the contrary, Velte (2017) found that environmental sustainability activities improve firms' financial performance. Our findings also differ from Cheruiyot *et al*. (2023) who observed that portfolio greenness among SA REITs improves their financial performance as measured by the return on assets. Environmental sustainability also had no significant effect on Tobin's Q, suggesting that listed real estate firms' consideration of environmental issues and concerns does not necessarily improve their market values. These effects may be a result of a lack of focus by REITs on environmental issues, concerns and activities which results in low environmental ratings by Bloomberg. Our findings also imply that listed real estate firms in South Africa have paid little attention to global environmental concerns, although the real estate industry contributes about 40% of carbon emissions. This is in accordance with Ahmad *et al*. (2021) who found that the environmental performance score of UK firms has a non-significant effect on the market value of those firms. Contrary to our

findings, Morri *et al*. (2024) found that environmental sustainability improves the market value of real estate firms.

5.3 Social sustainability

Social sustainability is positive and significantly associated with the return on equity and Tobin's Q but not significantly related to the return on assets. This suggests that firms that are socially responsible have improved financial performance as measured by return on equity. In addition, firms that engage in social responsibility have higher market values. This is supported by Masongweni and Simo-Kengne (2024) who found that the social sustainability of listed firms in South Africa improved their financial performance. Regarding the firm value, our findings are similar to Ahmad *et al*. (2021) and Machmuddah *et al*. (2020) who found that social sustainability has a positive and significant effect on the market value of firms in the UK and Indonesia, respectively. Our findings imply that listed real estate firms have embraced social responsibility as part of their organisational culture. Engaging in socially responsible activities builds firm trust and loyalty from stakeholders and improves corporate image which in turn results in higher firm performance and value. In South Africa, the Broad-Based Black Economic Empowerment (B-BBEE), a government policy and legislative framework that redresses the historical injustices that were created by the apartheid system of governance is a major factor in driving socially responsible investment. The policy has enabled real estate firms to ensure meaningful participation of black people in the economy through participation in ownership and management structures, increased involvement in communities, engaging employees and economic activities and skilling, which has improved their performance.

5.4 Corporate governance

Our findings indicate that governance has a significant positive effect on return on assets. This suggests that better corporate governance structures improve real estate firms' financial performance. Enhanced corporate governance processes in South Africa are attributed to the recommendations in the King Reports in 1991 (King I); 2002 (King II); 2009 (King III); and 2016 (King IV) on corporate governance in South Africa. These reports have provided clear guidelines on firm governance structures and operations. Our finding is consistent with studies like Chong *et al*. (2018) and Ng *et al*. (2021) who also reported a positive and significant relationship between corporate governance and financial performance among REITs in Asia. Similarly, corporate governance practices among SA REITs were found by Moloi *et al*. (2024) to lead to improved performance as measured by the total returns on their stocks. We however found no significant relationship between corporate governance and the return on equity, which implies that the governance practices of the listed real estate firms on the JSE do not improve shareholder returns. This is attributed to the low shareholder returns on investment as indicated in the data. Regarding firm value, our findings indicate a non-significant effect of governance on Tobin's Q, which suggests that the governance attributes of listed real estate firms on the JSE do not necessarily influence their value. Our finding is consistent with Morri *et al*. (2024) and Moloi and Akinsomi (2020) who found that corporate governance has no significant effect on the value of European and South African REITs, respectively.

5.5 Control variables

5.5.1 Firm size. The results indicate that total assets negatively and significantly influence financial performance measures, implying that firm size lowers the financial performance of listed real estate firms. Rahi *et al*. (2021) also found a negative relationship between firm size and the return on assets as well as the return on equity among listed financial firms in the Nordic region. Our findings imply that managers of the listed real estate firms may have over-invested in assets that have not yet yielded revenue growth. Firm size, however, has a positive and statistically significant effect on Tobin's Q, but only in Model 1 (where composite ESG

sustainability is the explanatory variable). This implies that firm size improves the market value of listed real estate firms on the JSE. However, firm size has a negative but non-significantly impact on Tobin's Q in Models 2, 3 and 4, which implies that firm size does not necessarily influence firm value. This finding is in agreement with Olawale *et al*. (2017) and Li and Chen (2018) who found that firm size negatively impacts the value of listed non-financial firms in Nigeria and China, respectively.

5.5.2 Board size. The results reveal that board size has a non-significant effect on both return on assets and return on equity. This implies that the monitoring role of board members does not necessarily affect firm financial performance. This is supported by Abdulsamad *et al*. (2018) who argued that larger boards do not translate into better financial firm performance. As in Rafat Salameh *et al*. (2023), board size does not impact firm value. Contrary to our findings, board size improved both firm financial performance and value among listed firms in India (Kalsie and Shrivastav, 2016).

5.5.3 Gross domestic product (GDP). The results indicate that GDP positively and significantly affects return on equity and Tobin's Q for all the models. Similarly, GDP has a positive significant effect on return on assets, however, this effect is only non-significant in Model 4 in Table 2 (where governance sustainability is an independent variable). This implies that a higher GDP permits firms to advance their sustainable investment which improves their financial performance and market value. This is in line with the findings of Zeitun and Goaied (2022) and Al-Najjar (2014) who found that GDP positively influences firm performance among listed firms in Japan and tourism firms listed in five Middle East countries, respectively. Furthermore, Issah and Antwi (2017) recorded varying effects of GDP on firm performance among firms across the different sectors in the UK.

5.5.4 Inflation. Inflation only produced a significant positive influence on return on assets for Model 4 in Table 2 (where governance sustainability is an independent variable). This implies that listed property firms take keen note of the country's inflation to safeguard their financials. This is in line with Combes *et al*. (2024) who found that inflation targeting increases firm performance. Similarly, Tarkom and Ujah (2023) found inflation positively affects firm efficiency in the USA.

6. Summary and conclusion

Investors and stakeholders today increasingly take into consideration the ESG performance of firms before making their investment decisions. Because of this, firms have endeavoured to publish their annual ESG reports detailing their ESG activities, plans and strategies. We analyse the various ESG performance metrics (i.e. the Bloomberg ESG scores for composite ESG, environmental, social and governance sustainability) to ascertain their impact on the performance (return on assets, return on equity and Tobin's Q) of real estate firms listed on the JSE. We employ panel data analysis with the help of the two-step system GMM.

As ESG factors continue to play a crucial role in investment decision-making, the JSE has also increasingly promoted greater interactions of its listed firms with their investors. Listed real estate firms have not being left out, as they too have increasingly incorporated sustainability issues and concerns in their operations as they fight to reduce carbon emissions, promote the social well-being of employees and communities, as well as produce a fair return to their shareholders. We add to the limited literature on ESG sustainability and the performance of listed firms in South Africa, particularly those listed on the JSE.

Our findings indicate that composite ESG has a significant negative impact on firm value. This implies that, overall, engaging in sustainability has reduced the market value of the JSE-listed property firms. This is interesting since ESG has been argued to improve firm value. This negative relationship has been attributed to firms' overinvestment in the short run or investment in suboptimal sustainability initiatives. It is important for firms to explore initiatives that both demonstrate a commitment to sustainability while at the same time ensuring that these initiatives also result in cost-savings or risk mitigation for these firms. For

example, in selecting their environmental investments, firms need to simultaneously determine how these initiatives would result in cost-savings through lower energy usage, water usage, etc. These additional benefits should be clearly communicated to investors to ensure that they translate into greater demand for the company's shares and higher share prices and enhanced market values. Corporate boards of listed real estate firms in South Africa should also adequately monitor managers to ensure that they engage in ESG initiatives that will enable better yields to improve firm market performance and value. These initiatives must also be promptly communicated to investors and potential investors to build investor confidence in the sustainable investment initiatives of these firms.

When we break down composite ESG into its individual pillars, we find that some sustainable investment initiatives result in better performance while others do not. For example, social sustainability initiatives positively impact firm financial performance (return on equity) and improve firm market values. Governance sustainability also improves firm financial performance as measured by the return on assets. We also find that GDP growth is also important in firms' ability to undertake sustainability initiatives, indicating that sustainability can be achieved when a country's economy is favourable.

We note, however, that the non-significant impact of composite ESG and some of its pillars on firm performance may be a result of the limited number of real estate firms included in this study. Although there are about 45 listed real estate firms on the JSE, only 11 firms had ESG data for a period of over five years and more on the Bloomberg ESG database by the year 2022. 10 of these firms are REITs. There is a need for property companies to pay greater attention to sustainability and report on their sustainability initiatives if they are to continue to attract international investors. As discussed earlier, the real estate industry has come under scrutiny as the industry, among other things contributes 40% of carbon emissions globally. Future studies can include more real estate firms as data becomes available. It would also be useful to split the data into REITs and Real Estate Operating Companies (non-REITs) to see if the unique structure of REITs may be driving their sustainable real estate investments or causes their returns to be impacted differently by their sustainable investment initiatives. Similarly, future studies could look at other industries (including real estate) to ascertain whether ESG sustainability impacts the performance of listed firms in different sectors.

ESG information disclosure and rating in Africa still faces major challenges, which according to Duru (2021) include insufficient awareness of ESG information disclosure, lack of appropriate infrastructure to collect and process relevant data, inconsistent policy engagements in relation to harmonised standards and enforcement plus other fiduciary incentives for ESG disclosure, weak institutional capacity and enabling framework for both voluntary and mandatory actions to integrate and disclose environmental and social commitments and actions and lastly, lack of transparency and information on environmental and social actions and performance. Some authors have attributed the reluctance of firms in Africa and other emerging markets to provide their ESG data for the purposes of ranking due largely to the fact that the ESG frameworks developed to access corporate sustainability focus on developed economies, with limited applicability and transferability to emerging markets (Darkoh, 2009; Linnenluecke, 2022). Africa and other emerging economies face unique challenges when it comes to sustainability. Issues such as deforestation, desertification, waste management and water scarcity that face African and other developing/emerging markets may differ significantly from more developed economies. There is a need for more customised ESG metrics to be developed and applied within the context of different countries and regions. This could encourage more firms in these countries/regions to opt into or voluntarily report their sustainable investment initiatives along these lines and possibly receive credit for these. More relevant sustainability metrics would also be more likely to impact on the performance of firms. Although the provision of ESG data based on a set of standardised criteria as done by data providers such as Bloomberg and Sustainalytics makes it easier to compare firms internationally, these metrics may overlook the nuances of different markets. For example, an important social sustainability measure in South

Africa is the B-BBEE programme. This programme provides a legislative and policy framework to encourage firms to put in place measures to address the social and economic inequalities brought on by the Apartheid and the long history of economic inequalities in South Africa. This framework can be fully incorporated in social sustainability metrics of ESG analytics firms like Bloomberg and Sustainalytics. Although issues such as diversity appear to be universal, they may have different implications in different countries or regions. Mählck and Thaver (2010), for example, noted that there is a lot more emphasis on the concept of gender diversity than racial or ethnic diversity in Sweden while the emphasis in South Africa is on gender diversity. It is important that these nuances are captured by sustainable investment metrics. Future studies should investigate whether emerging economies need to have a special ESG framework that adapts to their relevant ESG issues and concerns and the aspects of different ESG metrics that need to be altered to make them more relevant to a particular context.

We will encourage more listed real estate firms to increase the quantity and quality of their sustainable investment initiatives since institutional investors are increasingly taking this into account before making their investment decisions. We also urge policymakers such as Market Regulators to monitor the adherence of firms to their sustainability disclosure guidance. This would go a long way to improve the disclosure information on the sustainable investment of firms. With this, we shall see an increase in listed real estate firms in South Africa with their ESG data on various platforms. Corporate boards also need to effectively monitor managers and chief executives to ensure that they efficiently allocate ESG investment resources for firms to realise better financial performance and higher market values.

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Appendices

Appendix 1. Breusch–Pagan test for heteroskedasticity

Assumption: Normal error terms

Variable: residuals

H0: Constant variance

$\chi^2(1) = 3.41$

Prob > $\chi^2 = 0.0648$

Source(s): Authors' own work

Appendix 2.

Table A1. Variance inflation factor (VIF)

	VIF	1/VIF
esg score	1.951	0.512
logtotal assets	1.9	0.526
board size	1.17	0.855
loggdp sa	1.048	0.954
inflation rate	1.046	0.956
Mean VIF	*1.423*	

Source(s): Authors' own work

Appendix 3.

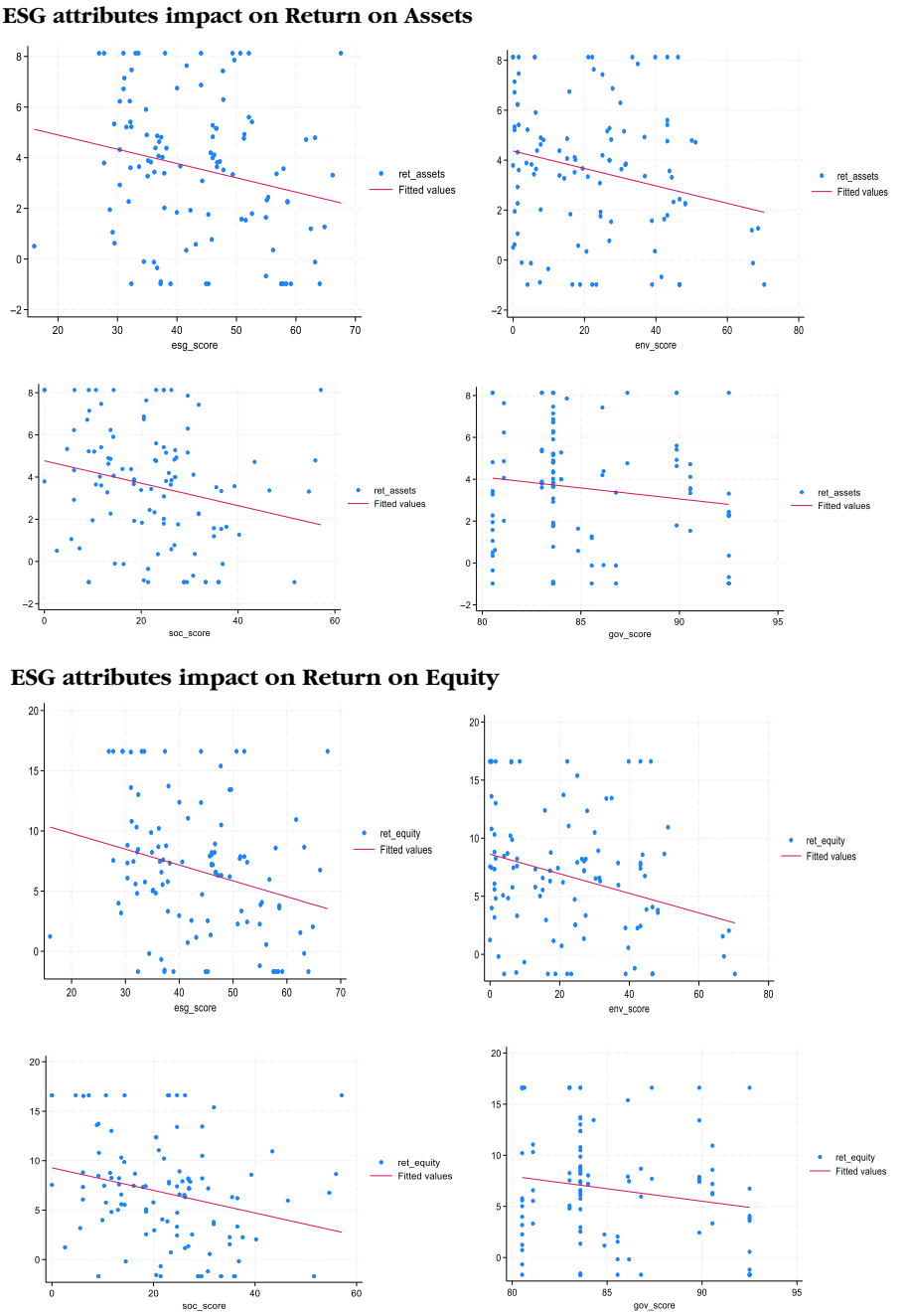
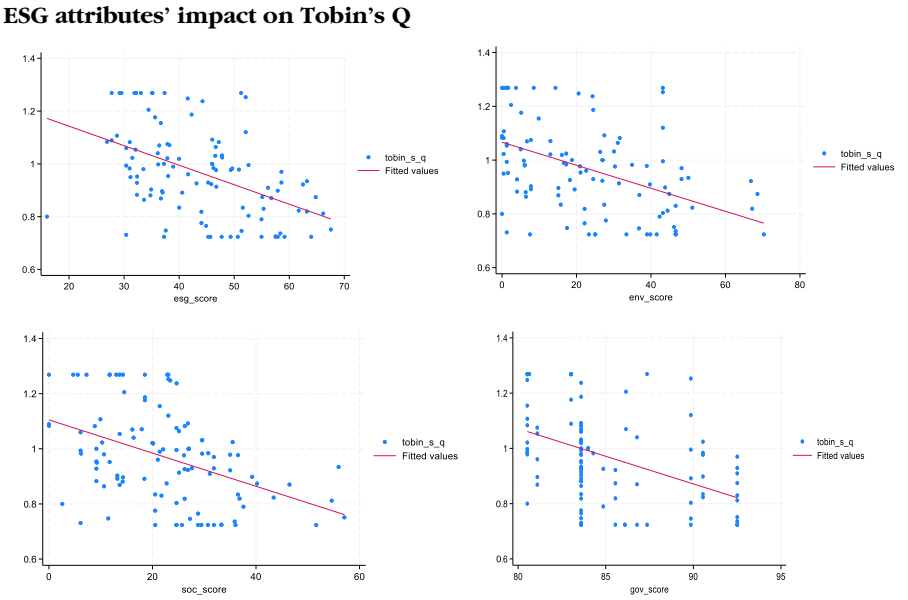


Figure A1. Scatter plots



Source(s): Authors' own work

Figure A1. (*continued*)

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