

IMPACT OF CLIMATE CHANGE & ENVIRONMENTAL DISCLOSURE ON FINANCIAL PERFORMANCE: EVIDENCE FROM PAKISTAN

Mustansar Hayat^{*1}, Asad Ali², Zulfiqar Ali³, Basharat Khan⁴

^{*1}Assistant Professor, SZABIST University, Karachi, Pakistan ;

²SZABIST University, Karachi, Pakistan;

³Assistant Professor, Department of Business Administration, University of Mirpurkhas, Pakistan ;

⁴Lecturer, Department of Management Sciences, Hazara University, Mansehra, Pakistan.

^{*1}dr.mustansar@szabist.edu.pk; ²asad0336@gmail.com; ³zulfiqar1989@outlook.com;

⁴basharatmaju@gmail.com

Corresponding Author: *

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ABSTRACT

We explore the relationship between climate change and environmental (CCE) disclosure and the financial performance of non-financial companies listed on the KSE-100 index in Pakistan. Recognizing the growing importance of environmental, social, and governance (ESG) factors, the study investigates the impact of CCE disclosure on financial indicators such as Tobin's Q. The research also introduces the moderating role of company size in this relationship. Using a mix of qualitative and quantitative methods, the study analyzes data from annual reports of 62 firms for the years 2021-2023. The findings suggest a positive association between CCE disclosure and financial performance, with a non-linear relationship observed. Additionally, the study highlights the moderating effect of company size on this relationship. The significance of the study lies in its contribution to understanding the decision-making value of CCE information for stakeholders in Pakistan. Recommendations include increased awareness of corporate social responsibility and continued enhancement of legislative laws governing CCE disclosures.

Keywords: Climate Change, Environmental Disclosure, Financial Performance, KSE-100 Index, Stakeholder Theory, Corporate Social Responsibility, Sustainability, Pakistan.

INTRODUCTION

The various stakeholders in corporate firms have been urging for mandatory disclosure of corporate social responsibility information to go much further. This has led to an emphasis on ESG performance (environmental, social and governance). The need for non-financial data is rising and this includes the demand from traditional investors as well as regulators. As a result, ESG information has been integrated more widely than before into portfolio managers' investment decisions (Miralles-Quirós et al., 2018).

ESG is described as an acronym for the three basic principles that make up CSR, or corporate social responsibility. These principles can be used for evaluating a company's CSR activities (Huang, 2021). As it is the most objective indicator presently available, according to Shakil et al.

(2021), instead of other measures ESG score are frequently used as an alternative metric to evaluate a company's CSR efforts. An ESG score can provide an objective measure of a company's performance over its environmental, social and governance (ESG) practices (Paolone et al., 2022). While a large number of developed countries have legislation governing corporate disclosure, which requires the presentation of social performance indicators, such obligations are not imposed upon firms in emerging economies by way of this type-of instrument (Cohen et al., 2015). It raises the question of how much and at what level stakeholders in developing economies understand that ESG information is important to making an informed decision. For instance, traditional corporate communication in Pakistan has always

focused mainly on financial information; social performance data have had much less emphasis (Amel-Zadeh & Serafeim, 2018).

The Securities and Exchange Commission of Pakistan (SECP) has recently modified the Revised Code of Corporate Governance, 2017. Under the revised code, the board of directors is required to reveal social information in order to protect the interests of shareholders and oversee management's decision-making process. According to new SECP laws, Pakistani enterprises must now report the social effect of their activities. Consequently, access to social data of the corporates has risen rapidly.

Due to the substantial influence that environmental disclosers have on a company's overall performance, they are regarded as an essential element of its strategy. A multitude of sectors and factors have been examined in numerous research studies that examine the correlation between ESG ratings and financial performance. The impact of ESG activities on the financial performance of eleven different industries and four geographical regions (the United States, China, Japan, and Europe) was investigated by Xie et al. (2019). The sectors included materials, energy, healthcare, finance, and telecommunications services.

In light of the increasing inclination of conscientious investors to evaluate a firm's performance on ESG aspects when formulating investment strategies, corporations have implemented stakeholder-centric approaches and enhanced social value. Organizations with robust ESG sustainability management generate more shared value for their stakeholders (Taliento et al., 2019; Bonini & Gorner, 2011). According to Porter and Kramer (2011), corporate shared value occurs when businesses create financial value by providing social advantages to their communities. They gave an example of how a business may boost its bottom line by reducing waste and, in turn, its negative externalities. Through competitive advantages, improved operational efficiency and reputation, and less waste, firms may improve their shared value and EES (economic, environmental, and social) performance by inculcating ESG practices holistically into their management.

Companies' disclosure of ESG data and the widespread adoption of sustainability plans are two responses to rising public and corporate awareness of these concerns. With more ESG data readily

available, there has been a corresponding uptick in research devoted to impact evaluation. The decision-making value of ESG and its effect on the financial performance of listed firms in Pakistan, however, have not been well researched. There has been a dearth of research done on this topic. For instance, Jamil and Siddiqui (2020) found that ESG was significantly related to ROA, but not to ROE or Tobin's Q, two key measures of financial success. Also, researchers have used the data of 2018. Hira et al. (2023) observed a significant association between financial performance and ESG criteria, however they only examined non-financial businesses in the KSE-100 index. Given the characteristics of a growing market like Pakistan, further research is required (Jamil and Siddiqui, 2020). Around the world, numerous studies have been conducted to examine the relationship between Environmental disclosure and financial performance.

In Pakistani context, there is research gap of definitive findings about this link, so it is essential to conduct a broader study in this regard. This is crucial for the businesses' survival and success as well as for stakeholders like investors, suppliers, and consumers who depend on these firms for their own well-being. Investors are looking for details about a company's social performance before deciding how to allocate their assets, and ESG data may help clear up any confusion and reassure stakeholders that their money is going towards good causes. The financial effects of sustainability disclosure should be further investigated via empirical means, using a variety of methodologies and samples.

Secondly, there is a scarcity of research on the decision usefulness of climate change and environmental disclosure information and its impact on the financial performance of listed companies in Pakistan. This raises the question of how stakeholders in developing economies perceive the usefulness of climate change and environmental information and to what extent it affects financial performance. Previous studies conducted in Pakistan have provided mixed results, and there is a need for further research in this area, considering the unique dynamics of the emerging market in Pakistan. In addition, no Pakistani studies could be found that looked at how firm size affected the relationship between climate change, environmental disclosure, and financial

performance. Businesses and investors in Pakistan would do well to study the correlation between ESG and financial success. Because it would provide light on the relevance and impact of ESG practices on financial outcomes, stakeholders in Pakistan's business environment may gain valuable insights from this kind of research.

Thus, the purpose of this research is to examine the relationship between environmental disclosure and financial performance, and whether firm size moderates this relationship in the context of Pakistan. This research has the potential to assist researchers and investors in Pakistan in addressing the knowledge voids pertaining to the correlation between greenwashing and financial performance. Our research makes three distinct contributions to the extant ecological, social, and governance literature. Before proceeding, we conduct concurrent testing on the financial performance of a company in relation to both environmental and climate change disclosure, as opposed to isolating a single aspect of environment. Next, an analysis of the firm's performance is conducted utilizing accounting system measures. Furthermore, we evaluate the influence of environmental disclosure and climate change on financial performance through an analysis of data from 2021 to 2023.

The outcome of this study will help various interested parties, including industry and governmental administrators, researchers and investors as well to understand the effects of climate change on environmental disclosure upon corporate financial performance. We hope to convince firms of the benefits, which can be obtained by participating in ESG initiatives. It could prompt them to increase their investment in environmentally friendly operating methods and ethically correct business practices, thereby helping both long-term values as well as financial benefits.

Moreover, our analysis may provide policymakers with effective suggestions for promoting and supporting CSR operations, as well as their accurate and effective disclosure. These may serve as a reference for policymakers in setting up laws and regulations that will encourage firms to accept climate change standards, environmental disclosure standards, or even sustainability itself. This can contribute to a more sustainable and socially responsible business environment,

benefiting both the firms and the communities they operate in.

The next chapter of the study contains the literature review and discusses the previous research. The third chapter highlights the methodology employed to carry out this research. The fourth chapter contains the analysis results and discussion. The fifth and last chapter presents the conclusion, recommendations and limitations of the research.

02 LITERATURE REVIEW

Recently, organizations have been more inclined to adopt sustainability projects for several reasons, including ethical considerations, societal influence, and strategic benefits (Baron, 1995). Companies have included sustainability measures into their decision-making processes as a means of showcasing their dedication to sustainability (Taherdangkoo et al., 2017). ESG has emerged as the predominant metric for evaluating sustainability criteria, functioning as a mechanism to ensure that companies are held responsible for their environmental, social, and governance policies. Despite this, the primary objective of any business is to generate higher returns, and there is a growing interest in understanding how investment in ESG policies increases firm performance and how firms can be held accountable in terms of ESG performance (Howard-Grenville, 2021).

2.1 Theoretical Review

Some theories that govern the interplay of these factors are discussed in the following from the research perspective.

2.1.1 Stakeholder Theory

According to stakeholder theory (Garcia et al., 2017), the capacity of a business to achieve long-term success is contingent on its interactions with diverse stakeholder groups. Companies are obligated to ensure the accuracy of both financial and non-financial data they disclose to investors in order to mitigate any information imbalance and bolster investor confidence. A strong and statistically significant correlation was observed between CFP and ESG performance among corporations operating in developed countries, as determined by Garcia and Orsato (2020). An enquiry conducted by researchers unveiled an inverse relationship between the CFP and ESG ratings of Latin American multinational

corporations. Likewise, Friede et al. (2015) discovered no correlation between ESG factors and corporate financial performance (CFP) in capital markets. Consequently, it would appear that the correlation between ESG factors and geographic regions varies substantially. To thoroughly comprehend the correlation between ESG factors and the financial performance of corporations under a variety of conditions, additional research is required. The impact of stakeholders on a company's sustainability strategy was substantial, and the ESG factors function as a substantial indicator of corporate social. Two methods exist in which ESG initiatives can generate value for an organization, according to stakeholder theory responsibility (Diez-Caamero et al., 2020). To begin with, they have the ability to bolster the organization's standing and efficiency, resulting in increased cash flow and enhanced value for shareholders. Additionally, the satisfaction and advantages gained by shareholders of a sustainable company can be optimized.

2.1.2 Agency Theory

Agency theory is built upon two fundamental principles: the principal-agent relationship and the division between ownership and control (Fama & Jensen, 1983). The agent is entrusted with management authority by the principal and is anticipated to act in the principal's optimal interest (De Villiers et al., 2011). However, agents often prioritize their own objectives at the expense of the principal's interests. Governance mechanisms play a crucial role in mitigating agency costs and conflicts (Khatib & Nour, 202), particularly when a wide range of mechanisms are employed. Since both the principal and the agent stand to gain from the arrangement, a conflict of interest is created. To put it another way, the principle has a long-term perspective, whereas the agent tends to be more focused on the here-and-now (Khan et al., 2013; Chan et al., 2014). Principals may cut down on agency fees by being more transparent with their employees about both financial and non-financial matters (Katmon et al., 2019). Therefore, the principal is more satisfied when there is a higher level of non-financial information disclosure, such as ESG, as it increases transparency and reduces information asymmetry. This enables the principal to better monitor the agent's actions and align them with the principal's interests.

2.1.3 Slack Resources Theory

Another theoretical approach that sheds light on this subject is the slack resources theory, which suggests that business managers strive to achieve and maintain efficiency within a firm while also having surplus resources available to address unexpected opportunities or threats (Taylor & Oinas, 2006). Xie et al. (2019) state that this viewpoint considers the following characteristics when assessing businesses: improved resource management leads to better returns, superior performance can be sustained as long as consumers value it, and resources are allocated unequally across organizations. According to Taylor and Oinas (2006), sustainability performance might provide you an advantage under a resource-based paradigm that stresses the need of developing competitive diversity.

2.2 Empirical Review

A wide array of empirical studies globally has explored the correlations between ESG performance and companies' performance from various aspects. Companies which are more transparent about their ESG activities and CSR investments tend to have a higher level of sustainable business behavior. This is what Branco and Rodrigues (2006) say may result in better company performances, as well as increased renown. Xie et al. (2019) affirm that such methods can raise productivity by fully utilizing resources while satisfying service users at the same time. Thus, this could stimulate innovation, which in itself would lead to higher revenues and lower costs.

Information disclosure is concentrated through press releases, integrated and sustainability reports, annual reports. the amount of ESG data or disclosers is, however, less significant than that their reliability and quality (Xie et al., 2019). Some organizations have been found to add false material in their reports, designed supposedly for raising the image of themselves and diverting attention away from how badly they actually perform on ESG indicators. When evaluating the effects of different levels of ESG disclosure, Partalidou et al. (2020) found that moderate ESG disclosure had the most beneficial effect on organizational effectiveness. ESG disclosures are linked to superior financial performance in all the ways that they identified: including a cleaner supply chain, less

discrimination based on age and gender; equitable training programs for managers; management structures more autonomous from political interference.

The impact of ESG activities on corporate value is a matter of debate in the existing literature. One view point is this that costs associated with implementing ESG initiatives may have a negative influence on a company's value (Abdi et al., 2022) but companies can make better profit from enhanced productivity and fewer environmental fines if expenses are kept to a minimum (Barnea and Rubin, 2010). Another view point is that sustainability spending on ESG criteria will increase the cost at significant levels that surpass those that maximize shareholder value, hence reducing shareholder benefits (Videras & Owen, 2006). Furthermore, full ESG initiative implementation across all dimensions might entail large expenditures, which may result in a negative association between the amount of ESG initiatives and business value (Abdi et al., 2022).

Engaging in ESG projects, on the other hand, may provide organizations with value-added advantages (Jo & Harjoto, 2011). Implementing sustainability measures, for example, may increase operational efficiency (Dhaliwal et al., 2011), capital market advantages (Dhaliwal et al., 2012), and risk management (Godfrey, 2005). However, there is no conclusive result regarding the long-standing relationship between ESG activities and business value (Jo & Harjoto, 2011). Whereas, research conducted by Eccles et al. (2014) showed that high-sustainability investments outperformed low-sustainability investments over an 18-year timeframe. In line with study, investing in projects with a high sustainability rating may help reduce the likelihood of unfavorable outcomes (Godfrey, 2005). These results support the rising notion that ESG initiatives will enhance both a company's bottom line and its public image.

Researchers from developed nations have found positive results when they look at the link between ESG disclosures and financial success. For instance, Velte (2017) studied German stock market businesses from 2010 to 2014. Accounting performance was positively influenced by ESG features, however there was no significant effect on market value as measured by Tobin's Q, according to the findings of this research. A second study conducted by Li et al. (2018) examined 350 FTSE-

listed companies on the London Stock Exchange to discover whether ESG disclosure was associated to financial performance. According to the authors, obtaining a better grasp of ESG problems and successfully communicating this information to stakeholders may increase a company's value. Furthermore, according to Li et al. (2018), CEOs have the ability to favorably influence ESG practice. Environmentally sensitive industries contributed little to CSR success, according to research on Korean corporations using ESG scores to assess CSR performance, although CSR activities were positively connected with stock price (Yoon et al., 2018).

According to Fatemi et al. (2018) study on the market value of American firms between 2006 and 2011, the influence of ESG performance on financial success varies. Positive ESG indicators, according to the authors, increase the value of a firm. Unfavorable ESG characteristics are associated with a decrease in firm value. The authors argue that governance-generated openness has a greater impact than environmental, social, and governance (ESG) aspects. Atan et al. (2018) discovered that sustainability reporting had a positive effect on the company's cost of capital but a negative effect on profitability and company value in their study of the relationship between ESG disclosures and the financial performance of Malaysian public limited companies. Aouadi and Marsat (2018) looked at the relationship between conflicts pertaining to environmental, social, and governance (ESG) and a company's value. Using information gathered from over 4,000 businesses in 58 countries between 2002 and 2011, their study stands apart from others. The authors conclude that ESG debates enhance the value of a company. Despite the negative correlation seen between ESG and CSR, the study's key takeaway is that corporations may boost their profile by engaging in CSP, and that this will ultimately translate into a higher market value and more profits.

Using stakeholder and legitimacy theory, Minutolo et al. (2019) examine the S&P 500 companies' ESG ratings from 2009 to 2015. According to the authors, more openness boosts business value and enhances productivity. Tobin's-Q and ROA are also significantly impacted by ESG performance, but only for the largest companies; the impact is minimal for the smallest businesses. Whereas research conducted by Wong et al. (2021) found a

consistently positive correlation between ESG and Tobin's Q in developing economies which shows incorporating ESG initiatives reduces a firm's cost of capital and increases financial value of the company. Similarly, Patel et al. (2021) conclude investors expect lower short-term growth and reduced deviations from growth estimates for organizations that have better ESG ratings. It means that investors prefer to go for companies which have long term view instead of short-term growth. CSR initiatives may be advantageous for businesses that are subject to substantial financial or environmental risks. With a CSR investment plan, businesses with reliable revenue streams and limited resources will benefit. CSR expenditures may not have the desired effects for businesses with modest financial or environmental concerns, and they may even have a negative impact on the value of the company (Lu et al., 2021).

The requirement for strategic ESG management in their operations is thus particularly important for some businesses, such as the energy and related chemical sectors, which operate in an environment of severe environmental hazard and have a greater duty for stakeholders (Blacconiere & Patten, 1994). According to ownership and the state of the economy, the link between CSR and firm value also changes. Overinvesting in CSR does not increase the value of a company's stock during the global financial crisis of 2008. (Buchanan et al., 2018). As developed economies have a solid institutional underpinning for CSR and ESG activities, the literature on ESG has been oversaturated in these countries to date (Ioannou & Serafeim, 2012). Evidence from emerging countries, however, may look quite different because of increased volatility in political and institutional systems, legislation, norms on carbon emission and environmental danger, pollution, and other social concerns (Odell & Ali, 2016). Firms also produce physical resources via superior ESG integration methods, such as technical improvement to prevent environmental risks and large financial reserves. For companies that are primarily in charge of increased GHG emissions, air pollution, and waste management, including energy and related industries, such physical and intangible competences are necessary. Shahbaz et al. (2020), specifically looking at the global energy industry, discovered that although market and accounting performance are good indicators of

financial success, stronger CSR performance in ESG ratings is not a guarantee of it.

Financial performance and ESG factors have been studied extensively, but the results have been inconsistent. Some research has shown a negative relationship between ESG and financial success; however, this is largely attributable to the expenses involved in enacting ESG policies. The high price tag associated with implementing ESG measures is to blame for the observed negative relationship. The advantages, however, seem to exceed the drawbacks, according to research conducted by Ben Lahouel et al. (2019) and McWilliams et al. (1999). Lee et al. (2013), on the other hand, point out how the research methodology could have been flawed, and how factors like the characteristics of the business under study might have skewed the results.

Studies conducted on different stock exchanges have also found different results. Study conducted on listed companies of Korea Stock Exchange between 2008 and 2014 by Han et al. (2016) found no correlation between social score and financial results. However, Governance score was shown to be positively associated while environmental score was found to be negatively associated with financial returns. Study conducted by Atan et al. (2018) on the listed companies of Malaysia found similar results. However, research conducted by Saygili et al. (2022) looked at the connection between ESG performance and financial success for Turkish listed firms from 2007 to 2017. Financial success was shown to be inversely related to environmental reporting. In contrast, the social component was connected favorably with stakeholder engagement in management, while the governance dimension was correlated positively with financial performance. Behl et al. (2022) looked at the link between ESG reporting and the value of companies in India's energy industry and discovered contradictory results. Despite the fact that the research described above show both positive and negative connections between ESG efforts and performance, other analyses find no association at all. Humphrey et al. (2012) investigated the independent impacts on performance of E, S, and G in a survey of 249 UK enterprises. Their results show investing in ESG activities has no major cost but there is no advantage as well which means there was no financial difference between company with low

and high ESG score. Moreover, another data of a multi-country study concluded that the ESG ratings did not influence business financial figures (Ben Lahouel et al., 2019). Because different contexts have contrasting effects, ESG performance and financial success are incompatible results.

When we explain that ESG performance is positively related to financial performance, however, other factors have to be taken into account, which may diminish the relationship. These are important in getting a handle on what's happening (Rowley & Berman 2000). Abdi et al. (2022) have demonstrated that firm size can condition the impact of ESG on financial performance. Large firms are spurred, since society's resources belong to them--they have to explain how they obey the government. Yet groups concerned about the way well companies treat their workers, communities and environment hound them with scrutiny and castigate them. There will be a greater need for social information among managers at bigger companies. Hence, it is imperative that these businesses gather and disclose more data on their social responsibility initiatives. A number of studies have found that larger companies are more likely to publish information about their social responsibility initiatives. More widespread and diversified stakeholders are associated with larger enterprises with a comprehensive operating area. Also, bigger companies will get it when it comes to social responsibility and transparency: it's a great approach to boost your company's image and reputation. Roberts (1992) conducted a study to examine the influence of firm scale on sustainability initiatives. Multiple research studies have shown that a company's size has a substantial influence on its degree of success and is connected with various corporate qualities. According to Al-Kake and Ahmed (2019), board structure choices are heavily impacted by the firm's size, which is also tied to the organization's market development potential.

The review of literature given above shows that the relationship between ESG initiatives and financial performance is a subject of considerable empirical debate. While certain authors propose a positive correlation, others contend that there is no substantial connection. Despite the mixed findings,

a substantial number of studies indicate that ESG does have a significant effect on financial performance. Based on the existing literature, we propose the following hypotheses to be tested:

Hypothesis 1 (H1). There is a significant relationship between Climate change & Environmental disclosure and financial performance.

Hypothesis 2 (H2). Firm size moderates the relationship between financial performance and Climate change & Environmental disclosure

03 Research Methodology

We have conducted an explanatory study to examine the relationship between climate change and environmental disclosure and corporate financial performance and the role of firm size in this relationship. This research will be mainly done through the quantitative method. The research design is a mix of qualitative and quantitative, as data on environmental and climate change disclosure is collected through content analysis of the annual reports and then quantitative scores are calculated to test the relationship with the dependent variable.

3.1 Data Collection

The study focuses on the non-financial firms included in the KSE-100 index of listed companies on the PSX, specifically targeting the top companies. The dataset utilized in this study comprises of 62 firms. Since these companies disclose CSR information in their annual reports, which is why we have explored the annual reports to extract this data. We obtained data from the annual reports released in 2021, 2022, and 2023. However, it was not possible to collect information from all firms or for every year. Annual reports have been collected from the websites of the respective companies and from the website of PSX¹. The secondary data for control variables (financial leverage and dividend policy) and moderating variable (firm size) data has also been taken from the annual reports, as well from the PSX EasyData portal² and from Zakheera.com. Thus, we have used both primary and secondary sources for data.

¹ <https://www.psx.com.pk>

² <https://easydata.sbp.org.pk>

3.2 Measurement of Variables

We provide a theoretical framework for empirical testing based on a comprehensive review of the literature. Climate change and environmental disclosure are the independent variables in this idea, while financial success is the dependent variable. Furthermore, we wish to study the role of business scale (firm size) as a moderating factor in the relationship between climate change and environmental disclosure and financial performance. In addition, we will use two control variables: financial leverage and dividend payment. We wish to account for the likely influence of the firm's capital structure and dividend distribution on the connection between Climate change & Environmental disclosure and financial performance by including these two as control variables.

To examine the linkage between environmental disclosure, climate change and financial performance we have developed a set of indicators that will be part of our research (Abdi et al., 2022). One of the most commonly used performance measures is Tobin's q, according to Xie et al. (2019). The calculation is market value divided by assets.

Thomson Reuter's ESG dimension ratings are utilized as a standard for different ESG disclosures in several studies (Abdi et al., 2022). However, because data for Pakistan is not accessible, we are employing the technique used by Rahman Belal et al. (2010) in the Bangladesh context by developing a content analysis framework. As a result, we employed text content analysis using 24 categories to capture climate change & environmental disclosures made in annual reports. (Branco & Rodrigues, 2006) A "yes/no" or (1, 0) scoring approach was used.

Companies that provide disclosure information in their annual reports are designated as 1. Companies that do not share any information, on the other hand, are coded 0. The maximum number of points is 24, with 11 categories (including energy disclosure) related to the climate change theme and the other 13 categories encompassing disclosures on other environmental problems. For each company, index will be calculated by dividing the score of the company in climate and environmental disclosure with total number of categories. We will be evaluating different features in each category such as descriptive, monetary, and quantitative

disclosures, in line with earlier research (Rahman Belal et al., 2010).

The current study employed size as a moderator along with a collection of control variables, including dividend ratio & leverage. Firm's size will be taken as long of its total assets (Yang and Baasandorj, 2017). Different control variables have been studied in different researches but one of the most extensively studied control variable in the literature is leverage or capital structure of the company. Trade-off theory, which asserts that low-growth firms with tangible assets and predictable cash flows are more likely to employ debt in their capital structure (Pires & Fernandes, 2012), provides the theoretical foundation for this ratio. The leverage of an organization is determined by the debt ratio, which is calculated by dividing total liabilities by total assets (Lee et al., 2013). The dividend ratio serves as a mechanism through which a company's financial health is communicated to investors and through which its wealth is transferred to shareholders (Moon et al., 2015). As stated by Gordon in 1959, an increase in dividends is indicative of a greater value of the corporation. We anticipate a positive correlation between dividends and financial performance in this context.

3.3 Empirical Analysis and Model

Panel regression analysis has been used to determine the relationship between the dependent and independent variable, as well as to test the moderating effect. Panel data analysis is a widely used method in finance for studying the behavior and response of variables over time (Park et al., 2017). It involves analyzing longitudinal as well as cross-sectional data, and has gained popularity in the field of research (Okafor et al. 2021; Ferrero-Ferrero et al. 2016). The choice of employing a POLS, FEM or REM depends on the outcome of the diagnostic test. These models have also been utilized in the literature to examine the connection between environmental and climate change disclosure and financial performance. We will do a Hausman test to determine the appropriate choice between FEM or REM (Yaffee, 2003). Based on the hypotheses presented above, our empirical model is as follows:

$$TQ = \alpha_0 + \beta_1 \text{Index} + \beta_2 (\text{Index})^2 + \beta_3 \text{Size} + \beta_4 \text{Lev} + \beta_5 \text{Div} + \varepsilon_1$$

Where,

TQ: Tobin's q;
 Index: Index of climate change and environment disclosure;
 Size: Company size;
 Lev: Firm's leverage;
 Div: Dividend Payout ratio;

04 Results and Discussion

4.1 Descriptive Analysis

4.1.1 Environmental & Climate change disclosure

This section presents and examines the results of the research, focusing on the scope and characteristics of environmental and climate change disclosures made by non-financial companies listed on the KSE100 index in Pakistan. The overall disclosure profiles of these companies are detailed in Table 1.

Table 4.1

Environmental and Climate Change disclosure in %

Description	Annual Reports (2023)	Annual Reports (2022)	Annual Reports (2021)
Total % of companies with disclosures in at least one category	59	58	49
Total % of companies with no disclosures	3	4	13
Total	62	62	62

Table 4.1 shows that 49% of companies have shown climate change and environmental disclosure in at least one category in 2021 which has increased to 59 in 2023. There were 13% of the companies who have not shown any disclosure in their annual report but this has reduced to 3% in 2023.

Table 4.2

Overall Environmental and Climate Change Index

Descriptions	2023	2022	2021
Total Possible scores for all companies	1,488	1,488	1,488
Total Scores achieved for all	360	393	236
Overall Index (%)	24	26	16

According to the disclosure index shown in Table 4.2, the general level of disclosure looks to be quite low, with corporations rating 24%, 26%, and 26% in 2021, 2022, and 2023, respectively. This demonstrates unequivocally that environmental and climate change disclosure by Pakistani corporations is extremely low. There are at least two reasons for Bangladeshi firms' limited adoption of environmental and climate change declarations. First, we argue that one of the reasons for less corporate excitement on this issue is an inadequate definition of the business role in climate change mitigation and adaptation. In other words, it is due to a lack of proper policy incentives, which is consistent with the findings of the Jeswani et al. (2008) study. Second, it might be the reflection of Pakistani enterprises' poor performance in this sector.

4.1.2 Main Model

Descriptive statistics of all the variables used in this study are shown below

Table 4.3

Descriptive Statistics

Ite m	Me an	Me dia n	Max imu m	Mini mu m	Std. Dev .	Obser vation s
TQ	1.16	0.60	10.04	0.00	1.63	186
IND EX	0.21	0.20	0.64	0.00	0.15	186
IND EX	0.07	0.04	0.41	0.00	0.08	186
DIV	0.39	0.28	2.37	0.00	0.41	186
LE	0.53	0.50	0.93	0.07	0.18	186
V	3	5	0.93	0.07	0.18	186

	114		1,42			
SIZ	,59	55,	4,06	2,49	201,	
E	6	349	5	0	381	186

Table 4.3 shows mean value of Tobin’s Q is 1.16. Similarly, minimum, and maximum value of Tobin’s Q is 0.0 and 10.04. Standard deviation of Tobin’s Q is 1.63. Moreover, it shows that the number of observations is 186 as it is a balanced panel. Minimum value of Index is 0 as there were companies which does not have any disclosure that’s why it is zero.

4.1.3 Correlation

Correlation of all the variables used in this study are shown below

Table 4.4
Correlation

	TQ	IND EX	IND EX2	LE V	DIV	SIZ E
TQ	1.00	0.02	0.03	0.01	0.37	0.20
IND EX	0.02	1.00	0.94	0.11	0.03	0.01
IND EX2	0.03	0.94	1.00	0.13	0.02	0.02
LE V	0.17	0.11	0.13	1.00	0.04	0.07
DIV	0.37	0.03	0.02	0.04	1.00	0.13
SIZ E	0.20	0.01	0.02	0.07	0.16	1.00

Table 4.4 shows the correlation relationship between Tobin’s Q and Index is negative. Similarly, square of index also shows negative relation with Tobin’s Q. Dividend payout shows the positive relation with Tobin’s Q. While Leverage and Size also shows negative relation with Tobin’s Q

4.2 Validation of Model

We use the pooled regression model of panel data analysis in this research to check the impact of Environmental & Climate disclosure on financial performance of the company for three-year period of listed non-financial Pakistani companies.

Table 4.5
POLs

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.11	1.13	5.41	0.00
INDEX	2.88	2.13	1.35	0.18
INDEX2	-5.53	4.04	-1.37	0.17
DIV	1.34	0.25	5.29	0.00
LEV	0.35	0.60	0.58	0.56
LOG(SIZE)	-0.54	0.10	-5.34	0.00
R-squared	0.26			
Adjusted R-squared	0.24			
F-statistic	12.82			
Prob(F-statistic)	0.00			

Initially, we have run POLs shown by table 4.4 to check the impact of Environmental & climate change disclosure on financial performance. To decide which model POLs is fit for our model or not, we have applied Breush-Pagent to check.

Table 4.6
BP Test

	Cross-section	Period	Both
	One-sided	One-sided	
Breusch-Pagan	142.58	0.64	143.2
	0.00	-0.42	3
			0.00

The value of breusch pagan is 0.00 which shows that Null Hypothesis is rejected e.g. "POLS is not appropriate in comparison of FEM/REM".

4.3 Hypotheses Testing

Before we go for out hypotheses testing, we need to run another test to check whether to use Random

effect model is apporiate or Fixed effect model. For this we will apply Huasman test:

Table 4.7
Huasman test

Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Pro b.
Cross-section random	6.66	5.00	0.25

The Prob value of Hausman test shows 0.25 which is greater than 0.05. which means accept null hypothesis or in another words Random Effect Model (REM) is appropriate for our model and we should apply REM to estimate regression.

Table 4.8
Random Effects Model

Variable	Coefficient	Std Error	t-Statistic	prob.
c	0.933175	0.404394	2.307589	0.0222
INDEX	0.855545	0.959257	0.891883	0.3736
INDEX2	-2.518932	1.71575	-1.468123	0.1438
DIV	0.789605	0.155801	5.068036	0
LEV	-0.177214	0.627346	-0.282481	0.7779

Effects Specification		S.D.	Rho
Cross-section random		1.46322	0.8979
Idiosyncratic random		0.493442	0.1021

Weighted Statistics			
R-squared	0.14982	Mean dependent var	0.22167
Adjusted R-squared	0.131031	S.D. dependent var	0.529545
S.E. of regression	0.493634	Sum squared resid	44.10515
F-statistic	7.973999	Durbin-Watson Stat	1.529343
Prob(F-statistic)	0.000006		

Unweighted Statistics			
R-squared	0.112761	Mean dependent var	1.159898
Sum squared resid	433.9934	Durbin-watson stat	0.155421

Table 4.7 shows the results of the random effects model, without the moderating effect of firm size. As per the results, INDEX and INDEX squared both show an insignificant relationship with the

Tobin's Q, meaning the environmental and climate change disclosure doesn't have a significant impact on firm performance. Hence, we cannot reject the null hypothesis of no relationship between these

variables (in the absence of firm size). Dividend as control variable shows a positive and significant effect on performance. Leverage has an insignificant negative effect on the firm performance.

In the second step, we test the moderating effect of firm size in the relationship between firm performance and environmental and climate change disclosure, to test our second hypothesis.

Table 4.9
 Random Effects Model, with Moderating Effect

Variable	Coefficient	Std Error	t-Statistic	prob.
c	8.624751	1.369188	6.299171	0
INDEX	1.513124	0.877704	1.723958	0.0864
INDEX2	-3.20494	1.56063	-2.05362	0.0415
DIV	0.677364	0.142833	4.742358	0
LEV	0.320761	0.581213	0.551882	0.5817
LOG(SIZE)	-0.727562	0.124786	-5.83047	0

Effects Specification		S.D.	Rho
Cross-section random		1.373723	0.9042
Idiosyncratic random		0.447222	0.0958

Weighted Statistics			
R-squared	0.284589	Mean dependent var	0.214262
Adjusted R-squared	0.264717	S.D. dependent var	0.523956
S.E. Of regression	0.449285	Sum squared resid	36.33425
F-statistic	14.32076	Durbin-Watson stat	1.544084
Prob(F-statistic)	0.000000		

Unweighted Statistics			
R-squared	0.220164	Mean dependent var	1.159898
Sum squared resid	381.4571	Durbin-Watson stat	0.147076

Table 4.8 above shows the results of random effects model, whereby moderating effect of firm size is tested in the relationship between firm performance and environmental and climate change disclosure. LOG(SIZE) shows a negative and significant relationship with firm performance. Further, the INDEX has a positive and moderately significant (p=0.086) coefficient whereas INDEX squared has a negative and significant (p=0.04) coefficient. This confirms the moderating effect of firm size i.e. as firm size is introduced into the model, the relationship between firm performance and environmental and climate change disclosure

becomes significant. Thus, H2 for the moderating effect of firm size is accepted. With a ten percent confidence interval, H1 is also accepted when firm size is added to the model. The results also confirm that the environmental and climate change disclosure has a non-linear (inverted u-shaped) relationship with the firm performance, meaning that the effect of this disclosure on performance becomes negative at higher values. This result is in line with study of Pu (2023) and both variables formed an inverted U-shaped relationship.

Table 4.10
Results Summary

Variable	Coefficient	Value	Result
Climate change & Environmental disclosure	1.51	0.09	Accepted* *
Square of Climate change & Environmental disclosure	-3.2	0.04	Accepted*
Size	-0.73	0.00	Accepted*

Note.p-values in parentheses. *p<0.1, **p<0.05

4.4 Discussion

The primary goal of this research is to determine if climate change and environmental disclosure influences financial performance of the firms in PSX 100 index. The findings of this research align with the stakeholder theory, which contends that the environmental initiatives might serve as value drivers for the firm. The findings presented here align with studies of Xie et al. (2019) and Qureshi et al. (2020), which demonstrated a significant relation between environmental and social disclosure and corporate value in a positive direction.

According to the findings, stakeholders respect environmental actions and reward the organization accordingly. In other words, the business that takes a stakeholder approach will gain from such efforts. Climate change and environmental disclosure may have a beneficial impact on business performance in a variety of ways or channels. More climate change and environmental activities, for example, might contribute to improved trust in the organization's policies, resulting in more public aid and donations (Zhang et al., 2010; Li et al., 2018). Furthermore, climate change and environmental actions raise brand awareness and improve brand image. This, in turn, offers the company a competitive advantage and leads to a rise in sales. The argument about climate change and environmental disclosure and company performance is reviewed in this research. To be more specific, the current enquiry asks, 'do climate change and environmental efforts matter?' As previously stated, the subject has been addressed before, but the conclusions are somehow skewed in favor of climate change and environmental disclosure's favorable influence on performance but these results are not properly established particularly in context of Pakistan. In other words, the findings on the influence of climate change and

environmental disclosure on business performance are inconsistent. There might be several causes for these contradicting results, but one possibility is inaccurate models and data year selection. To broaden our understanding, we modelled the non-linear relationship between climate change, environmental efforts, and company success in this study.

The study models the association between climate change and environmental disclosure activities and business performance to add to the current body of work on the issue. The findings provide a number of intriguing observations. First, climate change and environmental operations have been shown to have a favorable impact on business performance. Along with this, study's findings indicated that there is a non-linear link between financial performance and environmental and social disclosure. Our finding suggest climate change and environmental activities are rewarding only up to a point until they negatively impact financial performance. In other words, there is an inverse u-shaped relationship between financial performance and climate change and environmental activities. These findings imply that stakeholders after reaching a certain point in climate change and environmental activities, sees these actions as unnecessary or preventable and these activities are seen as an expense to the company. Because the resources redirected to climate change and environmental initiatives may be used for research and development, as well as product and service enhancement. Major conclusion from this research is that companies must choose their thresholds in order to limit their climate change and environmental activities at that time. Furthermore, enterprises must identify more cost-effective climate change and environmental operations in order to prevent a negative shock to their profitability.

Further, our findings reveal that firm size has a significant moderating impact on the link between climate change and environmental disclosures and financial performance. However, the moderation direction differs, which is supported by López-Pérez et al. (2017)'s argument that a distinct slope in the association is possible for big and small enterprises. This finding is consistent with the view that size play a moderating role in the relationship between ESG and firm performance (Udayasankar, 2008); however, it contradicts the argument that company size influences the resources available for providing ESG (Drempetic et al., 2020). This study also contradicts the mainstream sustainability stance, which holds that organizations with relatively higher total assets, and therefore bigger size, are likely to sloped positively.

The implementation of mandatory reporting requirements for social disclosures in Pakistan has resulted in a visible surge in climate change and environmental disclosures, particularly in the aftermath of the catastrophic floods of 2022. This phenomenon represents a more extensive worldwide trend towards increased accountability and transparency in the operations of corporations, specifically with regard to the environmental and social consequences of their activities. In this context, the findings of this study are important, as these findings shed light on the possible factors associated with the environmental and climate change disclosure.

05 Conclusion, Recommendations and Limitations

5.1 Conclusion

The investigation of environmental and climate change disclosures among Pakistani non-financial companies listed on the KSE100 index provided important insights into the changing landscape of corporate social responsibility and its influence on financial performance. This research, which is anchored in the context of Pakistan's corporate sector, challenges the standard view of corporate responsibility as purely profit-driven, a concept famously summarized by Milton Friedman's argument that business's primary obligation is to increase profits.

Our results imply a paradigm shift, emphasizing that environmental and climate change disclosures are strategic business decisions that may favorably affect a company's financial success rather than

purely ethical ones. This is consistent with the rising worldwide trend towards sustainable investment, particularly in light of the Covid-19 epidemic and the mounting effects of climate change. The report highlights the growing relevance of Environmental, Social, and Governance (ESG) factors in investment choices, which reflects a larger change in investor objectives towards sustainability.

The empirical findings of the research revealed a substantial association between environmental and climate change declarations and financial performance. While the link with Tobin's Q shows that these disclosures have a favorable influence on business profitability, there is also evidence of a non-linear relationship, generating an inverted U-shaped curve. This shows that the advantages of environmental and climate change disclosures on financial performance may wane beyond a certain point. Results also suggest firm size moderates the relationship between climate change and environmental disclosures and financial performance. However, direction of the moderation is different which is against the view firm with bigger size are likely to be sloped positively.

These findings are crucial for corporate strategists and policymakers, as it implies the need for a balanced approach in environmental and climate change initiatives. Companies must identify optimal levels of disclosure and engagement in environmental activities to maximize their positive impact on financial performance without overextending resources or alienating stakeholders. This study contributes significantly to the understanding of the relationship between environmental and climate change disclosures and corporate financial performance in the Pakistani context. It provides empirical evidence challenging the traditional view of corporate responsibility and underscores the importance of ESG criteria in contemporary business practices. The findings are particularly relevant for corporate leaders and policymakers in Pakistan and other emerging economies, offering insights into how environmental and social responsibilities can be integrated into business strategies to enhance financial performance and contribute to sustainable development.

5.2 Recommendations

The outcomes of the study provide three important, practical consequences and recommendations. First, our study benefits investors by analyzing the link between the Climate change & Environmental disclosures and the characteristics of listed firms in Pakistan. Investors should choose firms that provide more information regarding climate change and environmental disclosures, as its openness is highly tied to a company's financial success.

Second, firms in Pakistan should be more aware of their corporate social responsibilities. Since, there are now stakeholders who are increasingly focused on CSR efforts coupled with sustainable development. Due to this, companies need to carry out their social duty of protecting environment and mitigating the impact of climate change and become more aggressive in publishing this information. This will have a long-term favorable impact on firm financial performance.

Third, the Government and SCEP should continue to enhance and complete the legislation governing climate change and environmental disclosures for listed firms. Currently, most of the substance of social responsibility information in the annual reports presented to stakeholders is voluntary, with limited requirements and a lot of relevant information that has not been revealed. The SECP should create and implement corporate social responsibility information disclosure guidelines in accordance with worldwide practice, as well as give sufficient information to listed firms.

5.3 Limitations

The research only examines the disclosure of Climate change and environmental information in annual reports, disregarding the potential use of other media platforms like websites or investor meetings for disseminating such information. Furthermore, although the data sample accurately reflects over 60% of the total transaction value of the whole market, the firms which are being studied constitute a limited number. Therefore, studies based on the data of higher number of companies need to be conducted to bring more reliable result. Furthermore, there may exist other variables that might potentially influence climate change and the ecosystem, which have not been examined in the article. To enhance the social responsibility report's content and relevance, future

studies may include these aspects and use cross-sectional variations. Furthermore, a comprehensive selection of publicly traded corporations might be used to assess a wider range of economic sectors. This study examines the influence of a three-year period, with the potential to include additional years to enhance the reliability of the model. Further studies might explore the establishment of regulatory frameworks that address social obligations and sustainable development reports. These frameworks would aim to improve the credibility of the reports and reduce risk awareness among capital providers, thus benefiting the stakeholders.

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