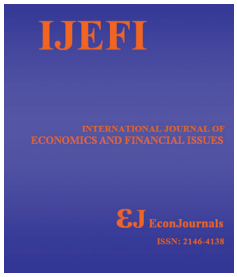

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Does Corporate Environmental Performance Influence Investors' Share Ownership? Evidence from the FTSE/JSE Responsible Investment Index

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ABSTRACT

A plethora of recent studies posit high relevance to the investigation of the impact that environmental, social and governance (ESG) has on investors' economic decisions. Notwithstanding the notable contribution that these prior studies have brought to the fore, the extant literature reviewed points to gaps emanating from disjointed literature and scanty results. To this end, there is no doubt from emerging research that capital lenders tend to expect a higher return premium for substandard corporate environmental performance. Such demands are exacerbated by environmental risks and hefty litigations linked to poor ESG ratings. However, this paper becomes imperative given the prevailing need to clarify the position of equity holders regarding ESG disclosures. This paper is presented in the context of investors having to make investment decisions amid questionable credibility of ESG disclosures. Therefore, we seek to establish the short run and long run dynamics between corporate environmental performance (hereafter named as CEP) and investors' share ownership (hereafter named as InvSO). We target companies listed in the FTSE/JSE Responsible Investment Index (hereafter named as FTSE/JSE RII) to draw a sample of 21 companies using purposive sampling technique. In addition to that, archival data were collected to compute a short panel data set. Thus, panel data set employed for statistical analysis comprised of 21 cross sections of 6 years totalling 126 observations. Thereafter, the paper adopted first differenced econometric models in data analyses namely panel vector error correction model (VECM), and subsequently panel least squares (PLS), Wald Test, and impulse response functions (IRF). The results indicated that a statistically significant positive relationship exist in the long run between corporate environmental performance and investors' share ownership. On the contrary, the same endogenous variables produced a statistically significant negative relationship in the short run. The paper contributes new insights to the prevailing debate regarding investors' perceptions on ESG practices, renders clarity to extant literature on the subject and equips companies on best practices for luring prospective equity investors.

Keywords: Investors' Share Ownership, Environmental Performance, Vector Error Correction, Capital Lenders, Wald Test, Equity Holders, Statistical Diagnostic Test
JEL Classifications: G11, M41, C33

1. INTRODUCTION

Corporate Environmental Performance (CEP) practices can be well understood if the historical context of its evolution is recognised (Ali, Nadeem, Pandey & Bhabra, 2022; Liang and Wang, 2021). Moreover, economic decisions made by investors can also be understood if the recent trend in Economic, Social and Governance (ESG) investing is explored. The global health crisis created by the Covid 19 pandemic intensified increasing demand for companies to strive for social upliftment while pursuing profit-oriented objectives (Awan, Awan, Dunnan, Jamil, Mustafa, Atif, Gul, & Guangyu, 2022). This means that companies must also prioritise

social benefits emanating from communities they serve as these returns compliment financial returns. Traditionally, reporting only favoured financial disclosures (Samkin, 2012; Meziani, 2014). However, the recognition of environmental disclosures has brought about a change in reporting practices where accounting reports now include nonfinancial information for the benefit of all stakeholders (Sands et al., 2022).

This paper recognises that inclusion of environmental disclosures in reporting has been made mandatory for companies listed on the Johannesburg Securities Exchange (JSE). Sustainability reports produced by entities demonstrate that they are making a significant contribution towards creating value for society (Halbritter & Dorfleitner, 2015). In view of the Covid 19 pandemic, social value creation as an addition to economic value creation cannot be underestimated. Awan et al. (2022) (Adams and Abhayawansa, 2020) posits that the Covid-19 pandemic prompted politicians, professional bodies, and advocacy groups to initiate discussions concerning social equity and diversity in order to address matters related to the climate crisis, corporate corruption and energy efficiency. Järvinen (2022) asserts that post the Covid-19 era, where Economic, Social and Governance (ESG) is embedded in the corporate model and strategy, the objective of creating social value is given equal priority just like profit maximisation.

Notwithstanding the potential social benefit that comes with ESG investing, many companies view it as disruption to their core goals of maximising profits and creating shareholders' value (Gao et al., 2022; Eccles et al., 2020; Hector, 2021). This increases the importance of accounting research in ESG performance to educate stakeholders and to elevate ESG into a significant topic in business and commercial discussions. This will enable companies to stay updated about changing expectations of stakeholders and be better prepared to address pressures from various advocacy groups advocating for the new agenda on social value creation (Hawn, Chatterji, & Mitchell, 2018). This paper sought to investigate if investors value corporates' environmental performance to such an extent that influences their investment decisions.

Thus, given the preceding introduction, the paper seeks to address the following main objective being investigated:

- To examine if corporate environmental performance influences investors' share ownership, and consequently develop a conceptual framework.

The remainder of this paper has the following structure. Following this introduction, Section 2 presents the related literature review. This is followed by the methodology and data analysis in Section 3. A precise discussion and analysis of results is given in Section 4. Section 5 marks the concise conclusion which embodies the modest contribution and recommendations emanating from this paper.

2. CONCISE LITERATURE REVIEW

Equity holders in various corporates need to keep abreast of ESG developments across the globe. Moreover, prospective investors may not ignore environmental practices of companies that exist as their investment destination. The success of a company at this day and age is believed to be anchored on the entity's ability to evolve towards attaining environmental sustainability. According to Archer (2022), ESG refers to the comprehensive taxonomy of nonfinancial imperatives which every reporting entity should recognise. These nonfinancial imperatives are founded on two notions: First, companies have a social contract with communities, as such their behaviour is closely monitored. If a company continues to be perceived as doing good for the society, they stand a chance of continuing to operate in the foreseeable future. On the other hand, if perceived as doing more harm to the environment than good, such companies might face the risk of going out of business or be compelled to discontinue their operations in such communities. Second, companies are obliged to operate within the bounds of gazetted environmental regulations and other laws enacted by countries in which they operate. These laws are designed to prevent companies from exploiting communities in their pursuit of profit at the expense of communities.

Lindsey et al. (2021) posit that the current framework of ESG is not static, neither is it conclusive, rather it is regarded as a dynamic process of discovery where companies are expected to strive for moral, ethical, and sustainable standards over and above financial objectives. Environmental imperatives focus more on issues such as carbon and greenhouse gas emissions, climate change as well as ethical management of scarce resources et cetera. Social imperatives involve issues such as health and safety, inclusion, diversity, data privacy and livelihood, employee welfare, social equity, curbing child labour and human trafficking et cetera. Furthermore, governance addresses issues pertaining to social and political voice, corruption, boards, management, oversight, and independence, reporting et cetera (Li et al., 2018; Macey et al., 2022).

2.1. ESG and Investors' Behaviour

Cognisant of the fact that corporate environmental performance is increasingly gaining traction globally, previous studies have sought to understand its influence it on investors' economic decisions. Numerous studies have focussed on the impact of corporate environmental performance on decisions made by investors. In one longitudinal study, Wei and Zhou (2020) investigated the relationship between shareholders and Corporate Environmental Investment (CEI) using companies listed in two Chinese' Stock Exchanges. Findings indicated that shareholders tend to significantly reduce CEI. This outcome was attributed to the corporate ownership structure and external supervision. Furthermore, shareholders who previously participated in State Owned Enterprises (SOEs) significantly improved CEI. This is precisely because of the interests that government has towards environmental protection. Critics of this study lament the fact that, focus tend to be placed on the attitude of investors towards spending on environmental protection as opposed to whether such investors regard environmental performance when making investment decisions.

In contrast, (Wei and Zhou, 2020), firms' earnings announcements by the United States firms were analysed to explore how investors' aversion to environmental risk affect their reaction (Kyaw

et al., 2022). Findings revealed that corporate environmental performance is crucial for investors as this influences the behaviour of investors who are averse to environmental risk. Investors were found to be drawn more to profit driven companies with a high level of environmental performance (Kyaw et al., 2022). Notwithstanding the contribution emanating from such a study, its methodology lacks richness as it merely relied on earnings announcements with little reference to environmental performance indicators. Thus, the current paper, therefore, advocates for a consideration of multiple variables directly linked to companies' environmental performance indicators to attain more conclusive results utilising the FTSE/JSE Responsible Investment Index.

In a more recent study, Park and Jang (2021) investigated the impact of Environmental, Social and Governance (ESG) management on investment decisions, focussing on institutional investors' perceptions of country-specific ESG criteria. This study revealed that institutional investors regard environmental and governance factors as more important compared to social factors. Among other factors, the study highlights pollution and waste, and greenhouse gas emissions (GHG) as having a greater influence on investment decisions (Park and Jang, 2021). However, the study concedes several gaps: Firstly, the study did not use existing ESG models, claiming difficulties associated with predictability and applicability due to unstable country environments; secondly, the study utilised an ESG framework that is country-specific to South Korea, thereby highlighting constraints relating to comparability, generalisability, and continuity of such models. Thus, the current paper seeks to benchmark these findings in the context of South Africa's emerging market with unique country-level specificities.

In one local study, Fakoya and Malatji (2020) examined whether mutual fund managers incorporated ESG factors when deciding which sector to invest in on behalf of their trustees. The results showed an insignificant negative relationship between return on equity (ROE) and the ESG proxies utilised in the study. This means that managers disregard ESG issues, and rather focus their attention on increasing the return on investment (ROI) whenever investment decisions are made (Fakoya and Malatji, 2020: 270). The study is, however, criticised for its bias to large industrial, machinery and equipment sectors with the exclusion of unlisted and service oriented JSE listed companies. Moreover, the study used a small sample of 28 companies. In Taiwan, (Al Farooque et al., 2022) adopted an experimental method to examine the effects of environmental performance on investors' investment decisions. Contrary to the findings from a local study by Fakoya and Malatji (2020), the results revealed a positive effect of environmental disclosure on investors' stock purchase decisions. However, the methodological approach the study used is questionable as it involved human interaction and a small sample size on environmental disclosure data. Furthermore, the methodology is criticised for its subjectivity, another researcher in a different setting may arrive at a different conclusion.

Ali et al. (2019) studied the impact of environmental performance in accordance with Global Reporting Initiative (GRI) indicators on investors' economic decisions. Their study found that there is no significant relationship between environmental performance and investors' economic decisions (Ali et al., 2019). Moreover, a parallel study highlighted no substantial market reaction to announcements upon the release of environmental reports which contain environmental performance indicators (Fahim and Mahadi, 2022). These results suggested that investors do not consider environmental performance as important when making decisions. These results are consistent with Biktimirov and Afego, (2021) who found that there are no significant securities price changes for entity's pure deletions or additions to the environmental index, implying that the inclusion or exclusion of an entity on this index does not impact investors' valuation of the entity. The study, however, was an first attempt to statistically test the effect of environmental performance on investors' economic decisions in Iraqi (Ali et al., 2019). Therefore, there is a need for more research to be conducted in different settings, which justifies the need for researching FTSE/JSE RII listed companies.

In contrast, some longitudinal studies reveal that when observed overtime, investors consider environmental performance when making crucial economic decisions (Durand et al., 2019; Giakoumelou et al., 2022; Hartzmark and Sussman, 2017). In one such study, Durand et al. (2019) found consistent results which show that sustainability events tend to gain traction leading to increased shareholding by long-term investors, which indicates that in the long-run investors pay more attention to environmentally sensitive firms. However, these studies are criticised for not utilising environmental performance indicators in the methodological approach adopted. To support these findings, Reverte (2020) analysed investors' valuation of assurance characteristics and found that investors recompense companies that embrace external environmental performance assurance. These findings were consistent with Veltri et al. (2020) who found that there is a significant positive association between the entity's market value and nonfinancial risk information disclosure levels. While this suggests that environmental performance disclosures are becoming an important consideration by investors when making critical decisions, it is worth noting that the study lacks depth in that it focusses on assurance characteristics in the context of Spanish setting following the passing of the European Directive (ED) 2014/95/UE. Consequently, the results are compromised given that the study focused on companies that are reactive to the ED which compels them to comply with external environmental performance assurance. Furthermore, the latter study (Veltri et al., 2020) also found its premise on the European directive (ED) mandating disclosure of nonfinancial risks for listed operating companies in Italy. Thus, this paper bases its investigation on environmental performance indicators to unravel environmental practices of similar companies in the South African context.

Given the gaps identified and discussed above, the following questions have remained unanswered:

- Does corporate environmental performance influence investors' share ownership in the long run?
- Does corporate environmental performance influence investors' share ownership in the short run?

Therefore, this paper attempts to answer these questions to fill the

research gap identified in the prior literature.

3. RESEARCH METHODOLOGY AND DATA ANALYSIS

It is argued that that a researcher must set out the philosophical assumptions underlying a study (Meissner et al., 2011). Therefore, the researcher adopted positivism to frame this paper (Morgan, 2007:48). According to Crowe (2011), this paradigm is preferred because of its association with quantitative techniques, where variables are empirically tested through observation and measurement. Thus, as a philosophical stance of the natural scientist, positivism focuses on observable and measurable facts (Saunders, Lewis & Thornhill, 2019). Therefore, the quantitative nature of the positivist paradigm makes it suitable for this paper. Groenewald (2004), postulates that quantitative research is employed when researchers are interested in testing the relationship between the variables.

The population in this paper comprised all companies appearing on the FTSE/JSE Responsible Investment Index for the period 2016-2021. Thus, it constituted 60 companies listed on the FTSE/JSE RII as of 28 June 2021. The researcher employed the purposive sampling technique for the purposes of this paper. This technique is a non-probability sampling method employed when the researcher's judgement is used to select elements for the sample based on a range of premises (Ilker, Musa & Rukayya, 2016). Consequentially, the sample will comprise of 21 companies drawn from the entire population. Furthermore, this paper employed content analysis technique to collect data needed to meet the objective being investigated. This approached has been extoled by prior studies for its aptness (Cowan, 2007; De Villiers and Van Staden, 2006; Jose and Lee, 2006; Kamala, 2012; De Villiers and Lubbe, 2001). Moreover, Hsieh and Shannon (2005) posit that this method is highly flexible in that it permits the researcher to utilise it in varying degrees of complexity. According to Guthrie, Petty, Yongvanich and Ricceri (2004), the researcher may use this approach to sift through archival documents to identify the needed data for the phenomena being studied. Therefore, the communication channels identified for this paper are integrated annual reports (IARs) and sustainability reports (SRs). Additionally, a short panel data set of 21 cross-sections for the fiscal years 2016-2021 were generated using Microsoft Excel spreadsheets. Thereafter, data were processed using Eviews 13 and STATA statistical software packages.

3.1. Operationalisation of Independent and Dependent Variables

In this paper, corporate environmental performance is represented by several key environmental performance indicators namely: Water Consumption (CoW); Energy Consumption (ConsE), and Greenhouse gases emissions (EmGHG). These environmental performance indicators are deemed useful to investors who make economic decisions that affect the company. Table 1 below shows how measurement of the independent and dependent variables was conducted in the paper.

3.2. Data Analysis Procedure

The statistical analysis commenced with several statistical diagnostic tests comprising panel data tests for normality, serial correlation, multicollinearity, heteroskedasticity, and stationarity. Subsequently, the cointegration test was performed to check if long run relationship exist between variables given that all variables were stationary at first difference - I(1). Consequently, the paper employed STATA to generate pairwise correlation matrix. Thereafter, Eviews 13 was utilised to run the panel Vector Error Correction model (PVECM) given that the variables under consideration were cointegrated. The researcher employed the same software package Eviews 13 to perform panel least squares (PLS) estimations, Wald Test, and impulse response functions (IRFs). Therefore, the adopted research design and methodological approach employed in this paper was deemed adequate to test the null hypotheses restated below as:

H_1: Corporate environmental performance does not influence investors' share ownership in the long run.

H_2: Corporate environmental performance does not influence investors' share ownership in the short run.

3.3. Decision Rules

3.3.1. Pairwise correlation

If $P < 0.05$, where $\alpha = 0.05$ is the level of significance, then reject the null hypothesis of no correlation between the variables. This follows that the alternative hypothesis of evidence of correlation between variables is accepted.

3.3.2. Long run coefficients of panel vector error correction model

Following the PLS estimations, accept null hypothesis indicating evidence of long run relationship only, and only if the speed of adjustment (ϕ) is negative and statistically significant at $P < 0.05$, where $\alpha = 0.05$ is the level of significance. The negative sign indicates the ability to bounce back to equilibrium in the event of a disequilibrium situation while the positive signs show movement away from equilibrium.

Table 1: Measurement of independent and dependent variables

Variable	Variable name	Variable sub-name	Measurement method
Independent variable	Corporate environmental performance	Water consumption (CoW)	Million cubic metres (Mm^3) and kilolitres (Kl).
		Energy consumption (ConsE)	Gigajoules (Gj) or Mega-watt hours (Mwh)
		Greenhouse gases emissions (EmGHG)	Metric tonnes of CO_2 equivalent (Mt CO_2e)
Dependent variable	Investors share ownership (InvSO)		Number of shares traded during the fiscal year

Source: Author's compilation, 2023

3.3.3. Short run coefficients of panel vector error correction model

Following the PLS estimations, accept null hypothesis indicating evidence of short run relationship only, and only if the short run coefficient is negative and statistically significant at $P < 0.05$, where $\alpha = 0.05$ is the level of significance.

3.3.4. Short run coefficients wald test

If $P < 0.05$, where $\alpha = 0.05$ is the level of significance, then reject the null hypothesis, at any conventional level, indicating evidence of no short run relationship between variables in favour of the alternative hypothesis that the short run relationship exists.

3.4. Statistical Modelling of the Paper

According to Getzmann et al. (2014), statistical models in research can render intuitive visualisations that aid the researcher in identifying relationships between variables being studied. To achieve the objectives set for this paper, the researcher adopts the PVECM introduced by Engle and Granger (1987) which suggests the double-set technique for modelling cointegrated I(1) type series. In equation (i) below, a long-run model is estimated to obtain the residuals. As a result, the cointegrated equation (ii) depict the lagged residuals for the long-run relationship among variables. Consequently, the VECM is formulated by adding the lagged residuals to the short-run terms as presented in equation (iii) below.

$$Yit = \beta 0i - \beta i1Xit + \varepsilon it \quad \text{(i)}$$

$$\varepsilon it\text{-}1 = ECTit\text{-}1 = Yit\text{-}1 - \beta 0i - \beta i1Xit\text{-}1 \quad \text{(ii)}$$

$$\Delta Y_{it} = \alpha_i + \sum_{k=1}^{p} \beta_i \Delta Y_{it-k} + \sum_{k=0}^{q} \delta_i \Delta X_{it-k} + \varnothing_i ECT_{it-1} + \mu_{i,t} \quad \text{(iii)}$$

Where:
Equation (i) = the long run cointegrating regression model,
Equation (ii) = Lagged residuals (cointegrating equation),
Equation (iii) = Vector error correction model, where:
ECT_{it-1} = Error correction term (lagged residuals from the long run model)
$\emptyset_i$ = Speed of adjustment
Subscript '*i*' = Represents each subject in the panel
k = The number of lags

Thus, the VECM model stated as equation (iii) above were operationalised to address the main objective pursued in this paper. To establish if corporate environmental performance influences investors' share ownership both in the short run and long run, the VECM equation is estimated as follows:

$$\Delta InvSO_t = \alpha_1 + \sum_{i=1}^{p} \alpha_{2,i} \Delta InvSO_{t-1} \sum_{k=1}^{q} \alpha_{3,k} + \Delta CoW_{t-1} + \sum_{l=1}^{q} \alpha_{4,l} \Delta ConsE_{t-1} + \sum_{j=1}^{q} \alpha_{5,j} \Delta EmGHG_{t-1} + \varnothing ECT_{t-1} + \mu_{,1t} \quad \text{(iv)}$$

Where:
InvSO = Investor share ownership, which represents investors' corporate support as a stakeholder. α = parameter to be estimated in the model, CoW = Water consumption, ConsE = Energy consumption, and EmGHG = Greenhouse gases emissions, are vectors capturing corporate environmental performance respectively. μ = Indicator for uncorrelated errors. $\emptyset$ = speed of adjustment or cointegration coefficient and *ECT* = indicates the error correction term which represents the estimated residual value from the cointegration regression.

In tandem to the VECM estimations, the impulse response function (IRF) analysis was performed. This was aided by use of statistical software Eviews 13 to perform this analysis after which the results were presented graphically for further interpretation. Cao and Sun (2011) postulate that the subscript '*i*' is omitted in the analysis given that IRF does not depend on this index and fixed effects in the system. As a result, the IRF matrix for this paper is defined as follows:

$$\phi_j = \frac{\partial \gamma_t + \mathbf{j}}{\partial u_t^{'}} \quad \text{(v)}$$

Where:
The (k, ℓ)-th element of the matrix specified above describes the response of this element to one standard deviation unit impulse in ℓ-th element of γ_t whereby all variables dated *t* or earlier are ceteris paribus.

3.5. The Elementary Regression Assumptions

Table 2 below presents numerous statistical diagnostic tests for normality, serial correlation, multicollinearity, heteroskedasticity, and stationarity. In congruent to the results of the panel unit root test for stationarity which indicated that all variables were stationary at first difference - I(1), the cointegration test was performed to check if long run relationship exist between variables. The result (Table 3) indicated that a long run relationship exists between variables hence the adoption of the VECM for this cointegrated type I(1) series.

3.6. Cointegration Test for Panel Data

Table 3 below depicts the results of the Kao Residual Cointegration

Table 2: Statistical diagnostic tests for panel data

Assumptions	Test employed	Decision rule	Remark
Stationarity	Panel unit root test - "Fisher type" based on the augmented Dickey-Fuller approach (ADF)	Non-stationary, if P<0.05	fulfilled
Normality	Jarque-bera tests	Normal distribution, if P>0.05	fulfilled
Heteroskedasticity	VEC residual heteroskedasticity tests	Homoscedasticity present, if P>0.05	fulfilled
Multicollinearity	Variance inflation factor (VIF)	VIF values must be<10	fulfilled
Serial correlation	LaGrange multiplier (LM) test	No serial correlation of any order, if P>0.05	fulfilled

Source: Author's compilation, 2023

Table 3: Kao residual cointegration test

Series: INVSO EMGHG COW CONSE				
Sample: 2016-2021				
Included observations: 126				
Null hypothesis: No cointegration				
Trend assumption: No deterministic trend				
Automatic lag length selection based on SIC with a max lag of 0				
Newey-West automatic bandwidth selection and Bartlett kernel				
			t-statistic	**Prob.**
ADF			−4.654269	0.0000
Residual variance			8.434239	
HAC variance			7.671265	
Augmented Dickey-Fuller test equation				
Dependent variable: D (RESID)				
Method: Least squares				
Sample (adjusted): 2017-2021				
Included observations: 105 after adjustments				
Variable	**Coefficient**	**Std. error**	**t-statistic**	**Prob.**
RESID(−1)	−0.939384	0.106996	−8.779640	0.0000
R-squared	0.425650	Mean dependent var		−0.019690
Adjusted R-squared	0.425650	S.D. dependent var		3.026838
S.E. of regression	2.293915	Akaike info criterion		4.507876
Sum squared resid	547.2530	Schwarz criterion		4.533151
Log likelihood	−235.6635	Hannan-Quinn criter.		4.518118
Durbin-Watson stat	1.733100			

Source: Authour's compilation, 2023

Test performed on variables utilised in this paper. Thus, on Eviews software, Investor share ownership (InvSO) variable was selected as a dependent variable. Thereafter, water consumption (CoW), energy consumption (ConsE) and greenhouse gases emissions (EmGHG) were selected as independent variables with automatic selection for lag length. The null hypothesis of no cointegration was rejected given that the Augmented Dickey Fuller test shows a P-value which is far <5%. Therefore, the alternative hypothesis of cointegration is acceptable confirming the existence of long-run relationships among variables employed in this paper.

4. RESULTS AND DISCUSSIONS

4.1. Pairwise Correlation

Table 4 depicts the results of the pairwise correlation analysis for variables applied in the regression models. Investors share ownership (InvSO) yielded a positive correlation value of 0.190 at P < 0.033 when paired with the predictor greenhouse gases emissions (EmGHG). This is indicative of a weak yet positive correlation between the two variables tested at 0.05 level of significance. Furthermore, statistically insignificant correlations were observed for greenhouse gases emissions (EmGHG) and energy consumption (ConsE) which produced correlation coefficient values of 0.072 and 0.077 respectively. Although these explanatory variables reveal a small positive correlation when paired with investor share ownership (InvSO), the respective P-values are higher than the threshold of 5% level of significance. Thus, water consumption (CoW) and energy consumption (ConsE) produced the P = 0.422 and 0.391 respectively. This means that there is not enough evidence in the sample to show that the generated correlation exists for the entire population of FTSE/RII companies.

Table 4: Pairwise correlations matrix

Variables	**(1)**	**(2)**	**(3)**	**(4)**
(1) InvSO	1.000			
(2) CoW	0.072	1.000		
	(0.422)			
(3) EmGHG	0.190*	0.297*	1.000	
	(0.033)	(0.001)		
(4) ConsE	0.077	0.232*	0.446*	1.000
	(0.391)	(0.009)	(0.000)	

***P<0.01, **P<0.05, *P<0.1. Source: Authour's compilation, 2023

Table 5: Panel least squares estimations

Dependent variable: D (INVSO)				
Method: Panel least squares				
Sample (adjusted): 2018-2021				
Periods included: 4				
Cross-sections included: 21				
Total panel (balanced) observations: 84				
Specification	**Coefficient**	**Std. error**	**t-statistic**	**Prob.**
CointEq1	−0.271319	0.097224	−2.790676	0.0066
D (InvSO[−1])	0.086845	0.108903	0.797448	0.4276
D (CoW[−1])	−0.006985	0.091395	−0.076432	0.9393
D (ConsE[−1])	−0.159913	0.215141	−0.743294	0.4595
D (EmGHG[−1])	0.250440	0.226279	1.106774	0.2718
Cons	0.489064	0.353208	1.384636	0.1701
R-squared	0.124523	Mean dependent var		0.523961
Adjusted R-squared	0.068403	S.D. dependent var		3.136759
S.E. of regression	3.027576	Akaike info criterion		5.122151
Sum squared resid	714.9651	Schwarz criterion		5.295781
Log likelihood	−209.1303	Hannan-Quinn criter.		5.191949
F-statistic	2.218866	Durbin-Watson stat		1.842386
Prob (F-statistic)	0.060633			

Source: Authour's compilation, 2023

4.2. The Vector Error Correction Model Results

The Error Correction coefficient of negative 0.271319 (Table 5) represents the speed of adjustment. This represents the speed at which the model will restore its equilibrium following any disturbances. Thus, the coefficients of the error correction term (ECT) with investor share ownership (InvSO) and water consumption (CoW) as outcome variables are negative and statistically significant. This is indicative that there is convergence from short dynamics towards long-run equilibrium. Hence, the adjustments coefficients of 0.271319% and 0.001379% respectively towards the long-run equilibrium in the event of a disequilibrium situation. Conversely, energy consumption (ConsE) and greenhouse gases emissions (EmGHG) produced positive Error Correction coefficients of 0.29% and 0.27% respectively. These adjustments are insignificant pinpointing the lack of significant adjustments towards long-run equilibrium in the event of any disequilibrium situation.

4.3. The Long-run Model Results

The cointegration equation and long-run model results deduced from equation (ii) above were specified in equation (vi) below. This is indicative of the ECT for the model wherein investor share ownership (InvSO) is the target variable with the coefficient value of 1.000000. It was observed that water consumption (CoW) produced a positive coefficient of 0.027090. On the other hand, other endogenous variables such as energy consumption (ConsE) and greenhouse gases emissions (EmGHG) generated negative coefficients of negative 1.534103 and negative 0.445800 respectively. Moreover, this long-run model also revealed an intercept of 15.35660 as shown in the equation below.

$$\varepsilon it\text{-}1 = 1.000000InvSOit{-}1 + 0.027090CoWit{-}1 - 1.534103ConsEit{-}1 - 0.445800EmGHGit{-}1 + 15.35660 \quad (vi)$$

Furthermore, panel least squares (PLS) estimations were performed to generate both long-run and short-run coefficients for the variables under study. Table 5 below shows the results derived from estimating the equation above where investor share ownership (InvSO) is the variable of interest stationery at I(1). The investor share ownership (InvSO) variable was complemented by the regressors of environmental performance i.e. water consumption (CoW), energy consumption (ConsE) and greenhouse gases emissions (EmGHG).

In Table 5 above, the long-run coefficient of 0.271319 is negative and statistically significant. The significance of this coefficient is attributable to the corresponding P = 0.0066 which is below 0.05. This is evidence that there is a long-run relationship between energy consumption (ConsE), water consumption (CoW) and greenhouse gases emissions (EmGHG) to investor share ownership (InvSO). Moreover, the negative coefficient indicates the ability to bounce back to equilibrium while a positive coefficient pinpoints movement away from equilibrium.

The Adjusted R^2 of 0.07 enhances the results of this estimation given that it is lower than 95% significance level. Moreover, the Durbin-Watson statistic of 1.8 which is deemed as leaning towards 0 which indicates positive auto-correlation.

4.4. The Short-run Model Results

Notwithstanding the results of the cointegration equation above, the short-run model results deduced from equation (iii) above is specified thus:

$$\Delta InvSOit = -0.271319ECTit{-}1 + 0.086845\Delta InvSOit{-}1 - 0.006985\Delta CoWit{-}1 - 0.159913\Delta ConsEit{-}1 + 0.250440\Delta EmGHGit\text{-}1 + 0.489064 \quad (vii)$$

The abovementioned equation contains the cointegration equation coefficient of negative 0.271319 which explains the speed of adjustment. The value of the unrestricted constant which deals with the unit of measurement utilised in the data is 0.489064. The short-run coefficients of all other endogenous variables depicted in the equation are imperative in understanding short-run dynamics. Thus, a percentage increase in investor share ownership (InvSO) will lead to an increase in itself by 0.09%. Accordingly, a percentage increase in water consumption (CoW) will produce a decline in investor share ownership (InvSO) by 0.01. Similarly, a percentage increase in energy consumption (ConsE) will lead to a decline in investor share ownership (InvSO) by 0.16%. On the other hand, an increase by 0.25% will be realised in investor share ownership (InvSO) as a result of a percentage increase in greenhouse gases emissions (EmGHG). However, Table 5 shows that the coefficients of these endogenous variables water consumption (CoW), energy consumption (ConsE) and greenhouse gases emissions (EmGHG) are statistically insignificant given that the corresponding P-values are more 0.05. Thus, the null hypothesis of a significant short-run relationship between environmental performance and investor share ownership (InvSO) is rejected. To further cement these results that do not infer short-run relationships in the model, Table 6 below depicts the results of a Wald Test which was performed for this purpose.

The results of the Wald Test in Table 6 above indicate that, at any conventional level, we accept the null hypothesis of no short-run relationship between corporate environmental performance variables and investors' share ownership. This follows that the probability values of the F-statistic and Chi-square are more than 5%.

4.5. Impulse Responses of Environmental Performance Measures to Standard Deviation Shocks in Investors' share Ownership

Notwithstanding the insights obtained from the VECM results, the

Table 6: Wald test for first sub-objective short-run dynamics

Test statistic	Value	df	Probability
F-statistic	0.428703	(3, 78)	0.7330
Chi-square	1.286109	3	0.7324
Null hypothesis: D (CoW[−1]) = D (ConsE[−1]) = D (EmGHG[−1]) = 0			
Normalized restriction (=0)	**Value**		**Std. Err.**
D (CoW[−1])	−0.006985		0.091395
D (ConsE[−1])	−0.159913		0.215141
D (EmGHG[−1])	0.250440		0.226279
Restrictions are linear in coefficients			

Source: Author's compilation, 2023

IRF analysis were performed to reinforce findings on the long-run and short-run dynamics specified in equation (iv) above. Thus, Eviews 13 was employed for this purpose with InvSO as the target variable to produce impulses for ConsE, CoW and EmGHG. In conjunction with the VECM presented above, impulse responses of water consumption (CoW), greenhouse gases emissions (EmGHG) and energy consumption (ConsE) to standard deviation shocks in investor share ownership (InvSO) were generated on Eviews 13. Figure 1 below reveals that one standard deviation shock to investor share ownership (InvSO) initially has a considerable noticeable impact on water consumption (CoW) in the periods 1 and 2. This noticeable effect slightly reduces between the periods 2 and 3 as represented by a reduced slope. Moreover, the response of water consumption (CoW) to shocks in investor share ownership (InvSO) retards gradually from period 3 until period 6 when it hits its steady state value. This steady value is just above 0 indicative of the response that is maintained on the positive region. Furthermore, a similar response to one standard deviation shock in investor share ownership (InvSO) is observed for the predictor variable greenhouse gases emissions (EmGHG). Figure 2 confirms the sharp impact on greenhouse gases emissions (EmGHG) from the periods 1 and 3. The impact decelerate slightly into period 4 where a gradual decline in the response becomes evident until period 6. Thus, the static value close to 1 is maintained beyond this sixth period in the positive region.

In addition, the results of the responses of energy consumption (ConsE) to investor share ownership (InvSO) innovation indicate that investor share ownership (InvSO) initially increases energy consumption (ConsE) sharply between the periods 1 and 2 (Figure 3 below). Thereafter, it slightly reduces until it reaches period 3 where sharp decline is observed until somewhat static value is achieved in period 5 howbeit with increasing tendencies.

The IRF graphs generated for the first sub-objective generally falls within the positive region. This means that standard deviation shocks to investor share ownership (InvSO) will have a positive impact on environmental performance measures especially in the long-run. However, this is with the exception of water consumption (CoW) where the innovation in investor share ownership (InvSO) begins on the negative region in period 1. Moreover, the impact that standard deviation shocks to investor share ownership (InvSO) have on water consumption (CoW) is weak given that the IRF lies along the horizontal line at 0. On the other hand, a significant impact is noticeable on greenhouse gases emissions (EmGHG) following one standard deviation shock to investor share ownership (InvSO). This is evidenced by the IRF almost hitting the horizontal line at 2 and further maintains above line 1.

5. CONCLUSION

The main aim of this paper was to establish the short run and long run dynamics between corporate environmental performance and investors' share ownerhip. The long-run coefficient of 0.271319 was found to be negative and statistically significant. The significance of this coefficient was attributable to the corresponding P = 0.0066 which was below 5%. This provided evidence that there is a long-run relationship between energy consumption (ConsE), water consumption (CoW), and greenhouse gases emissions (EmGHG) to investor share ownership (InvSO). These findings are consistent with prior studies that produced similar results for example, Botsari, Lang and Kraemer-Eis (2020), Zumente and Bistrova (2021) and Atkins and Maroun (2015). The negative coefficient pointed to the ability to bounce back to equilibrium while a positive coefficient indicated movement away from equilibrium. Moreover, the Adjusted R^2 of 0.07 validated the findings of this estimation given that it was lower than 95% significance level. In addition to that, the Durbin-Watson statistic of 1.8 which was deemed as leaning towards 0 indicated positive auto-correlation in the panel data utilised for the analysis. Consistent with these

Figure 1: Impulse response of CoW to shocks in InvSO

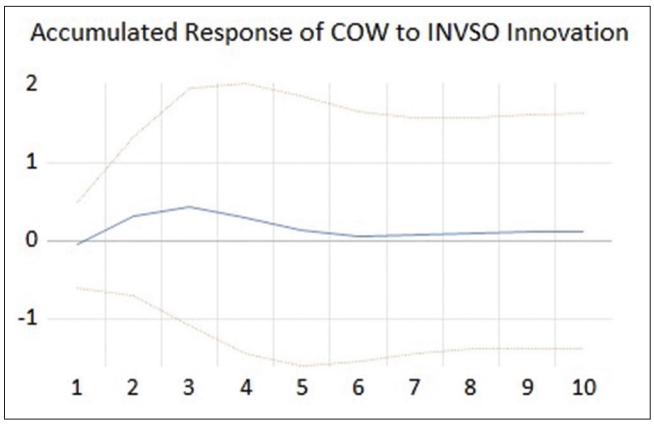


Figure 2: Impulse response of EmGHG to shocks in InvSO

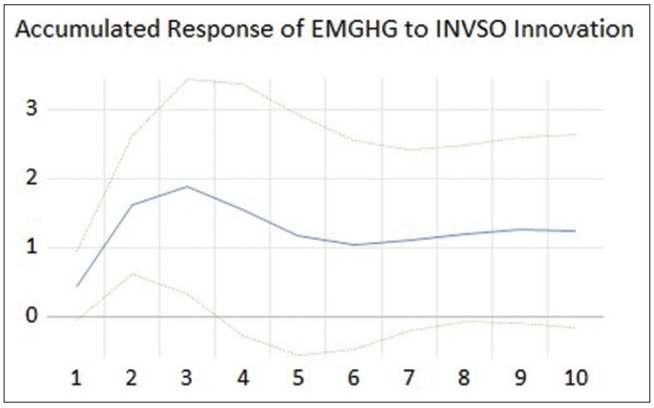


Figure 3: Impulse response of ConsE to shocks in InvSO

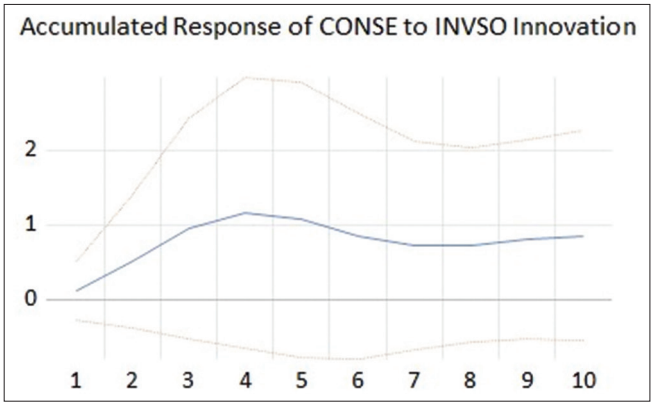
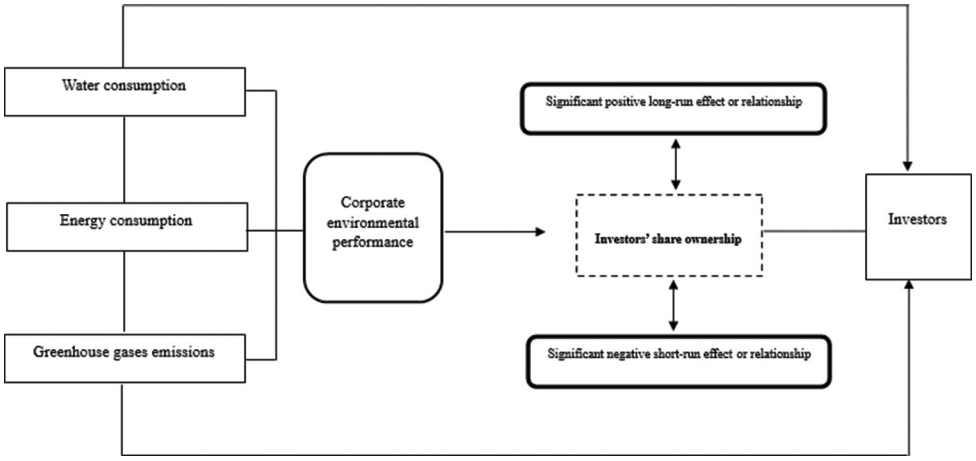


Figure 4: The proposed conceptual framework



Source: Author"s own compilation

findings, the pairing of investor share ownership (InvSO) with the predictor greenhouse gases emissions (EmGHG) yielded a positive correlation value of 0.190 at a P = 0.033. This was indicative of a weak yet positive correlation between the two variables when tested at 0.05 level of significance. Furthermore, the IRF graphs computed for this paper generally remained within the positive region. This implied that one standard deviation shock to investor share ownership (InvSO) yielded a positive impact on environmental performance measures especially in the long-run. The impact that standard deviation shocks to investor share ownership (InvSO) have on water consumption (CoW) was found to be weak given that the IRF lies along the horizontal line at 0. On the other hand, a significant impact was noticeable on greenhouse gases emissions (EmGHG) following one standard deviation shock to investor share ownership (InvSO). This was evidenced by the IRF almost hitting the horizontal line at 2 and further maintaining a steady state above line 1.

Contrary to the long run results, the short-run dynamics for variables produced negative results. Thus, the coefficients of these endogenous variables were found to be statistically insignificant given that the corresponding P-values were >5%. In agreement with prior studies by Fakoya and Malatji (2020) and Chiromba (2020), the null hypothesis of a significant short-run relationship between environmental performance and investor share ownership (InvSO) was rejected. To further expatiate on these results that did not infer short-run relationships in the model, the Wald Test results indicated that, at any conventional level, we accept the null hypothesis of no short-run relationship between corporate environmental performance variables and investors' share ownership. This was supported by the probability values of the F-statistic and Chi^2 which were >5%. Moreover, these findings were also confirmed by the IRF of water consumption (CoW) where the innovation in investor share ownership (InvSO) begins on the negative region. Furthermore, statistically insignificant correlations were observed for water consumption (CoW) and energy consumption (ConsE) which produced correlation coefficient values of 0.072 and 0.077 respectively. Although these explanatory variables revealed a small positive correlation when paired with investor share ownership (InvSO), the respective P-values were greater than the threshold 5% level of significance. Water consumption (CoW) and energy consumption (ConsE) produced the P = 0.422 and 0.391 respectively, suggesting that there is not enough evidence in the sample to show that the generated correlation exists for the entire population of JSE SRI companies. Drawing from the findings of this paper, Figure 4 below shows a schematic diagram of the suggested conceptual framework.

5.1. Scope for Future Research

This paper is responsive to the prevailing need to clarify the position of equity holders regarding ESG disclosures. Thus, the results emerge when investors are expected to make investment decisions amid questionable credibility of ESG disclosures. The main aim of this paper was to identify short run and long run dynamics between corporate environmental performance and investors' share ownership. The paper contributes new insights to the prevailing debate regarding investors' perceptions on ESG practices, renders clarity to extant literature on the subject and equips companies on best practices for luring prospective equity investors. Despite it being insightful, the main constraint of the paper stem from the use of the content analysis technique and subjective proxy for the lead variable. Thus, data obtained using this approach may be subjective since the quality of sustainability reporting is still questioned. Furthermore, using mainly IARs and sustainability reports (SRs) has been criticised for underestimating the quality and quantity of environmental data disclosed by companies in various platforms (Shelley and Barker, 2016). This implies that the choice of communication channel selected for this paper (IARs and SRs) may be rendered incomplete in as far as reporting on environmental performance is concerned. However, future research could combine content analysis with interviews and survey questionnaires to solicit the preparer and users' views. Furthermore, future research may also seek to understand the responsiveness investors to CEP by adopting proxies to make the current findings more conclusive.

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