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Effect of Corporate Environmental Performance on Banks' Loan Pricing

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ABSTRACT

Capital lenders of money such as banks are perceived to be environmentally sensitive in contemporary times. This sensitivity is evidenced by the advent of new concepts such as green financing in the context of environmental catastrophes which are exacerbated by the climate change crisis. Thus, financial institutions such as banks face a dilemma in deciding whether to prioritise sustainability financing or seek after profit maximisation. To this end, little is known if corporate environmental performance lures support of key stakeholders such as banks. The study renders empirical evidence on this phenomenon by investigating short run and long run dynamics between corporate environmental performance and banks' loan pricing. Archival data were collected from the FTSE/JSE RII listed companies. A sample of 21 companies generated a short panel data set of 6 years per cross-section totalling 126 observations. The study adopted first differenced econometric models in statistical panel data analyses namely Panel Vector Error Correction Model (VECM), and subsequently Panel Least Squares (PLS), Wald Test, and Impulse Response Functions (IRF). Findings revealed a statistically significant positive impact, both in the short run and long run, between environmental performance predictors and banks' loan pricing. While the study makes immense contribution to literature, it renders new assertions in understanding stakeholders' current environmental practices and initiate a new agenda for future research.

Keywords: Environmental Performance, Sustainability, Stakeholder, Capital Lenders, Cost of Debt
JEL Classifications: G21, G32, 018, R21, F65

1. INTRODUCTION

Most recently, researchers have called for increased scrutiny of companies' sustainable performance (Wanner and Janiesch, 2019:143). These calls emanate from key stakeholders who require companies to develop and invest in robust Environmental, Social and Governance (ESG) programmes. Stakeholders such as Banks are crucial in advancing green investments in the backdrop of numerous environmental catastrophes. This paper therefore focusses on the environmental performance dimension to enhance knowledge in existing literature. Previous studies highlight the relationship between corporate environmental performance and cost of debt. Hauptmann (2018:15) argues that the relationship between corporate sustainability performance and cost of debt has become stronger in recent years. This argument emanates from a study whose findings reveals that the relationship between corporate sustainability performance and cost of debt is driven by a premium in loan spreads for companies with poor sustainability performance as opposed to spread discounts for companies with strong sustainability performance (Hauptmann, 2018:70). Despite this contribution to literature, the study leaves a gap given its holistic approach, with much attention given to borrowers' sustainability performance as whole. Thus, results could be different if the ESG elements were to be considered individually to investigate their effect on environmental performance. Therefore, this paper sought to streamline environmental performance for an in-depth analysis where multiple environmental performance indicators are utilised as proxies.

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In a longitudinal study conducted in the USA involving 27 countries, Fard et al. (2020:797) found that banks tend to adjust contractual features of their loans and consequently charge higher interest rates when borrowing to companies facing more stringent environmental regulations. Although South Africa formed part of the sample, the overall results of such an ambitious study fail to scrutinise individual countries concretely and give a clear picture of the status quo of individual countries sampled. Moreover, much criticism relates to the period during which the study was conducted, ending in fiscal year 2014, as a result the data is considered outdated. Thus, more recent financial periods may yield different outcomes. Additionally, the study leaves a gap in that the results are driven by environmental liabilities resulting from regulations where it is believed that companies have higher bankruptcy risk and lower credit ratings. Therefore, based on this study, it is not clear if environmental performance does attract banks' interest, or these capital lenders do so to avoid the risk associated to an entity's environmental liability, for example, bankruptcy, lower credit ratings et cetera.

In line with this study, a Belgian study investigated how corporate environmental consciousness is reflected in pricing of bank loans (Degryse et al., 2021:01). Findings from the study support the US study (Fard et al., 2020:797), by indicating that companies are rewarded by cheaper loans for being environmentally conscious. However, the study shows that such findings are true only on two conditions: Firstly, only when borrowing from a green consortium of capital lenders; Secondly, only after rectification of the Paris Agreement in 2015 (Degryse et al., 2021:52). While the study contributed positively to academic literature, it presented a gap for the current paper whose premise is based on the recent Glasgow Climate Pact (GCP) of COP26. This presents a more recent perspective on cost of debt given that the said GCP has financial pledges which are a deliberate move to increase accessibility of finance to combat the climate crisis.

In a landmark mixed-methods study which utilised semi-structured interviews and online questionnaires, Anagnostopoulos et al. (2018:16) investigated perceptions on environmental risks and the impact these have on bad loans. The study sought to unpack the consideration of environmental performance in lending decisions and management of bad loans. The astounding results indicated that environmental risk management does exist in the financial sector even though it has not penetrated credit risk management's core processes (Anagnostopoulos et al., 2018:16). Similarly, Herbohn et al. (2019:155) found that investors hold the view that financial institutions such as banks incorporate carbon risks considerations into their lending decisions. These studies are, however, criticised for the approach used in investigating lending decisions given that these studies sought managerial perceptions which may render inconclusive findings. Therefore, this paper sought to close the gap by statistically investigating the same phenomenon.

In contrast, other researchers employed both descriptive and inferential statistics to conclude that corporate environmental performance disclosures had an insignificant impact on the lending decisions done by banks (Aifuwa et al., 2019:62). Thus, the study pinpointed profit level and monetary value of collateral, to be the main contributors to the banks' lending decisions. In concurrence with this study, some researchers held the view that banks are not incorporating environmental disclosures into their lending criteria in a bid to reduce lending risks (Chatzitheodorou et al., 2021:1474). Moreover, the study by Chatzitheodorou et al., (2021:1474) attempted to develop a framework to aid banks in assessing corporate environmental risks through published environmental reports. Thus, findings indicated that published corporate reports do not offer quality data about corporate environmental risks (Chatzitheodorou et al., 2021:1483). Notwithstanding the contribution made by these studies (Aifuwa et al., 2019; Chatzitheodorou et al., 2021), much criticism lies on sample sizes utilised for these studies. Thus, the current paper sought to broaden the sample to conclude with more accurate results on banks' lending decisions.

Drawing from the preceding introduction, the paper seeks to address the following main objective being pursued:

- To determine if corporate environmental performance influences banks' loan pricing, and consequently develop a conceptual framework.

Therefore, the remainder of the paper is structured in the following manner. After this introduction, Section 2 presents the theoretical foundation and literature review. The decision usefulness theory is discussed together with literature studies conducted locally and internationally. This is followed by the methodology and data analysis in Section 3. This section delves into the research design and statistical analysis performed. The conclusion, contribution and recommendations are presented in Section 4 of this paper.

2. THEORETICAL FOUNDATION AND LITERATURE REVIEW

2.1. The Decision Usefulness Theory

This theory posits an assumption that individual decision makers are rational (Staubus, 2000:586). This means that individuals or groups will always choose an action that will yield highest possible expected utility (Staubus, 2000:586; Ravenscroft, 2012:232). It is also argued that this theory provides direction for reporting company performance for the purposes of providing stakeholders with information useful for decision making (Jabbar, 2017:481; Cordery and Sinclair, 2017:41). Thus, the choice of this theory is justifiable since it provides an explanation as to why crucial stakeholders such as banks would consider corporates' environmental performance.

Puxty and Laughlin (1983:104) point to Staubus (1958 and 1959) as the main proponent of the decision usefulness theory. Coetsee et al. (2021:18) further comments that the decision usefulness theory is not founded on scientific research rather it has been developed through a consultative basis over a passage of time. Thus, the theory was not formulated for empirical testing since it emphasises on noticeable corporate environmental practices. To this end, the decision usefulness theory has gained traction among researchers who employ surveys, experimental studies,

interviews, regression analysis, correlation and content analysis (Puxty and Laughlin, 1983:187; Ravenscroft, 2012:82; Cordery and Sinclair, 2017:01).

2.2. Perspectives on Cost of Debt

Given that ESG is gaining traction and momentum across the globe, some lenders of capital have initiated ESG-linked loans and green loans to complement conventional loans that have been in existence Harabida et al. (2022:56). Chouaibi and Zouari (2022:1450) argue that these have seen the loan market grow to unprecedented levels in recent years. The growth is attributed to these loans, since the former suggests that loans spreads are contingent on environmental performance, while the latter are issued for specific green projects. According to Kim et al. (2021:02) these loans present a net pricing advantage to borrowers. Christ et al. (2022:01) posit that high levels of CSP, particularly environmental and social dimensions, are associated with lower credit default swaps in Germany. This makes it imperative for the researcher to glean into international literature to explore the effect of these ESG imperatives on banks' loan pricing. The German study also postulates that the cost of debt is affected by international climate policy events. Thus, capital lenders tend to be softened by such events, which raises awareness on green practices. It is these initiatives that complement efforts of capital lenders, who offer ESG-linked loans and green loans in a bid to transform the global landscape in as far as climate crisis is concerned.

The climate crisis has prompted most researchers to take interest in carbon emissions disclosures, given that the environmental imperative of the ESG is gaining traction after COP26. Kleimeier and Viehs (2016:01) claim that there is a significant and negative association between producing voluntary disclosures on carbon emission levels and banks' loan pricing. This is true for internationally opaque borrowers. Moreover, higher carbon emissions have a positive impact on loan spreads (Kleimeier and Viehs, 2016:38). Although the climate crisis is relevant for ongoing studies, the social and governance imperatives are still crucial and must be investigated in ESG related studies. Most environmental performance studies have utilised ESG scores, ESG disclosures and ESG ratings when investigating the relationship between these ESG imperatives and cost of debt. However, some studies also reveal that there are various ESG dimensions that can be studied to widen knowledge base in this area. Maaloul et al. (2021:01)'s study focused on corporate reputation as influenced by ESG information and studied its impact on cost of debt financing. Maaloul et al. (2021:51) argued that ESG data positively influences the companies' reputation. This confirms the assertion that stakeholders and lobby groups are beginning to take environmental compliance seriously.

Corporate reputation, through the public relations department, is aided by different media used to communicate activities of the company, be they ESG related or otherwise. In one study, Gao et al. (2022:3989) investigated the impact of media spotlight of companies' environmental performance on the cost of debt financing. Findings showed that positive media spotlight on ESG issues significantly lowers companies' cost of debt in that it enhances the reputation of the company (Gao et al., 2022: 148). Furthermore, in Maaloul et al. (2021:01)'s study, using the SEM researchers were able to conclude that good company reputation lowers cost of debt financing, and plays a mediating role between environmental performance and banks' loan financing. International studies such as these contributed not only to the body of existing literature, but also changed perceptions of capital lenders, managers, accountants, and regulators. Managers are becoming aware of the likely benefits to be derived from CSR disclosures and management. Moreover, capital lenders may begin to consider environmental performance indirectly through corporate reputation when assessing creditworthiness of borrowers. Regulators are expected to formulate policies that are emanating from a pool of knowledge base to govern activities of reporting companies.

As an extension to expectations of regulators in the market environment, some studies have reported the importance of civil society groups and government in exploring and addressing the limitations of free market regimes (Eliwa et al., 2021:1045). According to Aboud and Diab (2018:196) prior literature generally suggests that capital lenders value ESG performance and incorporate such into their lending decisions. However, Eliwa et al. (2021:2354) note that the market still fails to distinguish between ESG performance and ESG disclosure. This highlights the need for more research to be done in this field to produce findings that will offer practical solutions to all players in the market. While there is emphasis on the role of civil society groups toward bettering understanding ESG, the Paris Agreement and later COP26, advocate for this agenda globally. Thus, studies conducted at country level are earmarked for pushing the agenda at a country level to contribute toward attaining the goals of the Paris Agreement in 2015. There is call for those countries and companies who are top emitters to actively work toward reducing carbon emissions significantly. Such efforts will arguably yield the benefit of easy access to affordable debt financing at corporate and country level (Herbohn et al., 2019:63).

Hui et al., (2018:01)'s study explored the association between environmental performance and companies' debt finance costs. The results demonstrate that ESG compliance leads to finance cost reduction and that cost reduction is more evident in companies that are among high greenhouse gas emitters (Hui et al., 2018:34). Moreover, Hui et al. (2018:33) posit that ESG performance at country level played a role only since 2015, which marks the period the Paris Agreement was adopted. This implies that there is still a need for government to benefit from ESG research to equip themselves with empirical data as they continue to promote the agenda toward achieving objectives of the Paris Agreement.

2.2.1. Studies which demonstrates positive relationship between environmental performance and cost of debt

Several studies have been conducted in emerging markets to investigate the relationship between ESG imperatives and the cost of debt. One example is China, it is one of the largest emerging markets experiencing rapid economic growth at the expense of worsening environmental and working conditions, which has taken a heavy toll on communities Kong et al. (2020:682). Bauer and

Hann (2012:37) note that such worsening conditions have created an undesirable image and threatened social instability globally in recent years. In conjunction with escalating concerns pertaining to the ESG predicament in China and across the globe, the Shenzhen Securities Exchange (SZSE) and Shanghai Securities Exchange (SHSE) made it mandatory for listed companies to report on ESG issues (Deng and Cheng, 2019:346). Cui et al. (2018:86) confirms that form the beginning of the financial year 2008, the regulation of the mandate was implemented to ensure that listed companies produce IRs. Moreover, Deng and Cheng (2019:348) argue that in the case of China, mandatory requirements were earmarked at ensuring that different stakeholders derive a holistic picture of the companies' environmental performance. Additionally, the directive forced listed companies to be more involved in ESG activities for the purpose of accountability to interested parties.

To exacerbate the situation, one Chinese study investigated the impact of these mandatory ESG disclosures on banks' loan pricing. In this study, Xu et al. (2021:2191) employed a sample of listed companies that are ESG compliant in the SZSE and SHSE to conduct a quasi-natural experiment. The results complemented findings by Li, Hu and Hong (2022:31) who opined that there is a significantly positive association between environmental performance and cost of debt. Thus, ESG compliant firms who were subjected to ESG disclosures were found to exhibit cheaper cost of debt and easy access to long term bank loans (Xu et al., 2021:2205). Furthermore, Xu et al., (2021:2191)'s study added that companies exhibiting high CSR scores, with detailed CSR reports, compiled accordingly with the GRI principles pronounced a sharp decrease in the cost of debt.

Notwithstanding the important implications of the study, the study is criticised for utilising dated data which is indicative of the fiscal years soon after the mandates were implemented by the SZSE and SHSE to listed companies. Thus, highlighting a gap in literature which can be filed by more research in this area, to interrogate the relationship of these variables a decade later or so. Moreover, Xu et al. (2021:2191)'s study also coincided with IFRS adoption in the fiscal year 2008 as well the global economic crisis, as such the findings may be driven by other imperatives leading to inconclusive results. In a similar study in Taiwan, Kuo et al. (2021:01) also focussed on the impact that mandatory CSR disclosure, reputation of assurance providers and CSR assurance have on banks' loan pricing. The results concurred with Xu et al. (2021:2191), demonstrating that mandatory CSR assurance on CSR disclosure as provided by various accounting firms tend to reduce banks' loan pricing. However, results further revealed that the reputation the accounting companies did not influence cost of debt financing (Kuo et al., 2021:19).

Although insightful, Kuo et al. (2021:19)'s study suffers has one main limitation, which forms the basis of this research. In the case of the Taiwan Stock Exchange (TSE) and Taipei Exchange (TE), the directive for the mandates were implemented in a relatively short period of time, making it impossible for the researcher to interrogate these variables for a longer period. This implores the current research to focus on the latest fiscal year to generate more accurate results, a decade after the JSE mandated CSR disclosure for listed companies. Moreover, the quality of the CSR disclosures varied considerably, with limited variables utilised to perform the univariate and the multiple regression analysis (Kuo et al., 2021:19). To further confirm the findings, a landmark research interrogated the relationship between climate change conditions and cost of debt (Ali and Abdel Ghaffar, 2022:01). While social and governance factors are crucial, the environmental imperative stands out, given the climate crisis, this has motivated calls for concrete actions to be taken by companies to mitigate against the crisis (Zeidan, 2022:76). Apart from different lobby groups, the Climate Change Summit at Glasgow (COP26) highlighted the the urgency.

Given this premise, Ali and Abdel Ghaffar (2022:01) recently conducted a longitudinal study covering the period 2005 to 2020 with Standard and Poor's 500 (SandP 500) companies forming the sample for this comprehensive study. In line with Xu et al. (2021:2191)'s findings, Ali and Abdel Ghaffar (2022:15) found a positive association between climate change actions and banks' loan pricing. This indicates that corporate climate change efforts as advocated by lobby groups and COP26 are indeed rewarded by cheaper cost of debt financing. Moreover, Ali and Abdel Ghaffar (2022:15) interpreted these findings in the context of the decision usefulness theory, indicating that environmental performance is becoming crucial in assessing the borrowers' creditworthiness. Ali and Abdel Ghaffar (2022:01)'s study is applauded for considering both environmentally sensitive industries and non-sensitive industries and controlling for the impact of the Covid 19 pandemic. However, though informative, the results are based on a sample of exclusively larger companies in the SandP index. Thus, the results do not shed light if the findings would be the same for a sample that includes smaller firms as well. Moreover, the study focusses on larger capital markets, as a result they cannot be generalised across smaller capital markets comprising of smaller to medium enterprises. Additionally, climate change dimensions may be questionable as these are based on a composite index, more dimensions of ESG imperatives may still be interrogated for more conclusive results.

In support of the above findings, Kozak (2021:01) tested the relationship between the intensity of CO2 emissions and cost of debt financing. This study focused on European Union (EU) countries and employed a sample of 225 large nonfinancial companies. This study is viewed as crucial as it sheds more light on a subject of interest to drafters of the Paris Agreement and enjoins strong CO2 emitters to address issues raised at COP26. Accordingly, findings demonstrated that a company can reduce its cost of debt financing by reducing the intensity of CO2 emissions (Kozak, 2021:13). Though insightful, especially because of utilising latest data from a range of EU countries, the study is biased towards developed markets. Thus, creating an opportunity for replica studies to be conducted in other countries, especially in developing countries to understand the relationship between carbon risk and banks' loan pricing. Moreover, Kozak (2021:13)'s findings lack richness given that the quality of the CO2 emissions data produced by reporting companies is doubtful. Thus, the study leaves a gap for a quest for more accurate results.

Acknowledging that very little attention has been given to examining the influence of ESG scores on banks' loan pricing, Arora and Sharma (2022:04) argued that it is imperative to assess how ESG variables influence banks' loan pricing. This is because the ESG issue is currently at the top of the global agenda, although not yet standardised. In India, ESG regulation is getting stricter given that the country is one of the top emitters as far as the climate crisis is concerned (Sood et al., 2022:384). A study conducted in India revealed that higher ESG scores were significantly negative to the cost of debt (Arora and Sharma, 2022). This means that where companies exhibited higher ESG ratings, cost of debt was lower. However, these findings lack depth as the focus was on nonfinancial Indian listed companies. The current study includes companies from different institutional and cultural contexts, in a different setting altogether to understand the behaviour of these variables in different emerging economies.

In Italy, Raimo et al., (2021:1412) attempted to bridge gap identified in previous literature by analysing the influence of ESG disclosures on the cost of debt financing. The study is commended for its in-depth approach where panel data of 919 companies was observed for a 10-year period. The results confirmed that ESG disclosures influence cost of debt financing. Moreover, this demonstrated that companies that are ESG compliant tend to have easy access to finance with better conditions from capital lenders. Despite its modest contribution to existing literature, Raimo et al. (2021)'s study concedes two gaps that call for further research to be done in this area. Firstly, the study focused solely on ESG disclosure and failed to introduce moderating variables which may include ESG performance. Secondly, the initial sample utilised for testing the hypothesis from a global perspective may be misleading since it was comprised of the SandP 1200 companies. These companies from different markets across the globe may present unreliable data given that some of them lack financial and ESG data given disparities in the adoption of ESG reporting.

In one Australian study, Bhuiyan and Nguyen (2020:419) further confirms the results of the triennial studies conducted across the globe by researchers given the currency of the phenomena under study. The relationship between CSR and cost of debt was investigated utilising listed companies in Australia. The negative results of the study confirm the inverse relationship that exist between these variables (Bhuiyan and Nguyen, 2020:430). This was indicative of the lowering cost of debt for high ESG scores in the case of Australian companies. However, the study is criticised for its lack of depth given that it was coupled with an interrogation of CSR disclosure impact on cost of equity. Thus, the study lacks thoroughness with more extensive scrutiny needed for the variables being studied.

2.2.2. Literature indicating a negative relationship between environmental performance and cost of debt

Amid many studies that have produced positive results for variables being studied, prior literature on cost of debt financing also documents a negative relationship between ESG imperatives and banks' loan pricing. In one such study, Magnanelli and Izzo (2017:250) investigated if there is a link between CSP and cost of debt financing. Thus, the study greatly anticipated that apart from cost of debt, even risk reduction is one of the potential benefits emanating from ESG activities (Magnanelli and Izzo, 2017:256). Accordingly, in this case, high CSP scores should be inversely associated with cost of debt financing to indicate that companies that are ESG compliant enjoy a net borrowing advantage.

In contrast to this expectation, findings of the linear regression model revealed that there was no significant relationship between CSP and cost of debt (Magnanelli and Izzo, 2017:265). The study utilised a data of 332 companies extracted for a 5-year period. Thus, Magnanelli and Izzo (2017:264)'s findings presented evidence that ESG factors are not value drivers with an influence on cost of debt and the companies' risk profile. The study added new dimensions to the existing debate on the variables being investigated. However, while the study focused on CSR performance, it ignored the impact CSR disclosure would have on the findings. Consistent with Magnanelli and Izzo (2017:264)'s findings, an Italian study did not report a statistically significant average treatment effect for companies with above average to high ESG scores (Gigante and Manglaviti, 2022:102). Simply put, the study did not find a robust relationship between ESG compliant companies and banks' loan pricing. The study was aimed at examining the effect of ESG on cost of debt financing using the regression discontinuity (RD) analysis. The study is commended for its relevance in academic literature and contribution toward strategic perspective in as far as European financial market is concerned.

In contrast to its positive contribution, Gigante and Manglaviti (2022:102)'s study concedes several gaps. First, the study is limited to only two proxies apart from the control variables that were utilised in statistical modelling. Thus, the analysis becomes an approximation rather an accurate study, current studies may consider risks such as greenwashing to produce more accurate results. Secondly, the study analysed the ESG solely by Refinitiv yet there is a vast majority of ESG performance metrics which could be considered in the current study to test the statistical robustness of the results. Thirdly, prior literature demonstrate that the cost of debt proxy utilised in this study is fragile (Giannarakis et al., 2014:78; Hui et al., 2011:86). Fourthly, the study employed an accounting proxy similar to that of Magnanelli and Izzo (2017) whereas a more reliable proxy is arguably the ratio of interest expense to an average of outstanding debt (Albelda Pérez et al., 2007:42; Bebbington and Gray, 2016:216; Eliwa et al., 2021:57).

In a combined study that, Devalle et al. (2017:53) conducted in Italy and Spain, the effect of environmental performance on credit ratings was investigated. While the study argued based on prior literature that environmental performance factors should be considered, the results were inconclusive. The anticipated outcome was based on the assertion that environmental performance impact borrowers' likelihood to of default on their debt obligations and cash flows (Jung et al., 2018:376). In contrast to this assertion, findings were inconclusive as the empirical analysis revealed no unanimous results and no clear-cut boundaries on the subject being investigated (Devalle et al., 2017:65).

In continuation to these unprecedented results, Devalle et al. (2017:65) further revealed that the environmental imperative of the

ESG factors did not portray any meaningful effect on credit ratings. These findings contradict prior literature which motivates that the environmental imperative is a priority given current climate crisis and calls to reduce carbon emissions (Kleimeier and Viehs, 2016:64; Kordsachia et al., 2022:332). While the study is highly commended for its practical implications to default probability and credit ratings, it is criticised for being limited to only Spanish and Italian public companies, thereby failing to give a picture of the whole European context. Moreover, it is cross sectional in that it only considered one fiscal year. The current paper employs panel data with considerations of the fixed effects on a wide range of years for more conclusive results.

In concurrence with the findings of Devalle et al. (2017:65) and Gigante and Manglaviti (2022:102), a French study tested whether environmental performance lowers the cost of debt for listed French companies (Hamrouni et al., 2020:279). In this study, a regression analysis was conducted using trusted ESG data retrieved from Bloomberg' database. Accordingly, Hamrouni et al. (2020:279) found that the social disclosure positively impacted on cost debt. This implies that there was no inverse relationship whatsoever, the social imperative is not a consideration for capital lenders of money. Moreover, the study also revealed an insignificant relationship with banks' loan pricing. Although informative, the study concedes two main caveats paving way for the current research. Firstly, the period under scrutiny is dated, which in turn renders the results of this study dated given that there is hunger for most recent knowledge in as far as ESG imperatives are concerned. Secondly, Hamrouni et al. (2020)'s study ignored contractual obligations and constraints that may be part of debt contracts. Moreover, apart from it being country specific, the study excluded certain sectors such as the financial, and utilities sector.

2.2.3. Studies which yielded mixed relationship between environmental performance and cost of debt

Prior literature suggests that ESG disclosures mitigate information asymmetries between managers and capital lenders of money, thereby lowering creditors' view of default risk (Kim et al., 2021:84). In conjunction with calls by investors for companies to disclose nonfinancial information to enhance investment decisions (Mutize and Nkhalamba, 2020:632; Sciarelli et al., 2021:746; Zeidan, 2022:198), capital lenders now demand such information when formulating debt contracts. Daugaard (2020:18) postulates that such information can help capital lenders to make accurate predictions on the companies' credit quality instead of solely relying on the traditional financial information which is quantitative in nature.

Furthermore, prior studies have sought to investigate the relationship between ESG factors and cost of debt in the light of growing calls for companies to disclose ESG factors to equip capital lenders with adequate information when debt contracting. In one Germany study, Gerwanski (2020:2299) sought to gather evidence to assess if IR influences cost of debt financing. The study was propelled by the lack of research in investigating the relationship between these variables given that researchers have been biased towards interrogating the impact of IR on cost of equity. This landmark study demonstrated evidence of a mixed relationship between environmental performance and the cost of debt. While findings revealed that IR decreases cost banks' loan pricing, further moderation analyses demonstrated that this only holds for companies operating in strong environmentally sensitive industries (Gerwanski, 2020:2319). This implies that capital lenders do not consider ESG imperatives as reported in IRs for companies that do not operate in environmentally sensitive industries. Although informative, the study failed to break down the IR variable to a more fine-grained level to identify ESG elements which have a dominant effect on the cost of debt. Moreover, the quality of IR is progressive, thus current studies may yield more accurate results given that the most recent IRs are of better quality.

In a related study conducted in Europe, Kordsachia (2021:1611) investigated the association between CSR and marginal credit costs of companies in Europe. Unlike an earlier studies by Magnanelli and Izzo (2017) and Raimo et al. (2021), Kordsachia (2021:1611) sought to provide evidence based on variables studied by employing various model specifications and fine-grained measures for CSR to interpret the results in the context of increasing relevance of ESG imperatives. Findings highlight that the relationship between CSR assurance and banks' loan pricing confirms that capital lenders do reward environmental performance by lowering the cost of debt (Kordsachia, 2021:1643). Conversely, Kordsachia (2021:1643)'s study suggests that the results are true for companies in relative financial distress. This suggests that capital lenders may negate CSR considerations for those companies who are not facing liquidity problems. Though insightful, the study is criticised for failure to incorporate small and medium-sized businesses, particularly those that are listed on the securities exchange. Those companies are likely to depend on bank loans to finance their operations. Furthermore, despite utilising a fine-grained approach in the operationalisation of CSR variables, it should be noted that the importance of CSR metrics may vary across industries, companies, and countries. Moreover, findings of this study are not consistent with similar studies which employed monotonic proxies. Thus, Kordsachia (2021:1643)'s study is not generalisable to different companies operating in the financial services sector as well as in different geographical regions.

In one Polish study, Ratajczak and Mikołajewicz (2021:74) examined the impact of ESG imperatives on both short-term and long-term debt using linear regression applied to a dataset of 300 companies recognised as socially responsible. This study confirmed a mixed relationship between the variables studied. Firstly, prioritising environmental issues was shown to lower the cost of long-term debt, while focusing on social issues yielded a net advantage to borrowing costs for both short-term and long-term loans (Ratajczak and Mikołajewicz, 2021:96). Secondly, the study further revealed surprising results as prioritising governance issues resulted in increased cost of debt financing in all time horizons. This study is applauded for breaking down the three ESG imperatives in the analysis to examine term structures of debt finance for companies. However, the study is criticised for the limited sample size of the companies utilised in the study. While the study retrieved data from the Thompson Reuters, a different data base source may yield different outcomes given that in a

study of this nature, the data base employed impact on the scope of data retrieved and variables measured thereof. Furthermore, interrogating CSP or CSR scores is deemed complex, let alone to investigate the impact these have on ESG. Thus, the study needs to be complemented by more current studies that employ proper proxies that will yield more accurate results.

In a related study, Lavin and Montecinos-pearce (2022:01) employed fixed effects model to analyse a unique data set of companies listed on the securities market in Chile. The study investigated the association between ESG disclosure and cost of debt financing to draw conclusions if heterogenous companies in emerging markets benefit from ESG disclosure when borrowing loans (Lavin and Montecinos-pearce, 2022:21). Thus, the study is applauded for its relevance to this study which focuses on South Africa as an emerging market. In support of the findings of the earlier studies, Lavin and Montecinos-pearce (2022:21)'s findings demonstrate a mixed relationship between the variables being scrutinised. This follows that if using a direct channel, greater ESG disclosure influences lower cost of debt financing. Conversely, through an indirect channel, ESG disclosure was found to interact with growth opportunities and greater disclosure associated with higher cost of debt financing (Lavin and Montecinos-pearce, 2022:21). Thus, Lavin and Montecinos-pearce (2022) presents evidence that in emerging markets ESG imperatives impact on the banks' loan pricing in two conflicting directions. On the other hand, censure on these findings highlight that Chile may not be the best region to represent emerging economies. As a result, more research needs to be undertaken in the context of emerging economies, where accessing loans limits growth as well as total factor productivity improvements.

Given the gaps identified and discussed above, on the relationship between environmental performance and cost of debt, the following questions have remained unanswered:

- Does environmental performance influence banks' loan pricing in the long run?
- Does environmental performance influence banks' loan pricing in the short run?

Therefore, this paper attempts to answer these questions to fill the research gap identified in the prior literature.

3. METHODOLOGY, DATA ANALYSIS AND RESULTS

3.1. Research Design, Population, and Sample

The researcher adopts positivism to frame the study (Morgan, 2007:48). This paradigm is preferred because of its association with quantitative techniques, where variables are empirically tested through observation and measurement (Crowe et al., 2011:08). The population of this study consist of all companies appearing on the FTSE/JSE RII from 2016 to 2021. This means that the population will comprise of 60 companies listed on the FTSE/JSE RII as of 28 June 2021. Judgemental sampling method was utilised for several reasons. Consequently, the sample will comprise of 21 companies drawn from the 60 FTSE/JSE SRI for the fiscal year 2021. The list of 21 companies sampled and respective industry sectors is based on the researcher's judgement informed by specific criteria.

3.2. Research Data

Previous studies, with a similar objective, have extoled the use of content analysis for its aptness where such objectives are to be accomplished (Cowan, 2007:109; De Villiers and Van Staden, 2006:763; O'Donovan, 2002:246; Jose and Lee, 2007:311; De Villiers and Lubbe, 2001:81). Thus, this paper employed content analysis technique to collect data needed to address the main objective. Content analysis is an unobstructive method since companies being investigated are not aware that environmental performance indicators they disclose will be studied. The researcher may use this approach to sift through archival documents to identify the needed data for the phenomena being studied (Guthrie, et al., 2004:282). The communication channels identified for this study are Integrated Annual Reports (IARs) and Sustainability Reports (SRs). A short panel data set of 21 cross-sections for the fiscal years 2016 to 2021 was generated in Microsoft Excel spreadsheets in preparation for the data analysis process using STATA and Eviews 13 statistical software packages.

3.2.1. Operationalisation of independent variables

In this paper, corporate environmental performance is measured by several key performance indicators namely: consumption of water (CoW); consumption of energy (ConsE), and emissions of greenhouse gases (EmGHG). These environmental performance indicators are deemed useful to stakeholders including banks who make economic decisions that affect the company. The Table 1 below shows how the measurement of the independent variable, and its sub-variables will be done in the paper.

3.2.2. Operationalisation of dependent variables

In Table 2 below, measurement of banks' loan pricing is presented together with the measurement of control variables associated with this variable. These proxies are adapted from previous studies (Aifuwa et al., 2019:61; Chatzitheodorou et al., 2021:1473; Anagnostopoulos et al., 2018:1012; Cui et al., 2018; Serrano-Cinca et al., 2016:3504).

To commence the statistical analysis for the paper, numerous statistical diagnostic tests were performed consisting of panel data tests for normality, serial correlation, multicollinearity, heteroskedasticity, and stationarity. Given that all variables were stationary at first difference – I(1), the cointegration test was performed to check if long run relationship exist between variables. As a result, the paper employed STATA to generate pairwise correlation matrix. Subsequently, 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:

- *H1: Environmental performance does not influence banks' loan pricing in the long run.*

Table 1: Measurement of corporate environmental performance

Variable	Variable name	Variable sub-name	Measurement method
Independent variable	Corporate environmental performance	Consumption of water (*CoW*) Consumption of energy (*ConsE*) Emissions of greenhouse gases (*EmGHG*)	Million cubic metres (*Mm3*) and kilolitres (*Kl*). Giga-joules (*Gj*) or Mega-watt hours (*Mwh*) Metric tonnes of CO_2 equivalent (*Mt* CO_2e)

Source: Author's compilation, 2021

Table 2: Measurement of bank's loan pricing and control variables

Variable	Variable name	Measurement method
Dependent variable	Banks' loan pricing (*BLP*)	Interest paid on bank's loan
Control variables	Total monetary value of collateral (*MvCOL*)	Total tangible fixed assets reflected in the IARs
	Level of profit (*LvP*)	Profit (loss) value reflected in the IARs

Source: Author's compilation, 2021

- *H2: Environmental performance does not influence banks' loan pricing in the short run.*

3.2.3. Decision rules

3.2.3.1. 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.

3.2.3.2. 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 ($\varnothing$) 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.

3.2.3.3. 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.

3.2.3.4. 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.

3.3. Statistical Modelling of the Study

As indicated above, corporate environmental performance is measured by variables CoW, ConsE and EmGHG whereas banks' loan pricing is measured by BLP. Panel data pertaining to these variables covered the fiscal periods 2016 to 2021. Getzmann et al. (2014:81) argue that statistical models in research can render intuitive visualisations that aid the researcher in identifying relationships between variables being studied and make predictions using such statistical models to raw data. To achieve the objective set for this paper, the researcher adopted the Vector Error Correction Model (VECM) 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.

$$Y_{it} = \beta 0_i - \beta_i 1 X_{it} + \varepsilon_{it} \quad \text{(i)}$$

$$\varepsilon_{it-1} = ECT_{it-1} = Y_{it-1} - \beta 0_i - \beta_i 1 X_{it-1} \quad \text{(ii)}$$

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

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)
- $\varnothing_i$ = Speed of adjustment
- Subscript '*i*' = Represents each subject in the panel
- k = The number of lags

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

$$\Delta BLP_t = \beta_1 + \sum_{i=1}^{p} \beta_{2,i} \Delta BLP_{t-1} + \sum_{k=1}^{q} \beta_{3,k} \Delta CoW_{t-1} + \sum_{l=1}^{q} \beta_{4,l} \Delta ConsE_{t-1} + \sum_{j=1}^{q} \beta_{5,j} \Delta EmGHG_{t-1} + \varnothing ECT_{t-1} + \mu_{,2t} \quad \text{(iv)}$$

Where:
BLP = Banks' loan pricing, which represents capital lenders' corporate support as a stakeholder. β = Parameter to be estimated in the model, CoW = Consumption of water, ConsE = Consumption of energy, and EmGHG = Emissions of greenhouse gases, are vectors capturing corporate environmental performance respectively. μ = indicator for uncorrelated errors. $\varnothing$ = 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 with the VECM estimations, the impulse response function (IRF) analysis was conducted. The statistical software Eviews 13 was employed to perform this analysis after which the results were presented graphically for further analysis interpretation. According to Cao and Sun (2011:356), the subscript '*i*' is omitted in the analysis since impulse response function does not depend on this index and fixed effects in the system. Accordingly, the impulse response function matrix is defined as follows:

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

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.

3.4. Basic Regression Assumptions

In Table 3 below, numerous statistical diagnostic tests are presented to check the series for normality, serial correlation, multicollinearity, heteroskedasticity, and stationarity. Given that all variables were stationary at I(1), the cointegration test was performed to check if long run relationship exist between variables. While all tests were fulfilled, the cointegration tests indicated that a long run relationship exists between variables hence the adoption of the VECM as the main model for the paper.

3.4.1. Cointegration test for panel data

To examine whether long-run relationships exists or not for variables employed in the study, Kao Residual Cointegration Test was performed using Eviews 13 software. The null hypothesis of no cointegration among variables was rejected at $P < 0.05$, where $\alpha = 0.05$ is the level of significance. The ADF P value of 0.0000 was generated for variables BLP, ConsE, EmGHG, CoW, LvP and MvCOL. This entails consideration of the alternative hypothesis of cointegration among variables given that $P < 0.05$. Thus, there is evidence of long-run relationship among variables computed for this analysis. Figure 1 below shows results produced by the Kao Residual Cointegration Test performed.

3.5. Results and Discussions

3.5.1. Pairwise correlation

Pairwise correlation values of all exposure variables for environmental performance utilised in the study indicated a weak but positive correlation when paired with BLP. Consistent with prior correlation studies, for example Kozak (2021:18), Arora and Sharma (2022:93), and Kuo et al. (2021:269), this is indicative of a possible relationship between environmental performance and banks' loan pricing. Thus, Table 4 shows a starred correlation coefficient value of 0.208 between BLP and CoW. This value is juxtaposed with a P value of 0.020 which is within the 0.05 level of significance. The P value suggests that the sample utilised has strong evidence for the existence of this said correlation between the concerned outcome and predictor variables. Additionally, the P value of 0.019 reflects stronger evidence for the existence of correlation between BLP and EmGHG. This suggests that capital lenders are more responsive to companies' performance regarding greenhouse gas emissions. Table 4 shows a starred correlation coefficient value of 0.209 which is acceptable at $P < 0.05$.

3.5.2. The vector error correction model results on banks' loan pricing

The VECM results for the main objective were computed using Eviews 13 and presented in Appendix XV. The cointegrated equation coefficient indicates that the previous year's deviation from long-run equilibrium is corrected at a speed of 113.9 percent. The correction is initiated following disturbances so that the equilibrium of the model is restored. Thus, the coefficients of the ECT showing negative results are statistically significant for BLP and EmGHG as dependent variables. As a result, the conclusion can be drawn to suggest that convergence from short-run dynamics to long-run equilibrium exist for variables being examined. Thus, Appendix XV depicts the ECT values of - 1.138652 and - 0.002862 for target variables BLP and EmGHG respectively. On the other hand, CoW and ConsE generated statistically insignificant adjustments towards long-run equilibrium in case of any disequilibrium situation. This inference is supported by the positive adjustment coefficients reflected as 9.3 percent and 4.6 percent respectively.

3.5.2.1. The long-run model results on banks' loan pricing

The lagged residuals equation (vi) specified below reveals long-run model results generated using Eviews 13. The equation is derived from the above-mentioned cointegration equation (ii) which depicts the ECT for this model. The unrestricted constant for the equation has a value of -9.727008 while the target variable BLP will always show a coefficient of 1.000000 in conventional terms. In the equation, only one predictor generated a positive coefficient of 0.214453 i.e. ConsE. The explanatory variables CoW and EmGHG produced negative coefficient values of 1.045805 and 0.753498 respectively (Appendix XV).

Table 3: 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	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

$$\varepsilon_{it-1}=1.000000BLP_{it-1} - 1.045805CoW_{it-1}+0.214453ConsE_{it-1} - 0.753498EmGHG_{it-1} + 9.727008 \quad \text{(vi)}$$

In addition, Figure 2 below shows the Eviews 13 results of PLS estimations conducted to interrogate short-run and long-run dynamics given the endogenous variables under consideration for the study. This estimation is imperative given that it reflects the probability values of the coefficients. This PLS estimation is utilised for the variables at first difference where BLP is the main target variable of interest. Moreover, the significance of the coefficients of interest can be observed as shown in the figure below.

Figure 1: Kao Residual Cointegration Test

Series: BLP CONSE COW EMGHG LVP MVCOL				
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			−4.975511	0.0000
Residual variance			67.74609	
HAC variance			64.18145	
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)	−0.945733	0.094583	−9.999002	0.0000
R-squared	0.488258	Mean dependent var		0.504158
Adjusted R-squared	0.488258	S.D. dependent var		8.324233
S.E. of regression	5.954835	Akaike info criterion		6.415762
Sum squared resid	3687.847	Schwarz criterion		6.441038
Log likelihood	−335.8275	Hannan-Quinn criter.		6.426005
Durbin-Watson stat	2.332387			

Source: Author's compilation, 2023

The PLS estimations for this paper revealed the F-statistic value of 0.00 which is indicative of an absolute statistically significant relationship between BLP and environmental performance measured by CoW, ConsE and EmGHG. This relationship is true especially for the long-run dynamics where the long-run coefficient of −1.138652 is negative and statistically significant at $P < 0.05$. In Figure 2 above, it is evident that the negative speed of adjustment exhibits the ability to bounce back to equilibrium since positivity may point to movement away from equilibrium. Moreover, these results are valuable given that the Adjusted R^2 produced a value of 52 percent which is lower than 95 percent level of significance.

3.5.2.2. The short-run model results on BLP

The lagged residuals specified in equation (vi) above indicate mainly the long-run dynamics of the variables of the study.

Table 4: Pairwise Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) BLP	1.000					
(2) CoW	0.208*	1.000				
	(0.020)					
(3) EmGHG	0.209*	0.297*	1.000			
	(0.019)	(0.001)				
(4) ConsE	0.271*	0.232*	0.446*	1.000		
	(0.002)	(0.009)	(0.000)			
(5) MvCOL	0.074	0.073	0.181*	0.069	1.000	
	(0.407)	(0.415)	(0.043)	(0.441)		
(6) LvP	0.022	0.132	0.188*	0.236*	0.372*	1.000
	(0.810)	(0.141)	(0.035)	(0.008)	(0.000)	

***P<0.01, **P<0.05, *P<0.1

Source: Author's compilation, 2023

Figure 2: Panel least squares estimations

Dependent Variable: D (BLP)				
Method: Panel Least Squares				
Sample (adjusted): 2018 2021				
Periods included: 4				
Cross-sections included: 21				
Total panel (balanced) observations: 84				
	Coefficient	Std. Error	t-Statistic	Prob.
C (1)	−1.138652	0.157537	−7.227832	0.0000
C (2)	0.191323	0.111480	1.716206	0.0901
C (3)	−1.104803	0.204632	−5.398975	0.0000
C (4)	0.146000	0.478358	0.305212	0.7610
C (5)	0.244532	0.428545	0.570610	0.5699
C (6)	0.615823	0.718351	0.857273	0.3939
R-squared	0.548100	Mean dependent var		0.506172
Adjusted R-squared	0.519132	S.D. dependent var		9.170637
S.E. of regression	6.359348	Akaike info criterion		6.606478
Sum squared resid	3154.422	Schwarz criterion		6.780108
Log likelihood	−271.4721	Hannan-Quinn criter.		6.676276
F-statistic	18.92088	Durbin-Watson stat		2.158072
Prob (F-statistic)	0.000000			

Source: Author's compilation, 2023

The complete VECM provides information relating to short-run dynamics derived from equation (iii) above. Accordingly, the VECM estimates produced the following results.

$$\Delta BLP_{it} = -1.138652ECT_{it-1} + 0.191323\Delta BLP_{it-1} - 1.104803\Delta CoW_{it-1} + 0.146000\Delta ConsE_{it-1} + 0.244532\Delta EmGHG_{it-1} + 0.615823 \quad \text{(vii)}$$

In Figure 2 above, the short-run coefficients C(2), C(3), C(4) and C(5) represents coefficients of the endogenous variables BLP, CoW, ConsE and EmGHG respectively. Moreover, C(1) is the adjustment speed while C(6) represents the intercept of 0.615823 as shown in equation (7). To this end, the results indicate that a percentage upswing in CoW will lead to decline in BLP by 110.5 percent. Furthermore, the corresponding P value confirms the statistical significance of this coefficient. As a result, this negative coefficient of 1.104803 provides evidence that CoW has a statistically significant short-run relationship with BLP. However, despite such insightful results, the other endogenous variables ConsE and EmGHG do not show evidence of significant short-run relationship with the target variable of interest. To extend the results of the VECM's short-run dynamics, Figure 3 below depicts the findings of the Wald Test which was performed on Eviews 13.

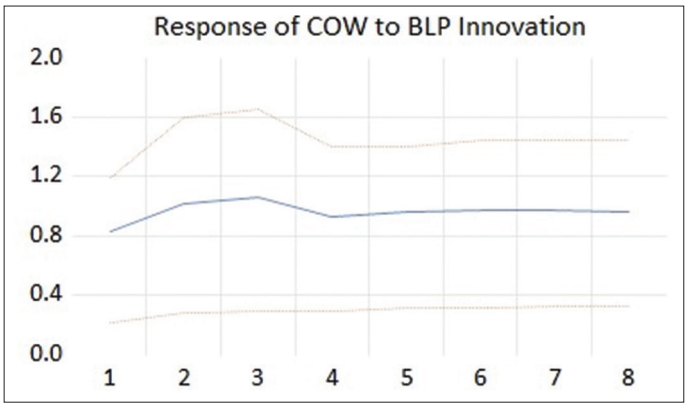
In congruency with the results of the VECM estimates in Appendix XV, the Wald Test for the second sub-objective confirms the short-run relationship among variables. Examining the values of F-statistic and Chi^2 indicate statistical significance at $P < 0.05$. Thus, the null hypothesis of a present short-run relationship between BLP and environmental performance is accepted.

Figure 3: Wald Test for short-run dynamics

Test Statistic	Value	df	Probability
F-statistic	9.926965	(3, 78)	0.0000
Chi-square	29.78089	3	0.0000
Null Hypothesis: C (3)=C (4)=C (5)=0			
Normalized Restriction (= 0)		**Value**	**Std. Err.**
C (3)		−1.104803	0.204632
C (4)		0.146000	0.478358
C (5)		0.244532	0.428545
Restrictions are linear in coefficients			

Source: Author's compilation, 2023

Figure 4: Impulse response of CoW to shocks in Banks' loan pricing



3.5.3. Impulse responses of environmental performance measures to standard deviation shocks in cost of debt

To replicate the analysis, impulse responses of CoW, EmGHG and ConsE to innovation in BLP were generated following the VECM estimation stipulated in equation (vii) above. Figure 4 reveals that one standard deviation shock to BLP slightly increases CoW between year 1 and year 2 after which the impact reduces significantly. It is further observed that the impact on CoW declines gradually from year 2 to year 3. Thereafter, the response remains constant in the positive region for the foreseeable future. On the other hand, the innovation to BLP initially increases EmGHG up to year 2. This positive response to a standard deviation shock in BLP equally decreases from year 2 to year 3 as shown in Figure 5 below. Moreover, a steady increase is produced between the periods 3 to 5 after which a steady state value is attained for the foreseeable future. The IRF generated for the standard deviation shock in BLP also reports a sharp increase in ConsE from year 1 to 2.

However, the observed increase in quickly hits a steady state value in the positive region howbeit with decreasing tendencies (Figure 6). In all the examined cases of the IRF for this paper, impulse response falls within the 95 percent confidence levels.

The above graph confirms the positive impact that standard deviation shocks to BLP will have on environmental performance measures (CoW, EmGHG and ConsE) utilised in the study. In all cases, there seem to be evidence of a significant positive impact both in the short-run and long-run. On The graphs reveal that on

Figure 5: Impulse response of EmGHG to shocks in Banks' loan pricing

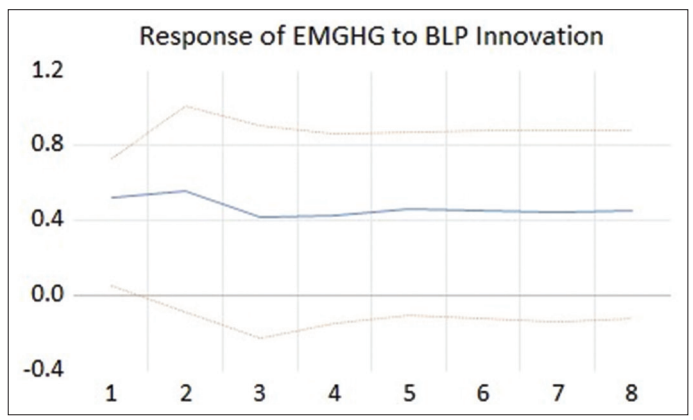


Figure 6: Impulse response of ConsE to shocks in Banks' loan pricing

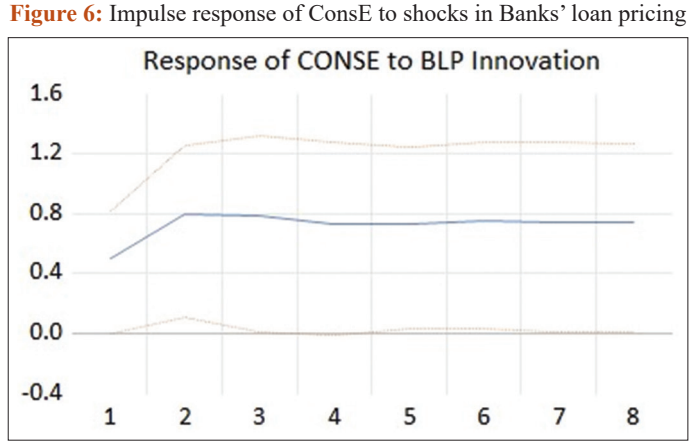
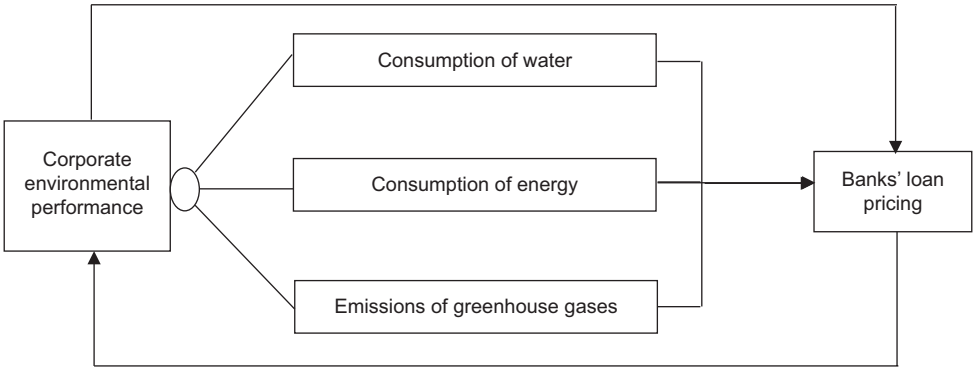


Figure 7: The suggested conceptual framework



Source: Author's own compilation

average the increase or decrease in response to standard deviation shock to the explanatory variables happen within the first three years. The results are congruent with the findings emanating from the pairwise correlation matrix and VECM above.

4. CONCLUSION

The objective of this paper was to investigate if corporate environmental performance influences banks' loan pricing. To achieve this objective, the paper utilised archival data collected from the FTSE/JSE RII listed companies. The paper used a sample of twenty-one companies to generate a short panel data set for statistical analysis. The paper adopted first differenced econometric models in statistical panel data analyses namely Panel Vector Error Correction Model (VECM), and subsequently Panel Least Squares (PLS), Wald Test, and Impulse Response Functions (IRF). The analyses produced a statistically significant positive impact, both in the short run and long run, between environmental performance predictors and banks' loan pricing. Thus, corporates that are compliant with ESG demands tend enjoy the support of financial institutions. This assertion confirms the backdrop of green finances pledged at a global stage towards alleviating the effects of the climate crisis. The paper renders new assertions in understanding stakeholders' current environmental practices.

To digest the findings of this paper, the results were consistent with the prior empirical studies Bhuiyan and Nguyen (2020:653) and Kozak (2021:432), where the PLS estimations produced the F-statistic value less than 5 percent. In this paper, F-statistic of 0.0000 was indicative of an absolute statistically significant relationship between BLP and corporates' environmental performance measured by CoW, ConsE and EmGHG. This relationship was found to be true especially for the long-run dynamics where the long-run coefficient of −1.138652 is negative and statistically significant at $P < 0.05$. Accordingly, evidence was found that the negative speed of adjustment exhibits the ability to bounce back to equilibrium since positivity may point to movement away from equilibrium. These results were validated by the Adjusted R^2 which produced a value of 52 percent which is lower than 95 percent level of significance. Moreover, the IRFs confirmed the positive impact that standard deviation shocks to BLP have on environmental performance measures. Thus, in all cases, the graphs confirmed evidence of a significant positive impact both in the short-run and long-run. The graphs revealed that on average the increase or decrease in response to standard deviation shock to the explanatory variables happen within the first 3 years. These results are congruent with the findings emanating from the pairwise correlation matrix and VECM estimates.

Furthermore, pairwise correlation values of all exposure variables for environmental performance utilised in the study indicated a weak but positive correlation when paired with BLP. These findings were consistent with prior correlation studies e.g., Kozak (2021:32), Kuo et al. (2021:433), Arora and Sharma (2022:54). Thus, the pairwise correlation matrix revealed a starred correlation coefficient value of 0.208 between BLP and CoW where $P = 0.020$ (at $\alpha = 0.05$). The P value suggested that the sample utilised has strong evidence for the existence of this said correlation between the concerned outcome and predictor variables. In addition, P equals 0.019 reflected stronger evidence for the existence of correlation between BLP and EmGHG. This pronounced that capital lenders are more responsive to companies' performance regarding greenhouse gas emissions. Thus, a starred correlation coefficient value of 0.209 was acceptable at $P < 0.05$.

Similarly, the short-run dynamics produced results pointing to the positive relationship between the endogenous variables tested in this paper. Thus, the coefficients C(1) represented the adjustment speed while C (6) represented the intercept of 0.615823. The results indicated that a percentage upswing in CoW will lead to decline in BLP by 110.5 percent. In addition to that, the corresponding P value confirms the statistical significance of this coefficient. As a result, the negative coefficient of 1.104803 provided evidence that CoW has a statistically significant short-run relationship with BLP. To extend the results of the VECM's short-run dynamics, the findings of the Wald Test further interrogated the short-run dynamics in the model. In congruency with the results of the VECM estimates, the Wald Test confirmed the short-run relationship among variables. Additionally, a closer examination of the F-statistic and Chi^2 values indicated a statistical significance at P less than 5 percent. As a result, the null hypothesis of a present short-run relationship between BLP

and environmental performance was accepted. Informed by the findings of the second sub-objective, the proposed conceptual framework is presented in Figure 1 below:

Notwithstanding the findings presented in this paper, the paper has two notable limitations. Firstly, the paper focussed on FTSE/JSE SRI which may exhibit a degree of bias to industry sectors. Thus, the paper might not sufficiently conclude that the results are generalisable to all companies that are listed in the JSE. Future research studies could include more companies to address the questions on corporate environmental performance practices concretely. Secondly, the paper utilised short panel data covering six financial years to perform statistical analysis to answer the posed questions. However, future studies could employer long panel data covering longer periods to enhance reliability of the results. Moreover, more companies may be included in the sample to widen the scope of industry coverage. Future research may also employ primary data by soliciting views of capital lenders to establish new insights on the phenomena being studied.

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