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EXAMINING THE RELATIONSHIP BETWEEN THE ENVIRONMENTAL AND SOCIAL INVESTMENTS OF COMPANIES AND THEIR OWNERSHIP STRUCTURES, BOARD DIVERSITY AND FINANCIAL INDICATORS

Şirketlerin Çevresel ve Sosyal Yatırımları ile Sahiplik Yapıları, Yönetim Kurulu Çeşitliliği ve Finansal Göstergeleri Arasındaki İlişkinin İncelenmesi

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Abstract

The objective of this study is to investigate the relationship between environmental and social investment expenditures, which play a significant role in the field of sustainability studies and corporate activities, and their ownership structures, board diversity, and selected financial indicators. In this context, panel regression analyses were conducted on the annual data of 17 companies listed on Borsa Istanbul (BIST) between 2018 and 2022. The study's findings indicate that block ownership, family ownership, institutional ownership, female directors, foreign directors, sales, and leverage variables have a significant impact on environmental investments. On the other hand, the sales size variable has a substantial effect on social investments. It is evident that companies listed on BIST, as with all other institutions and organisations, will be required to augment the magnitude and frequency of their environmental and social investments in forthcoming years, in the face of the influences, preferences, and pressures exerted by regulatory authorities, investors, and non-governmental organisations. In this context, the findings of this study and the comments and recommendations based on these findings will provide guidance to these companies and all interest groups, regulatory boards and other academic research to be conducted in Turkey in terms of increasing these investments.

Keywords:
Sustainability, Environmental and Social Investments, Panel Data Analysis, Borsa Istanbul.

JEL Codes:
G32, G38, Q56.

Öz

Bu çalışmanın amacı şirketlerin sürdürülebilirlik çalışma ve faaliyetleri kapsamında önemli bir yere sahip olan çevresel ve sosyal yatırım harcamalarıyla sahiplik yapıları, yönetim kurulu çeşitlilikleri ve seçilmiş finansal göstergeleri arasında bir ilişkinin olup olmadığını incelemektir. Bu bağlamda Borsa İstanbul'da (BIST) yer alan 17 şirketin 2018-2022 yılları arası yıllık verileri üzerinden panel regresyon analizleri gerçekleştirilmiştir. Çalışma sonuçlarına göre çevresel yatırımlar üzerinde blok hissedarlık, aile hissedarlığı, kurumsal hissedarlık, kadın yönetim kurulu üyeleri, yabancı yönetim kurulu üyeleri, satışlar ve borçlanma değişkenlerinin etkisi bulunduğu, sosyal yatırımlar üzerinde ise satış büyüklüğü değişkeninin etkisi bulunduğu ortaya konulmuştur. Diğer tüm kurum ve kuruluşlar gibi BIST'te yer alan şirketlerin de önümüzdeki yıllarda düzenleyici otoritelerin, yatırımcıların ve sivil toplum kuruluşlarının etki, tercih ve baskıları karşısında çevresel ve sosyal yatırımlarının miktar ve sıklığını artırmaları gerekeceği açıktır. Bu bağlamda, bu çalışmanın bulguları ve bulgulardan hareketle yapılan yorum ve tavsiyeler söz konusu yatırımların artırılması bakımından Türkiye'den ilgili şirketlere ve tüm çıkar gruplarına, düzenleyici kurullara ve yapılacak diğer akademik araştırmalara rehberlik sağlayacaktır.

Anahtar Kelimeler:
Sürdürülebilirlik, Çevresel ve Sosyal Yatırımlar, Panel Veri Analizi, Borsa İstanbul.

JEL Kodları:
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1. Introduction

The term sustainability was first coined by Hans Carl von Carlowitz, a German accountant and mine operator, in 1713 when proposing the principles of sustainability in the context of the forestry industry (TUYID, 2020: 6). Sustainability is a broad concept that encompasses the relationship between the environment, human beings, and the responsibilities of present generations for future generations. It demands a paradigm shift in thinking in order to ensure the overall quality of people's lives. The fundamental motivation behind this transformation is the necessity to shift the prevailing societal focus from consumption to one that is characterised by a global sense of solidarity. This shift is imperative for the attainment of environmental sustainability, responsible human conduct, and economic prosperity (Ozmehmet, 2008: 3).

In order to enhance global habitability, it is imperative that companies demonstrate not only financial profitability but also the positive societal impact they engender. Moreover, it is expected that these companies will furnish substantiated evidence of their beneficial effects and assume social responsibility. The aforementioned stakeholders encompass a diverse group, including shareholders, investors, employees, consumers, trade unions, and non-governmental organisations. ESG refers to the consideration of environmental (E), social (S), and governance (G) practices that may have an impact on the sustainability of companies. It is important to note that the concept's scope extends beyond the mere pursuit of profit, encompassing a comprehensive evaluation of a company's environmental stance, human rights policies, service process management, and the alignment of its management with ethical principles and corporate governance standards (Kırbaşoğlu, 2024). In the contemporary business world, characterised by the concept of a global village, public authorities have initiated the implementation of mandatory regulations. This is driven by two primary motivations: firstly, the need to maintain compliance with environmental regulations to avoid penalties, and secondly, the strategic response to heightened competition. Organisations, therefore, prioritise the enhancement of their economic, environmental, and social performance. This is undertaken to attain long-term sustainability on a universal scale (Mondal et al., 2022: 66). In recent decades, a novel form of investment has come to the fore, often termed ethical or socially responsible investing. This approach entails the incorporation of extra-financial considerations, including ethics, society, environment, or corporate governance criteria, within the conventional investing strategy, which is otherwise predominantly driven by financial imperatives. This form of investment has garnered increased attention in both practitioner and academic literature. Moreover, it has been the focus of significant attention from various writers, ranging from the popular press to academia, with an increasing number of finance enterprises providing either ethics-based or social awareness products and services (Sandberg et al., 2009: 519).

From a commercial standpoint, socially responsible companies have been shown to attract consumers to such an extent that it has had a significant impact on business practices, ultimately resulting in long-term modifications to the rules that govern the business environment. The paradigm shift in investor sentiment, from a myopic focus on profits to an expanded consideration of ethical corporate practices, is a salient development in contemporary investment dynamics. Investors are increasingly utilising non-financial parameters in their analysis, with the objective of identifying earnings and expansion prospects. These extra-financial elements have emerged as a crucial factor for determining the potential returns of investments in specific companies. In summary, it can be posited that ESG investing signifies a

multifaceted integration of sustainability and financial systems, with the overarching objective being the maximisation of profits (Aich et al., 2021). A sustainable business approach, incorporating ESG investments, confers a number of advantages on companies, with the concomitant benefit to all stakeholders. These companies have the capacity to obtain low-cost, long-term financing from the most suitable sources in a short period of time. The organisation effectively manages risk by developing its employees' knowledge and skills through effective human resources management. Furthermore, they possess the capacity to expeditiously develop new products, services and processes, whilst implementing continuous enhancements. The company has been commended for its commitment to transparency in its dealings with all stakeholders (TUYID, 2020: 11).

Recent studies have indicated that corporations that implement successful ESG management strategies generally exhibit elevated levels of profitability over an extended timeframe. These companies have been found to exhibit greater resilience and a higher level of preparation for sudden crises, such as the global pandemic due to the SARS-CoV-2 virus, in comparison to companies failing to adhere to the principles of sustainability. Moreover, ESG indices have demonstrated superior performance in all European market sectors during the crisis period when compared to non-ESG indices (Mavlutova et al., 2022). A number exist in the literature that address ESG activities from a variety of perspectives. A wide range of studies have been conducted on the significance of ESG activities in corporations. These studies have indicated that ESG scores facilitate companies in accessing financial resources with greater ease and mitigate the risk of default. Furthermore, they have proposed that companies should adopt a holistic approach to the reporting of ESG activities within the framework of their internal control structures (Maji and Lohia, 2023; Uludağ, 2023; Doğan, 2024). In addition to the aforementioned studies, it is evident that one of the most salient issues is the relationship between companies' ESG disclosure levels and scores and their performance, both empirically and bibliometrically (Karyağdı and Şit, 2023; Tiwari et al., 2023; Yavuz, 2023; Handoyo and Anas, 2024; Doğan and Başar, 2025). In light of these developments, it is anticipated that the significance of ESG investments will be elevated in the perception of both private and institutional investors. It is imperative to investigate the factors influencing ESG investments, which prove advantageous to both companies and all interest groups, from investors to customers, and most significantly, the physical world and the advancement of humanity.

As will be discussed in the following sections of this study, although the importance of ESG activities has not yet been fully grasped by investors and companies, it is clear that companies, like all institutions, will need to increase the amount and frequency of their activities and investments in the coming years in the face of the influence, preferences and pressures of regulatory authorities, investors and civil society organisations. The calculation of ESG performances is typically conducted by third-party organisations, employing a range of indicators and methodologies. One such indicator is the amount of investment made. As previously stated, the majority of studies on ESG, particularly in Turkey, focus on the relationship between ESG performance and the financial performance of enterprises. Therefore, the present study concentrates on the aforementioned gap in the literature and aims to identify firm-specific factors that have an impact on investment amounts. The present study investigates the impact of ownership structure, board diversity and financial indicators on companies' environmental and social investments within a comprehensive framework, by modelling them collectively. Furthermore, conducting two distinct analyses on companies' environmental and

social investments using available data will facilitate the identification of the factors affecting each type of investment, thus providing more detailed explanations and evidence and guidance from Turkey for companies, regulators and other academic research.

In the following sections of the study, the theoretical background underlying the relationship between ownership structure, board diversity and financial indicators and ESG activities and investments will be discussed, hypotheses will be developed. The recent literature on the subject will be reviewed, analyses and findings will be exhibited and recommendations will be made to companies, all stakeholders, regulatory boards and researchers based on the findings.

2. Theoretical Framework and Hypothesis Development

2.1. Ownership Structure

In relation to the ownership structure of companies and their relationship to ESG, the literature has examined block ownership, family ownership, institutional investors and foreign shareholders. Firstly, from an ownership concentration point of view, as argued by Grossman and Hart (1980), in companies with a high degree of shareholding structures, managers are probably to have much more authority over operating judgement than in companies with a more concentrated ownership structure. Consequently, under similar conditions, a less concentrated ownership structure is associated with greater managerial discretion in initiating donations (Adams and Hardwick, 1998). Managers can increase personal stature in the local society by having more discretion in making charitable and other donations (Haley, 1991). This may increase the level of their prestige in national and international labour markets. Conversely, Navarro (1988) has posited the argument that socially responsible administrative action may potentially compromise the objective of maximising shareholders' value. Directors in firms with concentrated ownership are subject to close supervision and oversight by owners, thereby reducing the likelihood that such discretionary donations will be made without the knowledge and consent of shareholders. In accordance with these perspectives, Rees and Rodionova (2015) suggested that block owners possess the capacity to implement their own logics at the management level, thereby exerting influence on environmental behaviour and performance. Dal Maso et al. (2020) conducted a more detailed investigation of the issue, explaining the reasons for the differences in environmental performance between family-owned and non-family-owned companies. They emphasised the ability of family businesses to intervene in human resource practices, especially in training and development, and concluded that this leads to low environmental performance.

Examining the phenomenon of philanthropic activity from the vantage point of family businesses, Ananzeh et al. (2022) posit that such endeavours are conspicuously absent in the family business sector. They attribute this dearth to the growing predominance of family dynamics in the management of these enterprises. Conversely, Hoi et al. (2020) advanced the argument that the ownership structure of companies functions as the primary governance mechanism. Furthermore, it was emphasised that companies with concentrated family ownership in the private sector adopt a strategy of value maximisation through donations. On the other hand, the consequences of voluntary corporate disclosures by family-dominated companies with the objective of attracting the interest of international investors in companies

with significant family ownership in the capital structure are discussed. It is an irrefutable fact that international investors seek higher returns and risk reduction by diversifying their portfolios. During various crisis periods, especially financial crises, international investors may experience a decrease in confidence in companies with intense family ownership in a foreign country where they already have limited information while investing. This phenomenon can precipitate a decline in the speed of international capital flows. It is suggested that, should family firms succeed in reducing information asymmetry, they may gain a competitive advantage over other firms in overcoming this lack of trust. It can be argued that greater disclosure of corporate investment and accounting information is a very important factor in attracting international investors (Chau and Gray, 2010). In this context, it may be an appropriate strategy for family businesses to focus on environmental and social investments, which are important evidence for corporate legitimacy and trust, and to disclose them regularly and completely, whether in times of crisis or during normal economic, political, etc. conditions, in order to attract both domestic and international investors and increase the amount of investments. Based on the above views and discussions in the literature, the first, second, third, and fourth hypotheses of the study were formulated as follows.

H_1: There is a relationship between ownership concentration and environmental investment in companies.

H_2: There is a relationship between ownership concentration and social investment in companies.

H_3: There is a relationship between family share ownership and environmental investment in companies.

H_4: There is a relationship between family share ownership and social investment in companies.

Recent years have seen a rapid development in cross-border investment, and as a consequence, the role of foreign investors in the corporate social responsibility of the companies in which they invest has become a subject of research. Foreign investors in the ownership structure have been shown to contribute to the enhancement of corporate social responsibility, thereby exerting a favourable influence on the field of corporate philanthropy (Wang et al., 2022). In their investigation, Mercer Consulting posed a question to investors regarding their perspective on the effects of ESG criteria upon prevailing investment concerns, specifically concerning risk and return. Consequently, from the perspective of the surveyed participants, the elements of ESG criteria pertaining to corporate governance were regarded to be of the greatest significance. However, a proportion of investors also recognised the importance of environmental and social factors. Recent years have seen mutual funds voting in favour of environmental and social investment recommendations with greater frequency. It should be noted that, with the exception of socially responsible investment funds, the rate of support for such proposals was comparatively low at the outset. Nevertheless, mutual funds' support for proposals varies, with some supporting many and others voting against or abstaining. The question of whether institutional investors should adopt a more active role in addressing environmental and social issues is a matter of perspective. Some institutional investors consider this to be within their purview, while others do not (Starks, 2009).

In the context of investment decision-making, shareholders are now charged with the evaluation and maintenance of oversight of a corporation's financial performance, as well as its environmental and social (E&S) performance. These aspects of company responsibility are of increasing significance in the modern era. The question of whether E&S performance is favourable to the overall interests of stockholders continues to be a subject of debate. It has been observed that companies experiencing significant pressure from institutional investors have been observed to exert greater pressure for enhanced ESG performance. This is likely due to the value of ESG being recognised during periods of financial instability. This suggests a potential incentive for investors to advocate for enhanced E&S performance, aligning it with the standards of firms within their local community. This could be a catalyst for firms to strive towards optimal E&S practices, driven by investors' aspirations. Nevertheless, it is important to acknowledge that cultural and social norms are likely to be significant factors. Foreign institutional investors (FIIs) residing in regions where social mores are conducive to robust ESG pledges exert a significant influence on the E&S achievements of corporations. It is argued that the social norms of a society are transmitted to firms by way of portfolio investment and that culture is embedded in economic decision-making (Dyck et al., 2019). On the other hand, evidence has been found to suggest that FIIs and domestic institutional investors (DII) may have different effects on voluntary corporate disclosures. This discrepancy could be linked to the numerous distinguishable characteristics of FIIs and DIIs, as well as the inherent disparity present within the FII group. In particular, FIIs are characterised by their extraterritorial nature, in contrast to domestic institutional investors who are typically based in the investee companies' home countries. The geographical distance between the home countries of FIIs and investee companies has been shown to have significant ramifications for the costs of information production and resulting information asymmetry. This may be influenced by factors such as language, culture, and legislative distinctions between the FIIs' home countries and those of the investee companies. Furthermore, the motivations and capacity of FIIs to advocate for changes in voluntary disclosure may be contingent on the degree of corporate governance strength in FIIs' home countries compared to that of the investee companies (Tsang et al., 2019). Based on the issues discussed in the literature on the impact of foreign and institutional owners on ESG, the fifth sixth seventh and eighth hypotheses of the study are stated as follows.

H_5: There is a relationship between foreign ownership and environmental investment in companies.

H_6: There is a relationship between foreign ownership and social investment in companies.

H_7: There is a relationship between institutional ownership and environmental investment in companies.

H_8: There is a relationship between institutional ownership and social investment in companies.

2.2. Diversified Boards

The relationship between board characteristics, such as the existence of independent directors, duality, the size of the board, the frequency of board meetings, and the financial, corporate, or social performance of firms, has become a subject of extensive research in

academic literature in recent years. Board diversity is defined as the representation of a broad variety of backgrounds, ethnicities, skills and experiences held by the board of directors in its complete composition. Ensuring effective governance and management within corporate organisations necessitates the presence of individuals on boards who possess a range of attributes, with each individual contributing unique perspectives and experiences to the collective decision-making process (Buhuiyan et al., 2021). The range of perspectives incorporates a variety of factors, including the age of board members, their nationality, the function they fulfil, and their religious background. Recent studies have demonstrated the significance of board and senior managerial variety with regard to ESG issues. The representation of women on boards and foreign board members have an important place in studies on board diversity.

The enhancement of gender variety within the composition of a board of directors has been demonstrated to engender an improvement in the effectiveness and supervisory function of the board. This enhancement in effectiveness can be attributed to the enrichment of the boardroom with a more diverse array of skills, experiences and ethical values, concomitant with the presence of a more heterogeneous group of individuals within the boardroom. The enhancement of gender balance within a board of directors has been demonstrated to lead to improvements in the quality of board decisions and the legitimacy of corporate practices. This enhancement is attributable to the diversity of skills, experiences and ethical values that a more balanced board brings to the decision-making process (Khaula and Ali, 2012). The impact of female representation on corporate boards has been demonstrated to engender positive change in several key areas. Firstly, it has been demonstrated that the presence of women is associated with higher attendance rates at meetings. Secondly, the quality of discussion has been shown to improve across a wider range of alternatives. Finally, evidence suggests that the quality of decision-making is enhanced by diversity, counteracting the tendency towards groupthink that can arise in homogeneous groups. Furthermore, female managers have been demonstrated to exhibit higher ethical standards in comparison to their male counterparts. They demonstrate a greater propensity to prioritise the ethical, environmental and societal responsibilities of the company, and are less inclined to engage in unethical behaviour (Eagly and Crowley, 1986; Kaplan and Hayes, 1993; Andreoni and Vesterlund, 2001; Oyenike et al., 2016; Ki and Oh, 2018). As posited by another perspective, Krebs (1970) determined that gender does not differentiate tendency towards altruism. However, when individuals do donate, women tend to exhibit higher levels of altruism and donate larger sums. Conversely, the domain of gender diversity research is frequently examined through the lens of 'tokenism', a term denoting the practice of incorporating a limited number of minority group members within a larger group, primarily to adhere to the minimum inclusivity standards. This viewpoint posits that the incorporation of women into leadership roles may be driven by the necessity to adhere to corporate governance principles, as opposed to a genuine dedication to diversity. Consequently, firms may be inclined to select a minimum number of women directors, essentially as a form of tick the box compliance, rather than a genuine effort to promote inclusion (Bhuiyan et al., 2021).

The composition of boards in terms of demographic diversity has proven to be an indicator of the educational and professional background of the members. Demographic diversity among board members has an impact on the dynamics of the board in question and leads to various conflicts (Goodstein et al., 1994). However, the extent of board demographic

diversity can serve as an indicator of the board's cognitive resources and capacity for complex and creative problem solving. It is vital for the board to develop an increased capacity to implement creative changes in ESG practices (Zhang, 2012). In addition, the notion that foreign board membership has a positive impact on a firm's ESG performance has also been considered in conjunction with the claim that the presence of such members serves to enhance the firm's legitimacy in the eyes of corporate stakeholders (Zhang, 2012; Kim and Lee, 2018; Harjoto et al., 2019; Beji et al., 2021; Wong et al., 2023). On the other hand, it is imperative to recognise the fact that both female board members and foreign national members, like all other members, have to prioritise both their individual interests and their own interests within the board framework. The presence of diversity within a community can impose significant limitations on the group's capacity to take effective action (Baysinger and Butler, 1985; Kosnik, 1990). The aforementioned detrimental effects can be attributed to a number of factors, including the underrepresentation of female on corporate boards, inconsistent public trust in these individuals, the absence of comprehensive legal frameworks, and the inability of multicultural boards to effectively utilise the extensive knowledge and diverse perspectives contributed by minority members (Zhang, 2012; Awwad et al., 2023).

In the light of the literature reviewed, it can be said that the debate on whether female and foreign board members have a positive or negative impact on environmental and social investment continues. Accordingly, the ninth, tenth, eleventh and twelfth hypotheses of the study are stated as follows.

H_9: There is a relationship between companies' female board members and environmental investments.

H_{10}: There is a relationship between companies' female board members and social investments.

H_{11}: There is a relationship between companies' foreign board members and environmental investments.

H_{12}: There is a relationship between companies' foreign board members and social investments.

2.3. Financial Indicators

Despite the extensive research conducted on financial indicators in the context of their influence on ESG issiues, it appears that company size and debt level emerge as the most significant considerations (Birindelli et al., 2018; Bhuiyan et al., 2021; Lavin and Montecinos-Pearce, 2021; Wang et al., 2022).

The argument is made that there is a high degree of correlation between the size of a company and its exposure to political pressure and controls. It is asserted that as a company's size increases, the level of scrutiny and attention from both public opinion and governmental authority on these entities is also expected to rise. Consequently, it is anticipated that larger companies will be held to a higher standard in terms of their social responsibility activities. This expectation is reflected in the higher levels of financial contribution to charitable organisations exhibited by larger companies (Roberts, 1992). One potential explanation for the elevated frequency of donations made by large corporations is the increased visibility that accompanies

their substantial scale. They benefit from the national and international goodwill that results from donations that are publicly disclosed in an appropriate, timely and complete manner. While such initiatives can be undertaken at the local level, companies tend to prioritise participation in these activities as part of their global public relations strategy (Amato and Amato, 2007). Specifically, the size of renewable energy firms operating in the field of green investment has been shown to have an increasing effect on both the amount of investment and the efficiency of their investments (Chang et al., 2021). Considering firm size from a sustainability perspective reveals that green loan disclosures negatively impact firm growth, with this effect increasing as firm size grows. However, there are also cases where size disadvantages green investments (Firmansyah and Kartiko, 2024).

High levels of debt have been shown to be associated with increased contractual obligations. Specifically, debt covenants are legal agreements that stipulate the rights of debt holders in the event of insolvency. These covenants may impose liquidity tests, non-proposed audits and sinking fund requirements. Consequently, under conditions of parity, highly leveraged companies tend to allocate smaller financial resources (Booth, 1992). Furthermore, such entities may be subject to a multitude of financial data audits and investment restrictions. Furthermore, social responsibility spending, including philanthropic contributions, can exert a substantial influence on corporate budgets. In certain instances, elevated levels of leverage may ultimately result in workforce reductions. Consequently, owners and managers of these large companies find themselves in a position to engage in more philanthropic activities in line with the expectations of external stakeholders (Ananzeh et al., 2022).

A review of the extant literature reveals the existence of further empirical studies on this topic (Adams and Hardwick, 1998; Brown et al., 2006). As discussed above, although situations contrary to expectations may arise, the general expectation in the light of recent studies on this subject in line with the theoretical framework is that company size will encourage environmental and social investments, while debt will have a restrictive effect (Chang et al., 2021; Zhao et al., 2023; Bouchmel et al., 2024). Accordingly, the thirteenth, fourteenth, fifteenth and sixteenth hypotheses of this study are formed as follows.

H_{13}: There is a positive relationship between the size of companies and their environmental investments.

H_{14}: There is a positive relationship between the size of companies and their social investments.

H_{15}: There is a negative relationship between the debt level of companies and their environmental investments.

H_{16}: There is a negative relationship between the debt level of companies and their social investments.

3. Literature Review

As shown in Table 1, recent empirical research has been conducted to identify the factors influencing environmental investments, donations and philanthropic expenditures.

Table 1. Factors Affecting Environmental Investments, Donations and Philanthropic Expenditures: Review of Current Empirical Literature

Author(s)	Country(s) and Period of Study	Methods	Results
Abban and Hasan (2021)	60 countries in both developed and undeveloped categories 2007-2017	Panel regression	The findings of this study indicate that left-wing parties, centre-oriented governing parties and parliamentary systems are more likely to encourage renewable energy investments.
Barabanov et al. (2021)	763 companies from 40 countries 2002-2015	Panel regression	There is a positive relationship between large firms and environmental investments, while highly valued and more profitable firms make less environmental investments. There is also a positive relationship between countries' per capita GDP and population and environmental investments.
Chu (2022)	20 OECD countries 1990 - 2015	Driscoll-Kraay standard errors, Feasible Generalized Least Squares and Panel Corrected Standard Error	There is a demonstrable relationship between ecological footprint and renewable energy, efficient use of energy and green technologies in the long term.
Yang (2023)	China 2008-2017	Differences-in-Differences regression	The policy on the trading of carbon emissions represents a significant obstacle for heavy industry when it comes to increasing investment in environmental measures. The impact is particularly acute for small enterprises.
Aliedan et al. (2023)	550 graduates of the fresh agriculture and food departments of Saudi Arabian public universities	PLS-SEM analysis technique on the survey data	There is a positive relationship between perceived behavioural control, green investment knowledge and green consumption commitment and potential investors' intention to make green investments.
Alsagr and Ozturk (2024)	51 top green investing countries 1996-2021	Random effect and 2sls regression	Resource rent has a dampening effect on renewable energy investments. Political stability, government effectiveness, control of corruption, rule of law and institutional quality are positively related to renewable energy investments.
Kotkova et al. (2024)	Czech Republic, Slovakia, Poland, and Estonia 2019	Binary logistic regression	The gender diversity of SMEs' boards and shareholders and family ownership have no impact on green activities expressed by the implementation of proactive environmental strategies and monitoring of energy consumption. The presence of environmental managers in family firms has a positive effect on the implementation of proactive environmental strategies
Bagadeem et al. (2024)	Companies in Indian manufacturing sector 2011-2021	Panel regression	There is a negative relationship between the rule of law, inflation and environmental expenditures of companies in the country. There is a positive relationship between the market capitalisation and size of companies and their environmental expenditures.

Table 1. Continued

Zhang et al. (2024)	Chinese A-share listed enterprises in Shanghai and Shenzhen 2008-2021	Channel analysis - mechanism analysis	Corporate digital transformation has a significant positive impact on green investments.
Yang (2022)	Manufacturing companies listed on the Taipei and Taiwan Stock Exchange 2013-2018	Panel regression	A positive relationship was found between the size, age, earnings, exports and employee-employer relations of a company and its commitment to corporate donations.
Fu (2023)	Chinese listed companies 2009-2019	OLS regression	There is a negative relationship between customer concentration and corporate donations.
Umar et al. (2023)	Publicly listed Nigeria Companies 2019-202	OLS regression and Tobit regression	The frequency of audit committee meetings positively affects corporate philanthropic donations, both before and during the pandemic. There is a positive relationship between audit committee independence and corporate philanthropic donations during the pandemic.
Chourou (2023)	2489 companies which are operating in 41 countries 2012-2018	Tobit regression, 2SLS regression	Companies operating in countries with higher levels of religiosity tend to spend more on corporate philanthropy. This is because the relationship between religiosity and corporate donations is based on aligning philanthropic spending with stakeholder preferences.
Chiebonam et al. (2024)	Deposit banks operating in Nigeria 2012-2022	Panel regression	Board independence and gender diversity have a positive effect on corporate donations. The effect of board independence is stronger in the post-Covid-19 period, while the effect of gender diversity is weaker.

A thorough analysis of the studies presented in Table 1 reveals that certain macroeconomic variables inherent in the operating environments of nations, factors that are not within the purview of corporate entities, such as the rule of law, government policies, and the prevailing technological advancements in the domain of digital transformation, exert a discernible influence on the expenditure patterns of companies. Moreover, empirical studies have been conducted to reveal the existence of a relationship between religious beliefs and personal views of investors in different geographical locations, as well as the characteristics of various shareholder groups, boards of directors and audit committees of enterprises and environmental and social investments. In this context, based on the theoretical framework and these empirical studies, this study will present evidence that will shed light on the impact of various groups that make up the ownership structures of companies, the diversity of the board of directors and important financial indicators on the financial performance of companies as well as their social and environmental investments, which may be a necessity for their survival in the near future.

4. Research Methodology

This study uses panel data analysis to examine the impact of ownership structure, board diversity and financial indicators on corporate environmental and social investments. Panel data analysis is a method used when estimating relationships using cross-sectional data with a time dimension. Panel data analysis allows to control the effects of heterogeneity between groups, to reduce the correlation between independent variables and to increase the efficiency of econometric estimators (Greene, 1993; Baltagi, 2005: 4-6). The panel data model with k variables, which has three basic approaches as pooled, fixed effects and random effects, is generally as follows:

$$yit = \beta_0 + \beta_{1it} X_{1it} + \beta_{2it} X_{2it} + \ldots\ldots\ldots\ldots \beta_{Kit} X_{kit} + \varepsilon it \quad (1)$$

where i=1,.....N denotes units of section and t=1,.....T time and ε is the error term. Correspondingly;

yit; the value of the dependent variable of the i-th cross-section unit at time t and

Xkit; the estimate of the kth explanatory variable of the i-th cross-section unit at time t.

In the context of panel data analysis, the application of stationarity tests to variables is contingent upon the fulfilment of two key criteria. Firstly, it is imperative that the time section (T) exceeds the number of units (N). Secondly, the time section must comprise sufficiently long periods. According to Baltagi (2013), panels comprising a minimum of 20 periods of data are designated as macro panels. The necessity for the fulfilment of the stationarity condition is a consequence of the extensive nature of these panels. Conversely, shorter panels with a time dimension are designated as micro panels, for which the stationarity condition is not applicable. In this study, the stationarity assumptions are disregarded, given that the time dimension is limited to five years. When each cross-section unit possesses an equal number of time series observations, this type of panel data is designated as balanced panel (Dougherty, 2006: 409). In the context of this study, balanced panel data is utilised, given that the data of the firms selected as the unit of analysis for the entire analysis period is available and companies with missing data are excluded from the analysis.

5. Data Set and Variables

In the framework of this study, an investigation was conducted into the annual reports, annual integrated reports, annual sustainability reports and annual financial reports of all companies listed on BIST. These reports were obtained from the company websites and the Public Disclosure Platform website.

The majority of the companies in BIST do not disclose sustainability reports, and the companies that do report vary significantly in terms of the information and data they share. As will be explained in more detail in the following sections, the variables of this study include environmental investment amounts and social investment amounts. With regard to the environmental issue, many companies express the positive effects of their environmental documents, environmental sensitivity and environmental protection activities, in sentences rather than quantities. However, with the exception of the disclosure of impacts such as carbon emissions as numerical data, there is a paucity of evidence to support such claims. A small number of companies regularly publish sustainability reports from 2018 to 2024, however the number of observations that would allow a reliable econometric analysis was reached for the years 2018-2022. Consequently, the units of analysis of the research consist of 17 firms for which data is available for the 5-year period which is the subject of consideration.

The dependent variables of the study were companies' environmental investment amounts and social investment amounts. The independent variables of the study comprised the following: the block ownership ratio, the family ownership ratio, the institutional ownership ratio, the foreign ownership ratio, the female board member ratio, the foreign board member ratio, asset size, sales (revenue) amount and the total debt ratio. In addition to the extant literature discussed in the preceding sections, the study by Bayrakcıoğlu and Şenol (2021) on the factors affecting the donations of companies in the BIST 30 index is also considered. In this study, sales (revenues) are included in the models as independent variables, along with assets and leverage as financial indicators. Table 2 presents the names of the variables, their abbreviations in the analysis, and explanations regarding their acquisition.

Table 2. Names, Abbreviations and Calculation (Explanations) of Variables in the Analysis

Variables	Abbreviation of the Variable	Explanations
Environmental Investments (Dependent)	LENVI	The natural logarithm of the company's environmental investment amount in the relevant year
Social Investments (Dependent)	LSOCI	The natural logarithm of the company's donations and grants amount in the relevant year
Block Ownership (Independent)	BLCK	The total shareholding of shareholders who hold a 5% or more share in the company during the relevant year is hereby defined as the total shareholding.
Family Ownership (Independent)	FAMO	Total proportion of shares held by members of a family in the company in the relevant year
Institutional Ownership (Independent)	INSTO	Total proportion of shares held by institutional investors in the company in the relevant year

Table 2. Continued

Foreign Ownership (Independent)	FOO	Total proportion of shares held by foreign investors in the company in the relevant year
Female Board Members (Independent)	FEBM	Number of female members on the company's board of directors in the relevant year / total number of board members
Foreign Board Members (Independent)	FOBM	Number of foreign members on the company's board of directors in the relevant year / total number of board members
Assets (Independent)	LAS	The natural logarithm of the assets related to the relevant year
Sales (Independent)	LSA	The natural logarithm of the sales related to the relevant year
Total Debt (Independent)	LEV	Total debts of the relevant year / total assets

6. Research Model

The present study proposes two models to explain the relationship between ownership structures, board diversity, financial indicators and environmental and social investments of companies. The two models are outlined as follows.

$$LENVI_{it}= \beta_0+ \beta_1 BLCK_{it} +\beta_2 FAMO_{it} +\beta_3 INSTO_{it} +\beta_4 FOO_{it} +\beta_5 FEBM_{it} +\beta_6 FOBM_{it} +\beta_7 LAS_{it} +\beta_8 LSA_{it} +\beta_9 LEV_{it}+ \varepsilon_{it} \quad (2)$$

$$LSOCI_{it}= \beta_0+ \beta_1 BLCK_{it} +\beta_2 FAMO_{it} +\beta_3 INSTO_{it} +\beta_4 FOO_{it} +\beta_5 FEBM_{it} +\beta_6 FOBM_{it} +\beta_7 LAS_{it} +\beta_8 LSA_{it} +\beta_9 LEV_{it}+ \varepsilon_{it} \quad (3)$$

7. Emprical Results

The descriptive statistics can be found in Table 3. As illustrated in Table 3, it is evident that there are companies that did not make any donations in the relevant years. It is evident that the block shareholding and family ownership of the company significantly exceed those of institutional and foreign shareholders, on average. As illustrated in Table 3, the analysis indicates that, on average, 16% of firms have female members on their boards, while 11% have members from foreign nations and a smaller number have members who are related. Furthermore, it should be noted that certain firms are not represented by such members on their boards of directors. The observation that the standard deviation values are relatively close to zero indicates that the values of the variables are near the mean value.

Table 3. Descriptive Statistics

Variables	Minimum	Maximum	Mean	Standard Deviation
LENVI	11.31	20.87	15.90	2.23485
LSOCI	0.00	22.04	14.29	3.98786
BLCK	0.45	0.95	0.69	0.13579
FAMO	0.00	0.79	0.43	0.30122
INSTO	0.00	0.95	0.20	0.31214
FOO	0.00	0.82	0.13	0.23144
FEBM	0.00	0.44	0.16	0.10913
FOBM	0.00	0.54	0.11	0.16620
LAS	21.18	29.75	23.45	1.50731
LSA	20.76	29.47	23.27	1.67093
LEV	0.22	7.46	0.70	0.76339

As presented in Table 4, the models established to determine the factors affecting the amounts of environmental and social investments have been solved. The F test and Hausman test were performed to determine which panel data model would be most appropriate. The findings of the F test results for both models ($p < 0.05$) indicate that the fixed effect model should be preferred to the pooled model. The Hausman test ($p > 0.05$) was performed in order to ascertain which of the fixed effect model and the random effect model is appropriate. The results of this test indicate that the random effect model should be preferred to the fixed effect model.

Table 4. Estimation of Environmental and Social Investments Models

Dependent Variables		**LENVI**				**LSOCI**		
Independent Variables	**Coefficient**	**Std. Error**	**Test Stat.**	**p**	**Coefficient**	**Std. Error**	**Test Stat.**	**p**
BLCK	2.803*	1.47	1.90	0.058	1.583	5.60	0.28	0.778
FAMO	-5.974***	1.28	-4.64	0.000	-3.463	4.00	-0.86	0.387
INSTO	-5.082***	1.21	-4.19	0.000	-4.141	4.06	-1.02	0.308
FOO	0.970	1.17	0.83	0.408	2.702	4.65	0.58	0.562
FEBM	4.343***	0.96	4.50	0.000	1.725	3.67	0.47	0.639
FOBM	-6.96***	1.73	-4.03	0.000	-6.667	8.71	-0.77	0.444
LAS	-0.496	0.71	-0.69	0.488	-1.161	1.15	-1.00	0.315
LSA	1.034**	0.48	2.15	0.031	1.970**	0.98	2.00	0.045
LEV	-0.104**	0.04	-2.45	0.014	0.103	0.08	1.29	0.196
C	5.145	8.83	0.58	0.560	-3.052	12.87	-0.24	0.813
R^2		0.57				0.29		
Number of Observations		85				85		
		LENVI				**LSOCI**		
F Test								
		$F_{\text{Test Statistic:}}$ 2.22 p: 0.0136				$F_{\text{Test Statistic:}}$ 2.81 p: 0.0020		
Hausman Test								
		χ2: 11.87 p: 0.2207				χ2: 7.13 p: 0.6235		
LENVI					**LSOCI**			
Levene, Brown, Forsthe Test								
W0 = 3.4965064	p = 0.00015262				W0 = 3.4965064	p = 0.00015262		
W50 = 1.7225686	p = 0.06301009				W50 = 1.7225686	p = 0.06301009		
W10 = 3.4965064	p = 0.00015262				W10 = 3.4965064	p = 0.00015262		
Modified Bhargava, Franzini, Narendranathan Durbin Watson and Locally Best Invariant Baltagi-Wu Tests								
Durbin-Watson = 1.2488647 Baltagi-Wu = 1.8826356					Durbin-Watson = 1.88776 Baltagi-Wu = 2.2773832			
Pesaran CD LM Test								
Cross sectional independence =1.893 p = 0.0583					Cross sectional independence =0.462 p = 0.6439			

Note: It is indicated by ***, ** and * respectively that the significance level is 1%, 5% and 10%.

Following the determination of the most appropriate models, a series of tests was conducted to ascertain the presence of heteroskedasticity, autocorrelation, and cross-sectional dependence problems. In accordance with the findings of Levene, Brown, Forsthe, and W0, as well as W50, the probability values for heteroskedasticity in both models are less than 0.05. This indicates the presence of a heteroskedasticity problem in the models. In the modified

Bhargava, Franzini, Narendranathan, Durbin Watson, and locally best invariant Baltagi-Wu tests applied for autocorrelation, it was determined that there is an autocorrelation problem in the model. This is evidenced by the fact that both the Durbin-Watson value and the Baltagi-Wu value are smaller than 2 for the environment model. It is recognised that the social investments model is not afflicted by an autocorrelation problem. The Pesaran CD LM test for cross-sectional dependence was conducted, yielding a p-value greater than 0.05, indicating that neither the environmental investment model nor the social investment model contains a cross-sectional dependence problem. In light of the above findings, the Arellano-Froot-Rogers robust estimator was employed to solve the environmental investments model, and the Eicker-Huber-White robust estimator was used to solve the social investments model.

As demonstrated in Table 4, the R^2 value in the environmental investment model is 57%. The findings of the study indicate a positive relationship between the block ownership ratio, the female board member ratio, sales and environmental investments at 10%, 1% and 5% significance levels, respectively. Consequently, an increase in the block ownership ratio by one unit has been demonstrated to result in a 2.3% rise in environmental investments. A corresponding rise in the ratio of female board members by one unit has been shown to yield a 4.3% increase in environmental investments. Finally, an increase in sales by 1% has been observed to result in a 1.03% rise in environmental investments. The findings of the study revealed a negative relationship between family ownership ratio, institutional ownership ratio, foreign board member ratio and environmental investments at the 1% significance level. Furthermore, a negative relationship was identified between leverage ratio and environmental investments at the 5% significance level. Accordingly, an increase in the family ownership ratio by one unit has been demonstrated to result in a decrease in environmental investments of 5.9%. A similar relationship has been observed between the increase in the institutional ownership ratio by one unit and the decrease in environmental investments, with a recorded figure of 5.08%. Furthermore, an increase in the foreign board member ratio by one unit has been shown to lead to a decline in environmental investments of 6.9%. Finally, an increase in the leverage ratio by one unit has been evidenced to cause a decrease in environmental investments of 0.1%.

Upon analysis of the social investment model in Table 4, it was observed that a statistically significant and positive relationship was only demonstrated between sales and the amount of donations. However, it is important to note that, according to the estimation results of the research model, although the model is statistically significant, some variables that are highly statistically insignificant will be removed from the model in order to achieve better and more accurate results.

In order to analyse social investments, it is necessary to exclude block ownership, family ownership, foreign ownership, female board members, and foreign board members from the model. The solution of the final social investments model in Table 5 is analysed, and it is evident that the fixed effect model should be preferred to the pooled model according to the F test results ($p < 0.05$). The Hausman test results ($p > 0.05$) indicate that the appropriate model is the random effect model. A re-examination of the diagnostic tests revealed the presence of a heteroskedasticity problem in the model. Therefore, the Eicker-Huber-White robust estimator was employed to solve the final social investments model. The R^2 of the model is 24%. The findings of this model, which corroborate the initial model, indicate a favourable relationship between sales and social investments at a 10% significance level. Consequently, a 1% increase in sales is associated with a 1.6% increase in donations.

Table 5. Social Investments Final Model Estimation

Dependent Variable	**LSOCI**			
Independent Variables	**Coefficient**	**Std. Error**	**Test Stat.**	**p Value**
INSTO	-0.427	1.61	-0.26	0.791
LAS	-0.835	1.12	-0.74	0.457
LSA	1.655*	0.88	1.87	0.062
LEV	0.101	0.08	1.19	0.233
C	0.632	10.59	-0.44	0.662
R^2	0.24			
Number of Observations	85			
F Test	$F_{\text{Test Statistic:}}$ 3.28		$p = 0.0004$	
Hausman Test	$\chi 2$: 3.22		$p = 0.5207$	
Levene, Brown, Forsthe Test	W0 = 3.4965064		$p = 0.00015262$	
	W10 = 3.4965064		$p = 0.00015262$	
	W50 = 1.7225686		$p = 0.06301009$	
Modified Bhargava, Franzini, Narendranathan Durbin Watson and Locally Best Invariant Baltagi-Wu Tests	Durbin-Watson = 1.7513017 Baltagi-Wu = 2.1664966			
Pesaran CD LM Test	Cross sectional independence =1.346		$p = 0.1782$	

Note: It is indicated by ***, ** and * respectively that the significance level is 1%, 5% and 10%.

8. Conclusions and Recommendations

This study analyses the relationship between indicators representing the ownership structure, board diversity and financial structure of 17 companies listed on BIST, and their environmental and social investment expenditures, based on annual data for the years 2018 to 2022. In the context of the study, a total of sixteen hypotheses were formulated, eight pertaining to environmental investments and eight to social investments. To this end, two distinct panel regression models were constructed for the purpose of testing the aforementioned hypotheses. In accordance with the findings of the model established for social investments, variables that were found to be highly insignificant were eliminated, and the model was subjected to a re-analysis.

The findings of the study demonstrate that block ownership has a motivating effect on firms' environmental investments. However, the present study finds that family ownership has a negative impact on environmental expenditures in Turkey, in line with the findings of Dal Maso et al. (2020) and Ananzeh et al. (2022) on donations. Moreover, the results of the present study are in accordance with the assertions put forward by Starks (2009), who contended that institutional owners of shares demonstrate a negative correlation with environmental investments. The results of the study indicate that institutional shareholders in Turkey adhere to the perspective that the responsibility for investing more frequently or in greater amounts in environmental and social issues does not repose with them. The negative impact of institutional owners, such as family ownership, may also occur as a result of these owners making decisions against sustainability investments because they believe that such investments do not lead to an increase in financial returns from a wealth maximisation perspective.

The finding that female board members, one of the board diversity variables, have an increasing effect on environmental expenditures proves that women are more sensitive to issues such as contribution to the world and ethics such as environmental expenditures, as suggested in the studies of Andreoni and Vesterlund (2001), Oyenike et al. (2016) and Ki and Oh (2018).

The findings demonstrate that foreign members exert a detrimental influence on environmental investments, in contrast to the positive impact of female board members. This observation suggests that gender diversity and nationality diversity have distinct effects on these investments. As demonstrated in the descriptive statistics section of the study, both diversity elements are found to be a minority in firms in Turkey. This state of affairs demands an alternative explanation to the interpretations proposed by Zhang (2012) and Awwad et al. (2023) that such groups are in a minority and consequently incapable of presenting their ideas and recommendations, or of having them accepted. In the context of Turkey, it can be posited that the influence of diverse board members, including women and foreign members, on ESG investments is attributable to their unique perspectives on these investments, rather than their status as minorities. The majority of foreign members are on boards as representatives of foreign shareholders. In this case, as argued by Tsang (2019) in his study, foreigners may perceive the impact and results of corporate sustainability practices as lower than in their home countries and may exert pressure to avoid making such investments in Turkey.

The findings of this study are consistent with the results of previous studies on the relationship between environmental investments and firms' debt levels (Booth, 1992; Chang et al., 2021; Zhao et al., 2023; Bouchmel et al., 2024). It can be posited that firms with elevated debt levels allocate a reduced amount of resources to such investments, due to their obligations to creditors. The positive effect of sales on both environmental and social investments supports the findings of Bayrakcıoğlu and Şenol (2021) on donations. The study's findings suggest that, while companies have previously established donation and grants limits within various committees, they may increase their donation and grant amounts within these limits during periods of increased sales.

The absence of a relationship between donations and the ownership structure and board diversity of firms is at contrary to expectations. The fact that some environmental investments are required by the state or regulatory authorities, but donations, which are part of corporate social responsibility activities, are not subject to any obligation, should not reduce the sensitivity of these groups to social investments. In the context of nationwide disasters, such as the February 6 earthquakes, or global disasters, such as the COVID-19 pandemic, it is imperative to acknowledge the pivotal role that corporate contributions, whether in the form of financial aid or in-kind donations, play in fostering positive perceptions of these entities within the broader community. These contributions, when made effectively, can significantly enhance the reputation of the company among its stakeholders, including individuals, families, and institutions. The decision regarding the allocation of financial resources is made by the company board of directors on an annual basis. Companies may elect to donate and grant funds up to a pre-determined upper limit.

A thorough analysis of extant literature reveals that firms' sustainability activities have not yet played a significant role in investment decisions. Nevertheless, it is evident that these activities have begun to garner the attention of a diverse array of groups, ranging from individual shareholders to portfolio managers. There is a strong likelihood that they will soon evolve into a bona fide investment criterion. Families with a significant proportion of shares in the capital structure should consider that by providing support for environmental and social investment expenditures, they can make non-financial contributions to the development of the physical environment and humanity. Furthermore, such actions can engender the appreciation of local and global public opinion, while concurrently attracting increasingly sensitive investors to

their companies, thus resulting in financial returns. When such investments are endorsed by these shareholders, it can be anticipated that both domestic institutional shareholders and foreign individual or institutional shareholders and members of the boards of directors of these groups will also endorse such investments, given that the host countries in which they invest are sensitive to environmental and social issues and attach importance to them. Increases in the number of women members on the boards of companies or the ratio or number of recommendations by regulatory boards to have women members on the boards of directors of publicly traded companies, as well as the transformation of these decisions into mandatory ones, may also have an incentive effect on ESG investments.

As of the date of this study, there are a total of 688 companies in BIST and 89 companies in the sustainability index. The finding that only 17 of these companies provide comprehensive data on their ESG expenses and investments in their corporate reports indicates that the majority do not yet clearly reflect such expenses and investments in their reports. In this context, it is the responsibility of regulatory and supervisory bodies such as the Capital Markets Board and the Banking Regulation and Supervision Board to publish information booklets and reports e-bulletins, on environmental and social investments for all owners, investors and firm's board and top management. Furthermore, it is recommended that they disseminate awareness-raising materials and, at the very least, propose recommendatory regulations.

In future studies, the perspectives and effects of different shareholder groups and board members on environmental and social expenditures can be investigated using methods such as surveys and interviews. An investigation into the relationships between company senior management and ESG investments can be of use in this regard. The relationships between ESG investments and various factors, including but not limited to educational fields, levels of education, and the age diversity of boards of directors, can be examined. Moreover, the profitability of companies, a significant financial indicator, is not encompassed within the purview of this study. As emphasised in the preceding sections, the majority of studies on ESG and financial performance are related to the impact of ESG activities and scores on financial performance. In subsequent studies, it would be beneficial to examine the impact of various profitability measures of firms on ESG activities and the two-way relationship between ESG and profitability.

Declaration of Research and Publication Ethics
This study which does not require ethics committee approval and/or legal/specific permission complies with the research and publication ethics.

Researcher's Contribution Rate Statement
I am a single author of this paper. My contribution is 100%.

Declaration of Researcher's Conflict of Interest
There is no potential conflicts of interest in this study.

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