The Relationship between ESG and Cost of Debt: In [*]Egyptian Companies in EGX100

Abstract

Environmental, social and governance (ESG) performance is becoming more and more important, and researchers have looked at how it affects business and profitability in an effort to show how it helps a firm succeed financially. Although debt is a crucial financial tool for businesses, the influence of ESG on debt financing and debt expenses has received very little attention in the research. Therefore, the objective of this paper is to study the effect of ESG on cost of debt using firm size, leverage, profitability, and interest coverage ratio as control variables. Using secondary data, its main source is the annual reports of non-financial Egyptian institutions registered on the stock market in accordance with the EGX 100 between 2011 and 2020. A quantitative method that incorporates reports from non-financial entities was used to acquire the essential data. The results demonstrated that independent factors had direct, and substantial effects on equity cost. However, control variables were insignificant according to the results.

Keywords: ESG, Cost of Debt, EGX100.

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العلاقة بين ESG وتكلفة الدين: في الشركات المصرية في EGX100

خلاصة

أصـــبح الأداء البيئي والاجتماعي والحوكمة (ESG) أكثر أهمية ، وقد نظر الباحثون في كيفية تأثيره على الأعمال والربحية في محاولة لإظهار كيف يسـاعد الشـركة على النجاح ماليًا. و على الرغم من أهمية الدين كأداة مالية للشـــركات ، إلا أن تأثير ال ESG على قرارات التمويل من خلال الدين ونفقات الديون لم يتلق ســـوى القليل من الأبحاث. لذلك ، فإن الهدف من هذه الورقة هو دراســة تأثير ESG على تكلفة الدين باسـتخدام حجم الشـركة ، والرافعة المالية ، والربحية ، ونسـبة تغطية الفائدة كمتغيرات تحكم. اعتمد البحث على البيانات الثانوية من التقارير السـنوية للمؤسـسـات المصـرية غير المالية المســجلة في البورصـــة وفقًا لمؤشــر EGX 100 بين عامي 2011 و 2020. تم استخدام طريقة كمية تتضـمن تقارير من جهات غير مالية للحصـول على بعض البيانات الاساسية. أظهرت النتائج أن العوامل المستقلة كان لها تأثيرات مباشرة وجوهرية على تكلفة حقوق الملكية. ومع ذلك ، كانت متغيرات التحكم غير مؤثرة وفقًا للنتائج.

الكلمات المفتاحية: ESG ، تكلفة الدين ، .EGX100

1. Introduction

The easiest way to determine whether an organization's borrowing is beneficial is to compare the service cost of debt with the rate of return on the expenditure that is supported by debt. The cost of debt is a term that refers to the interest that must be paid to creditors. Rollover costs, or the expenses of refinancing as debt matures, can rise significantly during times of financial stress and possibly spark a financial crisis, which is a key argument against extensive borrowing, which may exceed the advantages of borrowing in some nations. The magnitude and efficacy of fiscal stimulus measures during recessions may also be constrained by high debt levels. Finally, a large debt load might slow development over time by discouraging private investment that boosts productivity (Kose et al., 2020).

The cost of debt is one of the most important factors for businesses to take into account when making financial decisions. When loan costs are low, businesses frequently increase their financial capital investments. So, it is important to understand the elements that influence loan costs in order to lower debt costs. Companies may boost operational performance, raise profitability, and become more competitive in the market as a consequence (Thu and Khanh, 2021).

For external business finance and growth, debt financing is special and crucial. The worldwide equity market is just half as large as the global syndicated loans market. Having access to affordable debt financing is essential for ensuring that businesses have enough cash flow. Creditors are important members of the business community. Therefore, creditors view a company's punishment or damaged reputation as an increase in risk that may jeopardies the company's capacity to repay its debt. The penalty sends the impression that there is no security, which makes creditors more sensitive to concerns about debt repayment. As a result, creditors may request more collateral, shorten the loan's maturity, increase the spread

charged on the loan, and/or change the loan's terms (Gong et al., 2021).

Debt cost is the return the creditor expects in exchange for lending the money, and it is based on how likely the debtor is to repay the loan. Companies seeking bank loans must offer thorough information on their products, the market, their technology, their money, etc. Based on the data given by the firms, banks assess the size, cost, and solvency of these risks. According to information disclosure theory, a company's information asymmetry is significantly influenced by its information environment and information policy. A thorough policy on information disclosure and proper information disclosure can lower a company's information asymmetry, improve information transparency, and lower financing costs (Miao et al., 2021).

According to earlier research, businesses may cut their cost of capital by increasing demand for their stock and debt issuance by making more detailed disclosures. The idea that voluntary public disclosure minimizes information asymmetry and enhances a firm's access to less expensive external finance is supported by empirical data. Because of lessened information asymmetry, lowered bid-ask spreads, higher stock liquidity, a lower average equity cost and debt capital, and better investment decisions as a result, more informative disclosures are observed to result in a more effective allocation of capital overall (Rosa et al., 2017).

Businesses may embrace high-risk projects that could benefit shareholders but decrease the value of bonds if boards take steps to improve the position of shareholders relative to creditors. Lenders may demand higher loan rates and stricter covenants from companies with more pro-shareholder governance as a result of this conflict. If some boards are successful in increasing the company's efficiency in a way that assists shareholders and creditors, the debts cost and/or their covenant conditions may be decreased. For instance, a diverse board might inspire banks to place more trust in internal governance processes, which would lead to lower

borrowing costs. On the other hand, a more seasoned board may offer better management advice and debt terms. More generally, the cost of borrowing money may be significantly impacted by the board's effectiveness (Fields et al., 2012).

In particular, the activities and traits (such as prediction accuracy and dispersion) of analysts appear to be responsible for the decline in the cost of debt (COD). By lowering bond yield spreads, analysts improve the business's information environment at a time when uncertainty regarding firm value is at its highest. Forecasts and advice from experts, therefore, have an impact on credit ratings. Because analysts are crucial information conduits and help market participants reduce the knowledge gap between lenders and management, corporations should provide information of higher quality and quantity, which should lower the COD (Rosa et al., 2017).

This study provides a worldwide perspective to investigate how an organization's COD is impacted by its environmental, social, and governance (ESG) performance. Few worldwide studies have studied the implications of political, cultural, and institutional governance processes, as well as the influence of ESG performance on COD. This study addresses a void in the literature of the connection between global ESG performance in COD for corporations. It does so by employing control factors including firm size, leverage, profitability, and interest coverage ratio (ICR) that may have an impact on the results.

Environmental (E) factors include the ways in which businesses consume energy, dispose of trash, pollute the environment, protect natural resources, and treat animals. It also covers the assessment of environmental hazards and how such risks are managed by businesses. Businesses may face environmental hazards as a result of their ownership of unclean property, oil spills, dangerous chemicals, poisonous emissions, or adhering to environmental regulations, for example. Additionally, social (S) factors, which are associations between businesses. Do the company's suppliers share

the same values that the company says they do? Does the company give back to the community or participate in charitable endeavors with a portion of its profits? Do the workplace conditions at the company show a genuine concern for the health and safety of its workers? Governing (G) elements, which are the governing facets of businesses. Investors want to know if companies adopt transparent and accurate accounting practices and whether shareholders have the right to vote on important matters. Investors also expect companies to choose board members without conflicts of interest. Investors also prefer not to put money into businesses that commit crimes or pay for favors with political contributions (Houqe et al., 2020).

An alternative perspective is that firms can become liable to their shareholders and the general public by focusing on ESG performance. Socially conscious businesses have greater availability of resources and recruit more competent workers. Additionally, these businesses are better able to market their goods and services, creating unanticipated business opportunities and gaining social acceptance. Consumers that care about the environment are more likely to support socially aware businesses. Sociopolitical theory suggests that even while many businesses understand the benefits of voluntary disclosure, there is no guarantee that doing so will result in gains that outweigh costs. As opposed to doing so willingly, some businesses disclose ESG data as a result of pressure from rival companies or the business environment (Maaloul et al., 2023).

This paper presents the introduction in section one, the literature review in section two, while the third one deals with the methodology of this paper. The fourth one deals with the results of analyzing data collected from companies. The fifth section includes a discussion of the results. Section six gives the conclusion of the paper. Finally, the seven and eight section present some recommendations for decision makers and some suggestions for future researchers.

2. Problem Statement

Cost of debt represents a crucial factor that control the company's financial and investment decisions, because the debt cost determine whether the debt is worthy or its costs is much higher than its benefits. In addition, it also represents a determinate of the decision of taking debts. Accordingly, it is important to identify factors that affect the cost of debt and by that affect the decision of taking loans and enhance the company performance. However as ESG is a growing field of research that affect the financial features of the companies, recent studies start to link between it and cost of debt for the aim of investigating its effect on cost of debt and on the company's decision to take debt. Hence the current paper develops its main questions, which is;

What is the relationship between ESG and cost of debt inside the Egyptian companies?

3. Literature Review

This section discusses the previous literature related to the research variables.

ESG and Cost of Debt

In the setting of Southeast Asia, Crifo et al. (2017) tested the capital structure, tax evasion, and business value. Data from 23 countries were collected using a panel regression model from 2007 to 2012. According to the analysis findings, low borrowing costs were correlated with good ESG ratings.

According to the debt ratio and the ESG rating, Lindkvist and Saric (2020) looked at the connection between sustainability performance and capital structure. This study is quantitative one that is based on secondary information that was taken from the Thomson Reuters database. Additionally, a cross-sectional analysis of businesses in the year 2019 was done. The results also proved

that ESG score had shown a significant or close to significant relationship with the COD.

Wu and Feng (2021) investigated the relationship between ESG disclosure and Real Estate Investment Trust (REIT) firm value and COD. The most recent data of GRESB ESG public disclosure for REITs worldwide were examined. It was demonstrated that the ESG higher levels had lower COD, better credit ratings, and larger percentages of unsecured loans to total debt when important business considerations were taken into account.

Pott (2021) investigated if ESG performance was associated with lower COD. The link was examined using data from 136 REITs from 2017- 2020. The results provided strong evidence that there was an unfavorable correlation between ESG and the credit spread. Debt cost would go down if it improves its ESG performance. The improvement of sustainability initiatives would benefit REITs, their shareholders, and all life on Earth as a whole due to this incentive.

Asimakopoulos et al. (2021) tested the changes done by ESG on COD. The study used Refinitiv, Capital IQ, and CRSP-Compustat merged (CCM) annual databases for U.S. corporations from 2002 to 2019 to assess the hypotheses. The outcomes demonstrated that the availability of ESG ratings reduces knowledge asymmetry. Current leverage ratios for ESG rated enterprises were not significantly altered, but these businesses switched their funding sources from debt issued by public bonds to loans from private banks. This replacement factor, which was primarily motivated by environmental and social challenges, is more obvious for enterprises that are under a lot of financial pressure, have limited development alternatives, and have assets that are more concentrated. Even when subjected to numerous robustness and endogeneity tests, debt restructuring remains valid.

Maaloul et al. (2021) looked into how corporate reputation affected the relationship between ESG data and COD. Using structural equation modelling, it was discovered that ESG had a beneficial

role on corporate reputation. A strong business reputation was also found to mediate the ESG and COD relation, lowering its cost and lowering COD. Therefore, it was determined that companies had a higher reputation as a result of managing and disclosing information on ESG issues, which in turn lowers the debt cost.

The change of ESG disclosure on COD was examined by (Raimo et al., 2021). From 2010 to 2019, a sample of 8264 observations was taken. The findings showed that debt cost was negatively impacted by the ESG. The study found that organizations benefited from easier access to outside financial resources at better terms in areas where the exchange of ESG data was more accessible.

Zhang (2021) examined the extent to which ESG performance was factored into business debt. A firm-specific ESG measure was created by the study from 136 raw indicators pertaining to the core ESG elements. According to the report, for each standard deviation increases in a company's ESG score, the debt spread for borrowing drops by 6.3 basis points. The decline in loan spread could be attributed to a reduction in credit risk, as highly rated ESG enterprises had a 4% reduced likelihood of defaulting in the future. Less financial restatement due to fraud, clerical error, and SEC inquiry was also predicted by higher corporate ESG scores.

The purpose of Ratajczak and Mikołajewicz (2021) was to investigate how corporate governance, social responsibility, and environmental factors (ESG) affected the short- and long-term COD. For 300 organizations, information set on Corporate Social Responsibility (CSR) and debt cost underwent linear regression analysis. The study showed that while taking part in social issues is advantageous for both short and long-term debt, taking part in environmental initiatives reduces the debt cost of long-term.

Porzel (2021) looked on the effects of CSR as measured by ESG scores on the COD of businesses at two different tiers, concentrating on the economic processes that underlie the sustainability performance improvement. Data were collected from European firms. The results also demonstrated that lenders were

increasingly taking traditional credit risk metrics at low levels of sustainability into consideration, which was the main reason for the negative association where it was found that ESG concerns had a significant impact on how credit risk was expressed. Overall, the results showed how crucial sustainability is to lowering credit risk as well as the financing costs.

The consequences of a company's environmental performance on COD were examined by (Chiesa et al., 2021). In this article, corporations that were issued in the EU and US between 2016 and 2018 were examined. According to the findings, there was a link between environmental performance and debt costs, as measured by coupon rates, so that environmental performance that was higher lowered COD through bond issuance.

The interaction between ESG and debt financing was tested by (Feng and Wu, 2021). In the course of the procedure for validation, all information had been updated. GRESB collected ESG data from publicly available sources. According to the findings, effective ESG can raise corporate transparency, which is advantageous for REIT financing debt and company value. After adjusting for important business factors, it was also discovered that greater ESG levels were associated with lower COD, better credit ratings, and higher proportions of unsecured loans to overall debt. These findings indicated that since lenders have paid close attention to a firm's ESG and have taken it into consideration when making loan choices, boosting ESG can facilitate a company's access to capital markets and increase their financial flexibility.

Sze et al. (2021) sought to investigate the connections between businesses' debt costs and their ESG performances. Bond data was analyzed that included 39,650 observations from 8,420 bonds issued by 649 companies during the years of 2008 and 2019 using information gathered from Bloomberg and ESG performances from Refinitiv. Empirical research supported the following conclusions: Effective companies' ESG had a long-term reduction cost on debt. Businesses in regions with significant

greenhouse gas emissions will see a greater impact on cost reduction.

Gigante and Manglaviti (2022) sought to determine whether companies with comparatively superior ESG performance had a beneficial influence on debt cost. Over the course of 2018–2020, information was obtained from European non-financial corporates. Statistically speaking, COD failed to endorse discontinuous jumps in relation to the average ESG score.

The implications of company ESG on COD financing was examined by (Gao et al., 2022). Media coverage was replaced with rankings of business ESG performance from 2009 to 2017 from the most significant media firm. Uplifting media ESG emphasis significantly decreased COD for companies by enhancing supply chain reputation, reducing financial risk, and increasing company transparency. The media's attention to ESG was particularly important for enterprises located in areas with more severe pollution and corporations with poor corporate governance.

Fabisik et al. (2022) developed a main question, which was; Do debt investors care about ESG ratings? Data were collected from financial reports of a sample of firms at USA. The secondary corporate loan market research revealed that compared to non-downgraded ESG-rated enterprises and compared to before the rating drop, loans spreads of downgraded ESG-rated firms increased by roughly 10%. ESG rating downgrades increase the premium that lenders charge above the spread for default risk, not the firm's basic default risk. The effect was shown to be larger for businesses that are more financially constrained as well as businesses that are more vulnerable to ESG and, in particular, climate risk concerns. Importantly, it was discovered that loan spreads of unrated private companies in sectors particularly impacted by ESG rating downgrades increased following the methodology adjustment.

In the setting of Southeast Asia, Duong and Huang (2022) looked at whether ESG had an impact on capital structure, COD, tax

avoidance, and business value. From 2018 to 2021, researchers collected data from the Refinitiv data stream, and they applied regression models and the Sobel test. The results showed that ESG has positive, major impacts on all the research variables. It also showed an upward association between firm value and tax avoidance.

For companies incorporated in the Nordic countries, Nyström and Skog (2022) investigated ESG and its link to COD. A sample of 560 public enterprises was gathered for the years 2015–2020 in order to address this research issue. The overinvestment perspective showed a positive connection, contrary to what the stakeholder theory and risk mitigation method indicate. The empirical outcomes discovered that ESG had a negative role on debt cost.

Arora and Sharma (2022) purposed assessing ESG ratings and its ability to change debt cost. From the Bloomberg database, the companies under investigation were the top 500 Indian qualified companies by total market capitalization. The collected data included the financial reports of the firm from year 2015 till 2020. COD had a negative coefficient, meaning that a higher ESG score would result in a lower COD component for the company. The model indicated that this relationship could be considerably established at the 10% level.

Lavin and Montecinos-Pearce (2022) explored the association of ESG disclosure and debt cost. Secondary data were gathered from 2015 till 2020, which included Chilean listed firms. Evidence revealed that the cost of debt was impacted by ESG disclosure in two different ways. Moreover, the same relation was analyzed by (Salvi et al., 2022), through 680 firms through the period 2011-2020. The findings showed that ESG has negative impacts on debt cost.

Xiyu and Myung-in (2022) determined whether ESG ratings were related to debt costs. It also analyses how the level of media coverage affected this relationship between ESG ratings and debt

cost. Data were collected from Korean listed firms. The empirical findings demonstrated that corporate social irresponsibility, as measured by low ESG ratings, increased COD in the next period, with a considerable reduction in this effect for companies with higher media coverage. According to the study's findings, negative effects of low ESG ratings were mitigated by increased media coverage. This suggests that when more media stories were published, creating a positive information environment, creditors were less willing to penalize corporate misbehavior.

The association between debt cost and ESG was looked by (Apergis et al., 2022). Over the years 2010 to 2019, secondary data that includes companies in the S&P 500 was gathered. Companies with low ESG are viewed as being riskier because of their exposure to CSR, which ultimately increased their default risk. Data showed that inside the primary bond market a correlation between a higher ESG and a lower cost of unsecured debt after adjusting for other risk factors.

Casén and Buettner (2022) investigated ESG activities that have been applied inside EU firms and how the investors have put a significant attention on environmental concerns. Thus, the studies searched in environmental scores inside the firms and its ability to change the cost of debt through documenting 3670 observations through a period 2014-2020. A statistically substantial negative correlation exists between debt costs and environmental performance was proved from the analysis results.

ESG issues have gained popularity recently as a result of the growing environmental consciousness of climate change. Wang (2022) collected information from Taiwan publicly traded companies over 2016 to 2020 for the purpose of discovering the environmental performance and its association with COD. Thomson Reuters Datastream database and the Taiwan Economic News Database were the two sources of data. It was proved that the Taiwanese businesses that had more environmental information were paying less for bank borrowing, which suggested

that businesses that share environmental information can effectively minimize information asymmetry and raise debtor credit ratings. Additionally, corporations providing their environmental information do not significantly affect bank debt capital costs over the long term. The main reason for this is that banks will use more targeted information when making credit decisions over the long term.

To analyze the family business ESG performance and potential changes to COD, Kong (2023) collected panel data from Chinese Shanghai and Shenzhen enterprises between 2009 and 2021. ESG performance was proved to successfully decrease the financing of COD. Moreover, the engagement in social and corporate governance dimensions in family firm was noted to reduce COD.

The study of Maaloul et al. (2023) extracted data from Bloomberg database and Sustainalytics database to analyze the link between ESG and COD, where prior studies had concluded mixed and contrary results. It was found that businesses with a better reputation for managing ESG information have reduced COD.

Based on the previous literature that was previously dealt with, the first hypothesis for this research was developed, which was represented in the following:

H_1: There is a significant relationship between ESG and Cost of Debt

ESG Practices and The Cost of Debt in Presence of Control Variables

Manner (2018) purposed testing ESG rating and its relationship COD through the control variables; firm size, profitability, equity return, and sales growth. Information was drawn from 200 Nordic publicly traded companies included the years 2002-2016. By utilizing dummy variables, regression models examined both the overall impact of ESG and the top and worst ESG performance. The study's empirical results showed that ESG has a large and beneficial impact on the market valuation of the company. According to the findings, equity markets reward companies with

excellent ESG performance and overlook those with weak ESG performance. Contrary to what prior studies and conclusions might imply, people who performed with more responsibility had fewer debt costs. Better ESG performance appeared to be positively associated with ROE, in contrast.

Aboud et al. (2019) tested how ESG practice could change COD. The relationship was measured by four control variables; the firm size, leverage, return on assets (ROA), and ICR. In 15 EU nations, a sample of all non-financial enterprises was chosen. The environmental element had the biggest impact on COD, followed by corporate governance, and the social dimension had the least role, indicating a negative relationship between ESG and COD. Furthermore, performance and debt are found to be significantly moderated by disclosure.

Niklander (2020) purposed discussing ESG criteria and firms' debt cost. Four control variables were included, which were; leverage, firm size, profitability and book to market. This study identified actual data that supported the hypothesis that companies who performed well in CSR initiatives typically enjoy lower credit rates in the European market. The results implied that creditors provided lower lending rates to companies with higher ESG scores.

Houqe et al. (2020) explained ESG and firms' debt cost and their link to each other through control variables; firm size, leverage, ROA, market-to-book ratio, current ratio, ICR, volatility of cash flow, net property, new property, value of plant and equipment, expenditure of capital, growth of GDP, and country rating. The final sample consisted of companies from 41 countries through years 2008 till 2015. There is a considerable inverse relationship between organizations' COD and overall ESG performance. Additionally, a strong inverse link between ESG performance variables and firms' COD was noted.

Eliwa et al. (2021) aimed to investigate ESG practices and the debt cost link through the mediators; firm size, leverage, ROA, and ICR. Secondary data were collected from non-financial firms in 15 EU

countries through the period 2005 to 2016. The link between ESG and COD was significantly influenced by the ESG disclosure. Contrarily, it was shown that ESG when other factors were taken into account were negatively connected with COD.

Murta (2021) looked into the potential negative correlation between European companies' ESG ratings and their debt cost. This relation was studied among number of control variables; firm size, leverage, ICR, the book-to-market ratio, the return on assets, the firm's beta, the sum of net cash flows from operating. Secondary data were collected. Only the fiscal years 2008 and 2020 could be used for the analysis. This dissertation's conclusion had three parts: the companies with the highest ESG ratings perform better in the debt markets because of the following reasons: (1) COD often shown a negative association with the higher quintiles of the ESG rating; and (2) A considerable concave link between ESG and COD is confirmed by the fact that all of the ESG coefficients are significant.

The relationship between ESG parameters and COD in businesses was investigated by (Latvala, 2022). Five control variables—firm size, interest coverage rate, leverage, board size, and ROA—were put to the test. The study for the thesis was quantitative in nature. OLS regression is used to evaluate the connection between ESG and debt cost. The final collection contained information from 270 businesses in 17 different industries. The actual results of this study demonstrated a strong inverse association between debt costs and ESG. The findings suggest that companies with good ESG scores can reduce COD. However, only the social factor showed an appreciably negative effect on COD. The study also found that corporations' use of women on their boards had a significant link to the inverse assosiation between ESG and COD.

Based on the previous literature that was previously dealt with, the four hypotheses were developed:

H_2: Firm size is a control variable in the relationship between ESG and Cost of Debt

H_3: Firm leverage is a control variable in the relationship between ESG and Cost of Debt
H_4: Profitability is a control variable in the relationship between ESG and Cost of Debt
H_5: Interest Coverage Ratio is a control variable in the relationship between ESG and Cost of Debt

4. Research Methodology

The main objective of the current paper is to test the influence of ESG practices on cost of debt using firm size, leverage, profitability, and ICR as control variables. In order to reach this goal, the paper re-analyzed secondary data. The researcher concentrates on the Egyptian non-financial companies listed on the Stock Exchange following the EGX100. After deleting the financial institutions (banking and non-banking sector), the number of companies was 80 Egyptian companies listed in the list of the best 100 companies in the Stock Exchange. Data on the controlling variables and the dependent variable were collected from the financial statements of companies from 2010 to 2020, with a total of 11 years. While the ESG data for Egypt was collected from the sovereign ESG Data Portal of the World Bank. Figure 1 shows the practical framework for this paper, which was reached from the previous literature and based on the objectives of the paper.

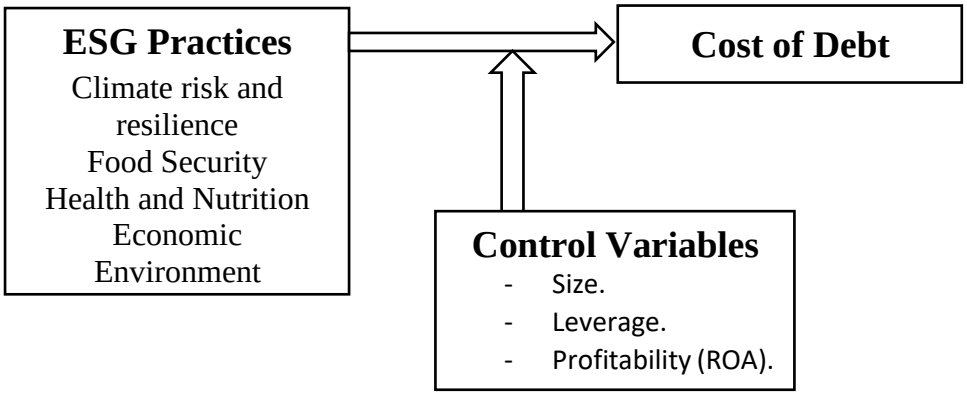

Figure 1 Paper Framework

The research variables are shown as follows:

1. **Dependent Variable:** -

Cost of Debt: The Ratio of interest expense of the firm to its total Debt.

2. **Independent Variable: -**

ESG: (Climate risk and resilience, Food Security, Health and Nutrition, Economic Environment, Gender, and Stability and Rule of Law), collected from the World Bank at the sovereign ESG Data Portal of Egypt.

3. **Control Variables: -**

- **Firm Size:** Natural log of total assets.
- **Leverage:** The Ratio of Total Debt to Total Assets.
- **Return of Assets (ROA):** Net Income Before Tax Over Total Assets
- **IntCov.:** Total Operating Income Over Total Interest Expense

This paper relied on collecting data from Egyptian companies operating in various non-financial fields. Table 1 shows the fields in which the companies operate and the number of companies included in this research that operate in these fields.

Table 1: The Final Sample of the Study

Sector Name	Number of Companies
Basic Resources	9
Building Materials	6
Contracting and Construction Engineering	4
Education Services	1
Energy and Support Services	2
Food, Beverages and Tobacco	8
Health Care and Pharmaceuticals	4
Industrial Goods, Services and Automobiles	2
IT, Media and Communication Services	6
Paper and Packaging	1
Real Estate	17
Shipping and Transportation Services	4
Textile and Durables	5
Trade and Distributors	1
Travel and Leisure	3
Total of Companies	**73**

Since the data are panel data, different statistical techniques were used to look for data analysis techniques and determine the research findings. These statistical packages included SPSS and

EViews. There are two approaches used: generalized least squares (GLS) and ordinary least squares (OLS).

OLS represents a method that makes use of linear regression to infer the relationship between a variable and an outcome, particularly when other factors are present (Sheffet, 2017). For the OLS regression analysis, it is necessary to confirm the assumptions of multicollinearity, normality, and correlation. Multicollinearity is the linear relationship between two or more variables; it also refers to the absence of orthogonality between the variables (Alin, 2010). The normality test aids in establishing the distribution of the model by depicting the normal distribution as a symmetric bell-shaped curve. In a typical normal distribution, the mean is 0 and the standard deviation is 1. The sample is outside of two standard deviations of the mean if the outcome is less than 0.05, and outside of three standard deviations if it is less than 0.1 (Lanzante, 2021). The correlation matrix displays the correlation between all pairs of data in the data collection. The correlation matrix uses pearson's or spearman's correlations (Cohen, et al., 2013).

To gauge the relationship between the research variables, GLS simple regression analysis is utilized. In this study's panel data sets, the generalized least squares approaches are used to estimate simple regressions and to determine the direction of the relationships between the research variables (Kheradyar et al., 2011).

5. Results and Findings

This section is presented to introduce the research findings and results.

Testing Multicollinearity

When a model's predictors have a high degree of correlation with one another, multicollinearity arises. Due to this, it is difficult to determine which predictors lead to the variance in criterion that is being explained. Table 2 demonstrates that the values of the variance inflation factor were less than 5, which suggests that multicollinearity is not a problem.

Table 2: VIF values for Research Variables

Variables	**VIF**
Climate risk & resilience	3.012
Food Security	2.622
Health & Nutrition	3.087
Economic Environment	5.026
Gender	1.529
Stability & Rule of Law	1.571
Firm Size	1.111
Leverage	1.320
ROA	1.256
Interest Coverage Ratio	1.024

Normality Testing for the Research Variables

Depending on the normalcy, the researcher can apply parametric or non-parametric tests to address the research hypotheses. A parametric analysis, such as Ordinary Least Squares Regression, could be used if data are regularly distributed. Kolmogorov-Smirnov and Shapiro-Wilk tests were performed in a formal examination of the normality, and it is clear from the P-values (<0.05) that the data are not exactly normally distributed.

Table 3: Formal Normality Testing for the Research Variables

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Climate risk & resilience	.213	516	.000	.883	516	.000
Food Security	.376	516	.000	.671	516	.000
Health & Nutrition	.241	516	.000	.802	516	.000
Economic Environment	.139	516	.000	.925	516	.000
Gender	.357	516	.000	.771	516	.000
Stability & Rule of Law	.495	516	.000	.494	516	.000
Firm Size	.052	516	.002	.989	516	.001
Leverage	.383	516	.000	.219	516	.000
ROA	.310	516	.000	.339	516	.000
Interest Coverage Ratio	.397	516	.000	.181	516	.000
Cost of Debt	.125	516	.000	.949	516	.000
a. Lilliefors Significance Correction						

As the data set under study did not show an exact normal distribution, the informal test of normality is used to examine the approximate normality of data distribution. Table 4 shows that data are not normally distributed, where the values are all not at the acceptance level of ±1.

Table 4: Informal Normality Testing for the Research Variables

	N Statistic	Skewness		Kurtosis	
		Statistic	Std. Error	Statistic	Std. Error
Climate risk & resilience	880	-.276	.082	-1.075	.165
Food Security	880	-1.611	.082	3.528	.165
Health & Nutrition	880	-.943	.082	-.790	.165
Economic Environment	880	.723	.082	-.433	.165
Gender	880	1.525	.082	1.272	.165
Stability & Rule of Law	880	-1.817	.082	1.553	.165
Firm Size	569	.014	.102	.011	.204
Leverage	569	11.294	.102	151.174	.204
ROA	568	-12.214	.103	216.914	.205
Interest Coverage Ratio	517	8.310	.107	178.141	.214
Cost of Debt	517	-.146	.107	-.878	.214

Descriptive Analysis for the Research Variables

By summarizing samples and the methods used to measure the data, descriptive statistics is a technique that explains and provides a clear knowledge of the characteristics of a particular data collection. The descriptive analysis of each of the research variables appears in the following table.

	N	Min.	Max.	Mean	Std. Deviation
Climate risk & resilience	880	556.517	732.480	644.764	53.842
Food Security	880	2.068	53.20	34.106	11.356
Health & Nutrition	880	9.343	23.33	19.229	5.028
Economic Environment	880	13.374	37.742	21.755	7.482
Gender	880	11.018	32.151	16.865	6.036
Stability & Rule of Law	880	-70236.627	-.570	-10707.786	23235.778

	N	Min.	Max.	Mean	Std. Deviation
Firm Size	569	7.306	10.921	9.309	.669
Leverage	569	.000	7.918	.138	.487
ROA	568	-4.301	.508	.043	.233
Interest Coverage Ratio	517	-553.652	986.392	3.739	58.151
Cost of Debt	517	-6.263	6.922	.908	3.749

Table 5: Descriptive Analysis for the Variables

Testing the Research Hypotheses

This section shows the results for the effect of independent variables ESG on Cost of Debt. Table 6 shows the correlation matrix obtained, where it is shown that:

- Climate risk and resilience, Health and Nutrition, Economic Environment, Gender, Stability and Rule of Law, and ICR all have significant positive relationships with Cost of Debt, where P-values are 0.000, 0.001, 0.000, 0.000, 0.000 and 0.000 respectively, with coefficients 0.368, 0.150, 0.298, 0.468, 0.317, 0.307.
- Food Security has a negative significant link to Cost of Debt, where P-value is 0.000 with a coefficient is -0.465.
- Firm Size, Leverage and ROA have insignificant relationships with Cost of Debt, where P-values are 0.625, 0.890 and 0.996.

Table 6: Correlation Matrix for the Research Variables

			1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
Spearman's rho	1. Climate risk & resilience	Correlation Coefficient	1.000										
		Sig. (2-tailed)	.										
		N	880										
	2. Food Security	Coeff.	-.427**	1.000									
		Sig. (2 tailed)	.000	.									
		N	880	880									
	3. Health & Nutrition	Coeff.	-.655**	.018	1.000								
		Sig. (2-tailed)	.000	.590	.								
		N	880	880	880								
	4. Economic Environment	Coeff.	.691**	-.009	-.755**	1.000						K	
		Sig. (2-tailed)	.000	.788	.000	.							
		N	880	880	880	880							
	5. Gender	Coeff.	.218**	-.345**	-.373**	.400**	1.000						
		Sig. (2-tailed)	.000	.000	.000	.000	.						
		N	880	880	880	880	880						
	6. Stability & Rule of Law	Coeff.	.664**	-.564**	-.318**	.173**	-.127**	1.000					

			1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.					
		N	880	880	880	880	880	880					
	7. Firm Size	Coeff.	.078	-.009	-.081	.102*	-.031	.063	1.000				
		Sig. (2-tailed)	.062	.837	.054	.015	.467	.133	.				
		N	569	569	569	569	569	569	569				
	8. Leverage	Coeff.	.021	.006	-.033	.039	.016	-.027	.044	1.000			
		Sig. (2-tailed)	.620	.889	.430	.359	.704	.525	.297	.			
		N	569	569	569	569	569	569	569	569			
	9. ROA	Coeff.	.109**	-.001	-.089*	.101*	-.076	.125**	.195**	-.137**	1.000		
		Sig. (2-tailed)	.009	.972	.033	.016	.070	.003	.000	.001	.		
		N	568	568	568	568	568	568	568	568	568		
	10. Interest Coverage Ratio	Coeff.	-.023	.010	.149**	-.050	.154**	.047	.060	-.125**	.083	1.000	
		Sig. (2-tailed)	.610	.819	.001	.257	.000	.285	.171	.004	.059	.	
		N	517	517	517	517	517	517	517	517	516	517	
	11. Cost of Debt	Coeff.	.368**	-.465**	.150**	.298**	.468**	.317**	.022	-.006	.000	.307**	1.000
		Sig. (2-tailed)	.000	.000	.001	.000	.000	.000	.625	.890	.996	.000	.
		N	517	517	517	517	517	517	517	517	516	517	517

Table 7 shows the GLS simple regression for the Research Variables on Cost of Debt:

- Climate Risk and Resilience, Food Security, Health and Nutrition, Economic Environment, Stability and Rule of Law all have significant positive influences on Cost of Debt, where P-values are < 0.05 and the coefficients are 0.006379, 0.087106, 0.545398, 0.348324 and 6.13E-05.
- Gender, Firm Size, Leverage, ROA and ICR have insignificant effects on Cost of Debt, where P-values are 0.0915, 0.9919, 0.6178, 0.4291, and 0.1553.

Additionally, R Square is 0.771978, which indicates that this model can account for 77.2% of the variation in Cost of Debt. The regression equation is estimated as follows:

Cost of Debt = -24.24111 + 0.006379*Climate Risk & Resilience + 0.087106*Food Security + 0.545398*Health & Nutrition + 0.348324*Economic Environment + 0.026886*Gender + 6.13E-05*Stability & Rule of Law – 0.001257*Firm Size - 0.089791*Leverage - 0.296680*ROA - 0.001973*Interest Coverage Ratio

Table 7: GLS Pooled Regression

Dependent Variable: Cost of Debt				
Variable	**Coeff.**	**Std. Error**	**t-Stat.**	**Prob.**
C	-24.24111	2.165032	-11.19665	0.0000
Climate Risk & Resilience	0.006379	0.002638	2.417914	0.0160
Food Security	0.087106	0.009638	9.038170	0.0000

Health & Nutrition	0.545398	0.026333	20.71155	0.0000
Economic Environment	0.348324	0.024094	14.45717	0.0000
Gender	0.026886	0.015902	1.690721	0.0915
Stability & Rule of Law	6.13E-05	4.60E-06	13.33153	0.0000
Firm Size	-0.001257	0.123586	-0.010168	0.9919
Leverage	-0.089791	0.179838	-0.499288	0.6178
ROA	-0.296680	0.374858	-0.791446	0.4291
Interest Coverage Ratio	-0.001973	0.001386	-1.423228	0.1553
R^2	0.771978			
Adjusted R^2	0.767463			
F-statistic	170.9697			
Prob(F-statistic)	0.000000			

Using the fixed versus random effect shows that P-value for the Hausman test is 0.9461, showing that the random effect is the significant one rather than the fixed effect. Significant impacts of all the variables on Cost of Debt were shown using the random effect, as P-values <0.05.

Table 8: Hausman Test for Fixed versus Random Effect

Variable	Fixed Effect		Random Effect		Hausman Test
	Coeff.	Prob.	Coeff.	Prob.	
C	-23.58794	0.0001	-24.24111	0.0000	0.9461
Climate Risk & Resilience	0.005597	0.0524	0.006379	0.0241	
Food Security	0.086348	0.0000	0.087106	0.0000	

Health & Nutrition	0.548620	0.0000	0.545398	0.0000
Economic Environment	0.352793	0.0000	0.348324	0.0000
Gender	0.023978	0.1712	0.026886	0.1142
Stability & Rule of Law	6.17E-05	0.0000	6.13E-05	0.0000
Firm Size	-0.022049	0.9727	-0.001257	0.9924
Leverage	-0.264024	0.4348	-0.089791	0.6405
ROA	-0.391435	0.3924	-0.296680	0.4592
Interest Coverage Ratio	-0.002277	0.1456	-0.001973	0.1835

6. Research Discussion

To reach the study's aim, secondary data are collected and analyzed through SPSS and EViews. The current section represents a discussion of the research results. A significant link is concluded between ESG and COD, this link was expected as the adoption and improvement of ESG helps in developing the performance of the company and reduces its debt cost. The same conclusion is also appeared in the prior studies as most of studies support this point, such as; (Crifo et al., 2017; Lindkvist and Saric, 2020; Wu and

Feng, 2021; Pott, 2021; Asimakopoulos et al., 2021; Maaloul et al., 2021; Raimo et al., 2021; Zhang, 2021; Ratajczak and Mikołajewicz, 2021; Porzel, 2021; Chiesa et al., 2021; Feng and Wu, 2021; Sze et al., 2021; Gao et al., 2022; Fabisik et al., 2022; Duong and Huang, 2022; Nyström and Skog, 2022; Arora and Sharma, 2022; Lavin and Montecinos-Pearce, 2022; Salvi et al., 2022; Xiyu and Myung-in, 2022; Apergis et al., 2022; Casén and Buettner, 2022; Wang, 2022; Kong, 2023; and Maaloul et al., 2023). The consistency in results between these studies and the current study did not prevent the existence of many other differences. The differences are represented in the way of collecting data, the case study, the population and sample and sometimes in the duration.

For example; Lindkvist and Saric (2020) had a great difference in methodology than the current study, as they collected cross-sectional data that included year 2019, while the current study collected panel data from 2010 till 2020. Porzel (2021) was different from the current study in the case study, as this study targeted European companies, while the current study targets Egyptian companies. Another difference was noticed between the current study and (Duong and Huang, 2022), the main difference was in the source of collecting data, as (Duong and Huang, 2022) collected secondary data from Refinitiv data stream in Southeast Asia, while the current study collected data from the world bank and financial reports of companies in Egypt. Moreover, the study of (Lavin and Montecinos-Pearce, 2022) collected data from Chilean listed companies though 2015-2020, while the current study collected data from Egyptian listed firms through 2010-2020, so the difference was in the sample as well as in the duration.

However, the result is inconsistent with only one study; Gigante and Manglaviti, 2022, as this study did not succeed in proving any significant relationship between the variables.

On the other hand, the roles of control variables (Size, Leverage, Profitability and ICR) are not proved by the current analysis, as these variables are insignificant with cost of debt.

7. Research Conclusion

The current study purposes the investigation of the role of ESG on COD inside EGX100. Moreover, four control variables are tested in this relation. Secondary data are collected from the World Bank and the financial reports of Egyptian companies, where the panel data included a period of 2010-2020. This period represents a vital one, where Egypt has exposed to many different occasions that affect its financial features. The GLS regression analysis showed a significant connection between ESG and debt cost, as well as proved the role of the control variables.

8. Research Recommendations

The analysis's external validity is relatively constrained, but its ramifications are wide-ranging. Only the real estate industry is the subject of the study. In spite of this, this sector contributes significantly to both global emissions and energy consumption, making it vital to the fight against climate change. The following recommendations are made to managers and investors as a result:

- Managers should also broaden the methods via which they communicate data and information in order to boost the availability of ESG information.
- In reality, the opening up of new channels may facilitate communication with institutions and boost the number of information consumers. Managers should use alternative channels including direct communications, news releases, and businesses websites in addition to straightforward corporate papers like annual, sustainability, and integrated reports in this respect.

- Important investing recommendations are included in the findings obtained. They should really want to invest in more transparent firms in light of the advantages of ESG disclosure. Better third-party funding terms for these enterprises promised by greater ESG disclosure would ensure investors a higher return and a lower degree of risk.
- Investors place importance on how much ESG activity REITs engage in. The analysis reveals that there are enough reasons for investors to change the emphasis of their portfolios to include ESG-intensive companies as a risk-reduction measure. Managers of real estate development or management firms should raise their ESG ratings.
- Real estate operating and developing enterprises should lessen their climate effect in order to prevent future economic obsolescence due to incompatibility with environmental requirements and to free themselves from stranded asset hazards.

9. Limitations and Suggestions for Future Research

A few study constraints should be noted before wrapping up. Company exclusion from the EGX 100 is a possibility, therefore survivorship bias in the data is the first constraint. The other drawback is that it was not possible to evaluate the regressions for serial correlation and heteroskedasticity. First, instead of using an after-tax cost of debt figure, future research should consider using a before-tax cost of debt figure. Due to the fact that every company has a unique tax structure, an after-tax number introduces extra unpredictability into the cost of debt calculation. Debt cost metric's fluctuation should be reduced by using a before-tax figure.

The second recommendation is to concentrate on crisis years. The year 2020 was initially recognized as an outlier in the research, and the results did somewhat change when the outliers were removed

via winsorisation. So, the exclusive focusing on crisis years to see if ESG plays a bigger influence could result in some interesting conclusions.

Third limitation is related to the country, as the current study targeted only one country, which is Egypt as a developing country. According to that the researcher suggests investigating more developing countries to notice the difference in results that could happen from one country to another and making more studies in developed countries as well as applying comparative studies between developed and developing countries.

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