THE EFFECT OF ESG SUSTAINABILITY ON FIRM PERFORMANCE: A VIEW UNDER SIZE AND AGE ON BIST BANK INDEX FIRMS

ESG Sürdürülebilirliğinin Firma Performansına Etkisi: BİST Banka Endeksinde Büyüklük ve Yaşa Bağlı Bir İnceleme

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Abstract

The goal of this study is to examine the relationship between environmental, social and governance (ESG) scores and firm performance and whether firm size and age moderating role in this relationship. The period of the study was determined as 2013-2021 and the sample is comprised of banks listed in the BIST Bank Index. The panel data analysis found a statistically significant and positive correlation between ESG scores and firm performance and a statistically significant and negative correlation between firm age and size and firm performance. In addition, while it was confirmed that firm age has a statistically significant and positive moderating effect in the relationship between ESG scores and firm performance, it was found that firm size does not have a significant moderating effect. Therefore, it is safe to say for the relevant period and sample that increased efforts of firms in environment, social responsibility, and proper governance have a positive influence on financial performance.

Öz

Çalışmada çevresel, sosyal ve kurumsal yönetişim (ESG) skorları ile firma performansı ilişkisi ve bu ilişkide firma büyüklüğü ve firma yaşının moderatör rolünün olup olmadığının araştırılması amaçlanmıştır. Çalışmanın dönemi 2013-2021 olarak belirlenmiş olup, çalışmanın örneklemini BİST Banka Endeksi'nde faaliyet gösteren bankalar oluşturmaktadır. Geçekleştirilen panel veri analizi sonucunda ESG skorları ile firma performansı arasında istatistiksel olarak anlamlı ve pozitif yönlü ilişki, firma yaşı ve büyüklüğün ile firma performansı arasında ise istatistiksel olarak anlamlı ve negatif yönlü ilişki olduğu tespit edilmiştir. Ayrıca ESG skorları ile firma performansı ilişkisinde firma yaşının istatistiksel olarak anlamlı ve pozitif yönlü moderatör etkisi olduğu doğrulanırken, firma büyüklüğünün anlamlı bir moderatör etkisinin olmadığı görülmüştür. Dolayısıyla ilgili dönem ve örneklemde firmaların çevre ve sosyal sorumluluk ve uygun yönetişim gibi faktörler üzerinde çabalarının artmalarının finansal performansa olumlu yönde yansıdığını söylemek mümkündür.

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1. Introduction

Firms now recognize that it is not enough to focus only on short-term financial goals. Environmental, social and governance (ESG) management, which puts focus on corporate social responsibility, has become widespread all around the world. The reason for this could be the stakeholders' interest in sustainability performance and social contribution activities, government policies, and the possible positive impact of ESG activities on corporate performance. Kicking off a series of reforms in sustainable finance, the European Union (EU) spearheads the process by transforming the way of work of financial and non-financial firms in the rapid development of environmental, social, and governance activities. ESG activities are also part of the new strategies being tried out by firms that feel a sense of crisis and believe that management methods that guide past performance can no longer guarantee future success. Therefore, the fact that financial accounting is no longer enough to meet the needs of shareholders brought about the necessity to devise other reports such as intellectual capital statements, value reporting, and sustainability reports. The resource-based view suggests that firms achieve superior performance when they disclose financial and non-financial resources. These resources support firms in improving the skills and competencies required to achieve a sustainable competitive edge (Buallay, 2019: 98; Zahid et al., 2022: 1-2; Cho, 2022: 1-2).

The traditional view in the business world was that firms existed to maximize the profit of their shareholders. For this reason, a contribution to social objectives was perceived as a decrease in the wealth of shareholders and was not professionally accepted. Due to the prevalence of agency logic in the previous period, ESG investment was considered to be an agency cost. As an alternative to this view, the stakeholder approach to management has gained importance which argues that firms have goals that are not limited to creating shareholder value and that they should take into account environmental and social responsibilities that contribute to their survival in the market. With an increased focus on stakeholders, it is safe to say that ESG performance serves as insurance-like protection for the intangible assets of firms deriving from the relationships between firms and non-investing stakeholders (Bahadori et al., 2021: 412; Nguyen et al., 2022: 92). The growing interest of investors and the global awareness of risks related to other non-financial factors, especially the environment and social responsibility and proper governance put pressure on firms to ramp up their efforts and focus on the non-financial aspects of their business. Firms report their performance related to these risks through three categories, namely environmental, social, and governance (ESG). According to the international management view, implementing ESG policies can also be considered a long-term strategy for exporting firms or multinational firms to operate overseas, positively impacting firm performance by overcoming foreign costs and securing social legitimacy (Aydogmus et al., 2022: 1-2; Cho, 2022: 1-2). Considering that firms and investors start to give more weight to ESG-related issues in their decision-making processes, the environmentally friendly activities of firms can influence firm performance in two ways. Environmentally-friendly activities can have a positive impact on firm performance by sending positive signals to stakeholders. On the contrary, investment in environmentally-friendly activities increases costs, which, in turn, negatively impacts firm performance (Cho, 2022: 2). In the literature, there is still a debate about whether the efforts to improve ESG-related elements improve the performance of firms or their reputation. According to the findings of empirical studies, there are studies that found a positive relationship between ESG and firm performance (e.g., Velte (2017), Ting et al. (2019), Buallay (2019), Zhang and Lucey (2022)) along with ones

that found a negative relationship (e.g., Alareeni and Hamdan (2020), Zahid et al. (2022)). Therefore, it could be said that there has yet to be a consensus on this matter.

The purpose of this study is to explore the relationship between ESG scores and financial performance of firms listed in the BIST Bank Index and whether firm size and age play a moderating role in this relationship. In this context, the contribution of the study to the literature is threefold: (1) As far as we know, the number of studies examining the relationship between ESG scores and bank performance is limited. Therefore, the present study will fill this gap in the national and international literature. (2) The present study the first time, reveals the moderator effect of size and age on the relationship between ESG and firm performance for banks operating in Türkiye. (3) This study provides reliable findings for firm shareholders, decision makers, and policymakers to evaluate their awareness of ESG scores and their relationship to firm performance. The study is made up of 5 sections, including the introduction. The second section is about the literature and relevant hypotheses, the third section offers information about data and the econometric model, the fourth section deals with the analysis methodology, the fifth section is about findings and discussion, and the final section covers conclusions and policy implications.

2. Literature Review and Related Hypothesis

The increasing importance of sustainable development has revealed the lack of non-financial disclosure of firms, such as environmental, social, and governance (ESG) information and practices. That is the reason why there is growing demand to improve business reporting, with a greater focus on encouraging firms to disclose non-financial information more (Albitar et al., 2020). In the long term, non-financial (environmental and social) performance should be transformed into better valuation of firms listed in the stock exchange in addition to good business performance (Atan et al., 2018). Due to the increasing awareness of investors and other stakeholders, firms are expected to disclose relevant and important ESG information to analyze the risks and opportunities that ESG factors bring to firms in the long run. That is why ESG investments go beyond a simple profit and represent an approach in which firms can take sustainable action and add value to the industry (Kim and Lee, 2020; Akyildirim et al., 2022). However, firms have failed to recognize the synergy between the impact of ESG efforts, their vision, the value of ESG, and their performance. It is still debatable whether ESG creates wealth for shareholders and improves firm profitability, or whether it is just used to improve firm credibility (Mohammad and Wasiuzzaman, 2021). In this direction, the number of studies in the literature that investigate the impact of ESG factors on firm performance and firm value across different periods and sectors has increased significantly recently. In their study, Atan et al. (2016) did not find a significant relationship between the ESG level and financial performance of the largest 100 firms listed in Bursa Malaysia and Nasdaq OMX Copenhagen. In contrast, Velte (2017) explored the relationship between ESG and the financial performance of firms listed in the German Prime Standard between 2010 and 2014. Specifically, it was found that ESG positively affects ROA and there is no significant relationship between ESG and TOBINQ.

For the period of 2010 and 2013, Atan et al. (2018) investigated the relationship between ESG and financial performance for 54 firms selected from Bloomberg's ESG database that includes ESG-related and financial data and did not find a significant relationship between individual and combined ESG factors and firm performance. On the contrary, Ting et al. (2019) found in their study where they examined the relationship between ESG interventions and

financial performance on a sample of 1317 emerging market firms and 3569 developed market firms that ESG interventions have a significant positive impact on firm performance. Similarly, Buallay (2019) examined the relationship between ESG and financial performance on 235 banks for the 2007-2016 period and found that ESG has a significant positive effect on financial performance. In another study, Alareeni and Hamdan (2020) examined the relationship between ESG and firm performance in firms listed in the US S&P 500 for the 2009-2018 period and found that ESG has a positive effect on firm performance, but the results differed in ESG subcomponents. Specifically, a negative relationship was found between environmental and social responsibility and ROA and ROE. Albitar et al. (2020) examined the relationship between ESG and firm performance and the potential moderating effect of corporate governance mechanisms on this relationship before and after the introduction of integrated reporting (IR) for a sample of FTSE 350 firms in the period 2009-2018 and found a positive correlation between ESG and firm performance before and after integrated reporting. Additionally, they also confirmed the moderating effect of corporate governance mechanisms. On the contrary, Di Tommaso and Thornton (2020) examined the relationship between European banks' ESG scores, risk-taking behavior and bank value in the 2007Q3-2009Q4 period and found that ESG is associated with the decrease in bank value.

According to Azmi et al. (2021), in a study examining the relationship between ESG score and firm performance on banks operating in 44 developing economies during the 2011-2017 period, they concluded that low level of ESG activity positively affects the value of the bank. Mohammad and Wasiuzzaman (2021) examined the effects of ESG on firm performance for 661 firms traded in Bursa Malaysia in the 2012-2017 period and found that ESG disclosures improved firm performance even after checking competitive advantage. On the contrary, Ruan and Liu (2021) found in their study that ESG activities had a significant negative impact on firm performance for a sample of Shanghai and Shenzhen A-share firms in China in the 2015-2019 period. In contrast, Sisman and Cankaya (2021) examined the relationship between ESG and financial performance for 26 airline firms for the period of 2010 and 2017 and found that ESG scores have no statistically significant effect on the financial performance of airline firms. On the contrary Pulino et al. (2022) confirmed the positive relationship between ESG and firm performance between 2011 and 2020 for a sample consisting of some of the largest listed companies in Italy. Similarly, Zhang and Lucey (2022) examined the relationship between ESG and firm performance for a sample of global and publicly-listed firms (47 countries and territories) for the 2016-2020 period and found that ESG performance has a significant and positive effect on firm performance. On the contrary, Al Hawaj and Buallay (2022) examined the relationship between ESG and financial performance for a sample of 3000 firms from 80 countries for the period of 2008-2017 and found that ESG has varying effects on operational performance (ROA), financial performance (ROE), and market performance (TQ). They specifically identified a negative relationship between ESG and ROA in Banks & Financial Services Sector, Agriculture & Food Industries Sector, and Telecommunication & Information Technology Sector.

According to Cetenak et al. (2022), in their study examining the relationship between ESG and financial performance in deposit banks operating in Türkiye during the 2010-2020 period, they found that ESG, social (SPS) and corporate governance (GPS) scores, positively affect performance indicators accounting and market-based. From a different perspective, Ersoy et al. (2022) examined the relationship between ESG and market value in the period of 2016-2020 on US commercial banks. As a result of the study, it was determined that there is an inverted U-

shaped relationship between market capitalization and ESG and The Social Pillar Score (SPS), and a U-shaped relationship between market value and The Environment Pillar Score (EPS). In their study, Akyildirim et al. (2022) examined how news on ESG about firms traded on Borsa Istanbul was perceived by the market. They found that only 10% of negative ESG-related news about firms leads to abnormal returns and that the rate of news leading to negative abnormal returns within ESG news is twice as much as the rate of news that leads to positive abnormal returns. In contrast, Nguyen et al. (2022) demonstrated a positive relationship between ESG and financial performance in a sample of non-financial firms in the US market in the period of 2018-2020. On the contrary, Zahid et al. (2022), examined the relationship between ESG and financial performance for 620 firms in Western Europe for the 2010-2019 period and found a significant negative relationship between ESG and ROA. They noted that this supports the exchange hypothesis which suggests that investing in ESG activities increases the cost of doing business. Based on the discussions in the literature, it is safe to say that there is no consensus on the impact of ESG activities on firm performance. Based on the discussions above, we formulated the following hypothesis:

H1: *ESG activities positively affect firm performance.*

Looking from a different perspective, the literature has also investigated the moderating role of firm size and age on the relationship between ESG and firm performance. Abdi et al. (2022) examined the relationship between ESG and firm value and firm performance for 38 airline companies for the period of 2009-2019. They also investigated the moderating role of firm size and age in this relationship. The study found a positive relationship between ESG and firm value and that firm size plays a moderating role in the relationship between both firm value and performance. Similarly, Kulali (2022) examined the relationship between ESG and market value in Borsa Istanbul and the role of firm structure in this relationship and found a positive relationship between ESG and firm value. The study also showed that positive effects are greater in relatively larger companies. In another study, Yoon and Chun (2022) examined the relationship between ESG and management efficiency and found a positive relationship between the variables and that firm size plays a positive moderating role in this relationship. Based on the discussions above, we formulated the following hypotheses:

H2: *Firm size has a moderating role in the relationship between ESG activities and firm performance.*

H3: *Firm age has a moderating role in the relationship between ESG activities and firm performance.*

3. Data Sources and The Empirical Econometric Model

The data used in this study, in which the relationship between ESG scores and firm performance and the moderating role of firm size and age were examined in this relationship, were pulled from Refinitiv and Finnet databases. The study period was determined as the period of 2013-2021, when the annual data are available. The scope of the study consists of 6 banks (Akbank, Isbank, Garanti Bank, Halkbank, Yapı Kredi Bank and Vakıfbank) listed in the BIST Bank Index, where we can access relevant data. The ESG score was included in the analysis as a total firm score made up of Environmental (E), Social (S) and Corporate Governance (G) components. Return on Assets (ROA) was selected as the financial performance indicator while

total number of employees as the size variable. Natural logarithmic transformations of ESG scores, firm size (SIZE) and firm age variables were performed. Moderator variables were standardized to prevent the possible problem of multicollinearity. A regression model (1) was specifically developed to examine the relationship between ESG and financial performance.

$$ROA_{it} = \alpha_0 + \alpha_1 \ln(ESG_{it}) + \alpha_2 \ln(SIZE_{it}) + \alpha_3 \ln(AGE_{it}) + \mu_{it} \qquad (1)$$

This study also investigates firm size and moderating roles in the relationship between ESG and financial performance. The following two regression models were developed to investigate this relationship (2 and 3).

$$ROA_{it} = \gamma_0 + \gamma_1 \ln(ESG_{it}) + \gamma_2 \ln(SIZE_{std\ it}) + \gamma_3 \ln(ESG_{it} \times SIZE_{std\ it}) + \mu_{it} \qquad (2)$$

$$ROA_{it} = \gamma_0 + \gamma_1 \ln(ESG_{it}) + \gamma_2 \ln(AGE_{std\ it}) + \gamma_3 \ln(ESG_{it} \times AGE_{std\ it}) + \mu_{it} \qquad (3)$$

Based on the literature, a positive correlation is expected to exist between ESG score and firm performance. Since large firms possess more available resources than their smaller counterparts, they would be more willing to invest in sustainability. Younger firms are less focused on their public and social image and more on financial performance. Therefore, younger firms are expected to take fewer initiatives towards sustainability (Abdi et al., 2022). Accordingly, firm size and age are expected to have a positive moderating role in the relationship between ESG score and firm performance.

4. Methodological Framework

Under the panel data analysis carried out in the study, hypotheses were tested, and a model estimation was performed. The hypotheses in question are as follows.

Multicollinearity and endogeneity test: First, it was tested whether there is a multicollinearity problem, which indicates a high degree of correlation between independent variables, and an endogeneity problem, which indicates a high degree correlation between the error term of the model and independent variables.

Cross-sectional dependence and homogeneity test: The impact of a shock that may occur in any of the cross-sections that make up the panel on other cross-sections is referred to as cross-sectional dependence. In the study, Pesaran (2004) CDLM test, which is used in cases where T is greater than N and the difference between the two sections is little, was used. The mathematical expression of the test is shown in Equation 4.

$$CDlm = \left(\frac{2}{N(N-1)}\right)^{1/2} \left(\sum_{i=1}^{N-1} \sum_{j=i+1}^{N} T_{ij}\, \widehat{p}_{ij}\right) \sim N(0,1) \qquad (4)$$

Another hypothesis for unit root test selection is the homogeneity test. The Pesaran ve Yamagata (2008) homogeneity test was performed to determine the homogeneity of slope coefficients. The mathematical expression of the test is shown in Equation 5.

$$\widetilde{\Delta}_{adj} = \sqrt{N}\, \frac{N^{-1}\,\widehat{S} - E(\widetilde{Z_{it}})}{\sqrt{Var\,(\widetilde{Z_{it}})}} \sim N(0,1) \qquad (5)$$

Stationarity test: It is not desirable for series to contain unit roots in panel data analysis. The stationarity of series should be established to obtain consistent and unbiased results. Since

cross-sectional dependency was identified across all variables in the study, the unit root test was performed using the CIPS test, a second-generation unit root test developed by Pesaran (2007). The CIPS statistic shows the arithmetic mean of CADF values. Its mathematical expression is shown in Equation 6.

$$\text{CIPS} = N^{-1} \sum_{i=1}^{N} \pi_i(N, T) \tag{6}$$

Selection of the estimation model: In panel data analysis, before model estimation was performed, the model was pooled, and the F test, Breusch-Pagan LM (1980) test and Honda (1985) test were performed to determine which of the fixed effects and random effects models were valid, that is, which estimator would be used. The F test shows whether there are unit or time effects in the model and two types of models are used, namely restricted and unrestricted. The models are shown in Equation 7.

$$\begin{aligned} &\text{Unconstrained Model: } Y_i = X_i\beta_i + u_i \qquad i = 1,2,3, \dots, N \\ &\text{Constrained Model: } Y_i = X\beta + u \end{aligned} \tag{7}$$

The Breusch-Pagan LM (1980) test sees whether the pooled model is suitable against the random effects model. The Honda (1985) test is where LM tests, the assumptions of which were established as two-way as variance components are usually positive in LM tests, are reformulated to be one-way (Baltagi, 2005: 60). The mathematical expressions are shown in Equations 8 and 9.

$$\text{LM} = (\ LM_1 + LM_2\ ) \sim X2 \tag{8}$$

$$\text{HONDA} = \sqrt{(\ LM_1 + LM_2\ )} \sim N(0,1) \tag{9}$$

Autocorrelation and heteroscedasticity test: A significant correlation between successive values of error terms is referred to as autocorrelation while different error terms for all sections is referred to as the problem of heteroscedasticity. In the case that these problems exist in models, consistent and unbiased results can be obtained using resistant estimators.

5. Results and Discussion

The purpose of the study was to examine the relationship between ESG and firm performance and the moderating role of firm size and age in this relationship. The descriptive statistics of the analysis performed to this end is provided in Table 1.

Table 1. Descriptive Statistics

Stats.	ROA	LnESG	LnAGEstd	LnSIZEstd
Mean	1.435942	4.091077	-7.39E-15	-5.26E-16
Median	1.441332	4.119230	0.017939	-0.021228
Maximum	2.363283	4.546529	1.529884	1.697270
Minimum	0.190702	3.201678	-1.578214	-2.085972
Std. Dev.	0.465406	0.296008	1.009390	1.009390
Skewness	-0.561488	-0.855233	-0.040207	-0.089157
Kurtosis	3.263605	3.885765	1.772120	2.119304
Jarque-Bera	2.993765	8.348109	3.406849	1.816696
Probability	0.223827	0.015390	0.182059	0.403190
Observations	54	54	54	54

The descriptive statistics regarding the logarithmic form and standardized values of the variables show that the average value of the ROA variable is 1.435942, the LnESG variable is 4.091077, the LnAGE variable is -7.39E-15, and the LnSIZE variable is -5.26e-16. The highest standard deviation occurred in LnAGE and LnSIZE variables. According to the JB probability values, the LnESG variable did not exhibit normal distribution while all other variables exhibited normal distribution. Since the LnESG variable did not show normal distribution, the problems of multicollinearity and endogeneity were examined using the Spearman correlation test. Test results are presented in Table 2 and Table 3.

Table 2. Spearman Correlation Matrix for Multicollinearity

Correlation	ROA	LnESG	LnAGE	LnSIZE
ROA	1.000000			
LnESG	0.296589	1.000000		
LnAGE	-0.145569	0.636745**	1.000000	
LnSIZE	-0.332349**	-0.017305	-0.100898	1.000000
P-value	**ROA**	**LnESG**	**LnAGE**	**LnSIZE**
ROA	-----			
LnESG	0.0294	-----		
LnAGE	0.2936	0.0000	-----	
LnSIZE	0.0141	0.9012	0.4679	-----

Note: *, ** & *** denote the significance 10%, 5% and 1% level respectively.

A high level of correlation among the independent variables of the model leads to the multicollinearity problem while a high level of correlation between the model's error term, which is estimated via OLS, and descriptive variables leads to the problem of endogeneity. When Table 2 is examined, there is between the independent variables, when Table 3 is examined, there is between the error term of the model and the independent variables there is no high level of correlation (0.75 and higher). Therefore, there is no problem of multicollinearity between independent variables and endogeneity in the model.

Table 3. Spearman Correlation Matrix for Endogeneity

Correlation	Error T.	LnESG	LnAGE	LnSIZE
Error T.	1.000000			
LnESG	-0.027177	1.000000		
LnAGE	-0.038613	0.636745***	1.000000	
LnSIZE	0.008043	-0.017305	-0.100898	1.000000
P-value	**Error T.**	**LnESG**	**LnAGE**	**LnSIZE**
Error T.	-----			
LnESG	0.8453	-----		
LnAGE	0.7816	0.0000	-----	
LnSIZE	0.9540	0.9012	0.4679	-----

Note: *, ** & *** denote the significance 10%, 5% and 1% level respectively.

In the study, four different tests were employed to investigate cross-sectional dependence. These tests are the Breusch-Pagan (1980) LM, Pesaran CD and Scaled LM (2004), Pesaran et al. (2008) Bias-Corrected Scaled LM tests. The test results are presented in Table 4.

Table 4. Results of Cross-Sectional Dependence Tests

Variable	Breusch-Pagan LM		Pesaran Scal. LM		Bias-Correct. Scal. LM		Pesaran CD	
	Statistic	p-value	Statistic	p-value	Statistic	p-value	Statistic	p-value
ROA	36.008***	0.001	3.8355***	0.000	3.4605***	0.000	4.4063***	0.000
LnESG	88.819***	0.000	13.477***	0.000	13.102***	0.000	9.3324***	0.000
LnAGE	134.99***	0.000	21.908***	0.000	21.533***	0.000	11.618***	0.000
LnSIZE	49.378***	0.000	6.2766***	0.000	5.9016***	0.000	-0.271***	0.786

In the study, results of the Pesaran (2004) CDLM test, which is used in cases where T is greater than N and the difference between the two sections is little, were taken into account. According to the test results, the probability value for all variables is significant at the significance level of 1%. Therefore, the null hypothesis, which suggests that there is no cross-sectional dependence, is rejected. There is a cross-sectional dependence problem across all variables. Following the cross-sectional dependence, slope heterogeneity was tested using the Pesaran and Yamagata (2008) slope homogeneity test. The test results are presented in Table 5.

Table 5. Results of Slope Homogeneity Tests

Variables	$\widetilde{\Delta}$	P-value	$\widetilde{\Delta}_{adj}$	P-value
ROA	0.294	0.384	0.360	0.359
LnESG	1.554*	0.060	1.903**	0.029
LnAGE	5.751***	0.000	7.043***	0.000
LnSIZE	0.629	0.265	0.770	0.221

Note: *, ** & *** denote the significance 10%, 5% and 1% level respectively.

According to the $\widetilde{\Delta}$ and $\widetilde{\Delta}_{adj}$ test statistics in Table 5, the null hypothesis was rejected for the LnESG and LnAGE variables and the existence of slope heterogeneity was confirmed. For the ROA and LnSIZE variables, the null hypothesis could not be rejected and the existence of slope homogeneity was confirmed. Since all variables had the problem of cross-sectional dependence, the stationarity of the variables was tested using the CIPS test, which also takes into account the heterogeneity of slope coefficients. The test results are presented in Table 6.

Table 6. Results of Panel 2nd Generation Unit Root Tests

Variables	Intercept Pesaran CIPS	
	CIPS t-stat.	p-value
ROA	-46.07426***	<0.01
LnESG	-96.95477***	<0.01
LnAGE	-96.75166***	<0.01
LnSIZE	-3.88689***	<0.01
Critical Values	%1	%5	%10
	-2.97	-2.52	-2.31

Note: *, ** & *** denote the significance 10%, 5% and 1% level respectively.

According to Table 6, the null hypothesis, which suggest that there is unit root for all variables, is rejected. Therefore, it was determined that all variables are stationary at the I(0) level. Then, to determine which of the pooled fixed effects and random effects models were valid, that

is, to identify which estimator to use, F test, Breusch-Pagan LM (1980) test, and Honda (1985) test were performed. The test results are presented in Table 7.

Table 7. Model Selection for Panel Data

	Model 1		Model 2		Model 3	
Test	Stat.	P-value	Stat.	P-value	Stat.	P-value
F Tests						
Individual effect (F.E)	4.2622	0.0036***	4.2620	0.0036***	4.5542	0.0024***
Time Effect (F.E)	3.4368	0.0047***	3.3959	0.0050***	3.6909	0.0029***
Individual and time Effect (F.E.)	3.8645	0.0005***	3.9547	0.0004***	8.1775	0.0000***
Breuch-Pagan LM Tests						
Individual effect (R.E)	0.0383	0.8447	0.0330	0.8556	11.433	0.0007***
Time Effect (R.E)	4.0493	0.0441**	3.6431	0.0563*	11.254	0.0007***
Individual and time Effect (R.E.)	4.0876	0.1295	3.6762	0.1591	22.687	1.18E-0
Honda (1985) Test						
Individual effect (R.E)	0.1957	0.4223	0.1818	0.4278	3.3812	0.0003***
Time Effect (R.E)	2.0122	0.0220**	1.9087	0.0281**	3.3547	0.0003***
Individual and time Effect (R.E.)	1.5613	0.0592*	1.4782	0.0696*	4.7630	9.53E-0

Note: *, ** & *** denote the significance 10%, 5% and 1% level respectively.

The F test results show that the two-way fixed effects model is valid and LM and Honda tests show that there is time effect and the one-way random effects model is valid. The F test results were taken into account as the data represent a specific time and group. Heteroscedasticity and autocorrelation test results calculated for the fixed effects model are presented in Table 8.

Table 8. Heteroscedasticity and Autocorrelation for Fixed Effects

	Model 1		Model 2		Model 3	
Heteroscedasticity	Stat.	P-value	Stat.	P-value	Stat.	P-value
Breusch-Pagan-Godfrey LM H_0: No Heteroscedasticity	1.08175	0.9557	5.75468	0.3308	2.81525	0.7284
Autocorrelation						
Baltagi and Li (1991) LM-stat H_0: No Autocorrelation	2.60432	0.1065	4.06196	0.0438**	2.64391	0.1039

Note: *, ** & *** denote the significance 10%, 5% and 1% level respectively.

According to the heteroscedasticity test results in Table 8, the null hypothesis cannot be rejected for any of the three models. There is no heteroscedasticity problem in any of the three models. According to the autocorrelation test result, the null hypothesis cannot be rejected for Models 1 and 3, while it is rejected for Model 2. Therefore, there is a heteroscedasticity problem for Model 2. In this context, estimation was performed using the White diagonal method, which takes into account and solves these problems. Estimation results for the models are presented in Table 9.

Tablo 9. OLS White (Dioganal) Estimation Results

Dependent Variables ROA

Variables	Model 1	Model 2	Model 3
LnESG	1.0304(0.0000) ***	1.1676(0.0000) ***	0.5505(0.0020) ***
LnAGE	-0.3445(0.0000) ***	-2.8156(0.0009) ***	-
LnSIZE	-0.2560(0.0000) ***	-	-0.1104(0.0400) **
LnESG*LnAGE	-	0.6048(0.0023) ***	-
LnESG*LnSIZE	-	-	0.0038(0.2145)
R-squared	0.516032	0.344605	0.239010
Adjusted R-squared	0.486994	0.305282	0.187124
S.E. of regression	0.333345	0.387915	0.408526
F-statistic	17.77085	8.763305	4.606464
Prob(F-statistic)	0.0000***	0.0000***	0.0068***

Note: *, ** & *** denote the significance 10%, 5% and 1% level respectively.

According to the OLS estimation results, it was found that all three models had a significance level of 1% according to the F statistical probability value. The power of independent variables to explain the dependent variable is 51% for Model 1, 34% for Model 2, and 23% for Model 3. Empirical findings reveal that all independent variables except LnESG*LnSIZE are statistically significant. In Model 1, where the relationship between ESG and firm performance was examined, a statistically significant and positive correlation was found between ESG and ROA and a statistically significant and negative correlation between LnAGE and LnSIZE and ROA. It specifically shows that a 1% increase in ESG scores will result in an increase of 1.03% on financial performance. The findings support the resource-based perspective. It is safe to say that when firms disclose financial and non-financial resources, they can gain sustainable competitive edge and improve their financial performance. These findings correspond to some of the previous studies, namely by Velte (2017) on firms listed in the German Prime Standard, by Ting et al. (2019) on a sample of 1317 emerging and developed market firms, by Buallay (2019) on a sample of 235 banks, by Mohammad and Wasiuzzaman (2021) on a sample of firms traded on Bursa Malaysia, by Pulino et al. (2022) on a sample of some of the largest firms listed in Italy, and by Zhang and Lucey (2022) on a global sample. On the other hand, these findings are different from those of studies by Atan et al. (2016) on the largest 100 firms listed in Bursa Malaysia and Nasdaq OMX Copenhagen, by Atan et al. (2018) on firms selected from Bloomberg's ESG database, by Alareeni and Hamdan (2020) on firms traded on the US S&P 500, and by Ruan and Liu (2021) on a sample of China's Shanghai and Shenzen A-share firms.

In Model 2, where we reveal the interaction between ESG and firm age, a significant and positive correlation was found between LnESG*LnAGE and ROA. This impact of ESG on firm performance is much stronger after the inclusion of this interaction variable in the model. Under the assumption that younger firms are less interested in their public and social image and focus more on financial performance, the initiative of firms towards sustainable activities will increase as a firm gets older. As a result, this situation has a moderating role on performance. These findings coincide with the study carried out by Abdi et al. (2022) on airline firms. In Model 3, where we reveal the interaction between ESG and firm size, a statistically insignificant but positive correlation was found between LnESG*LnSIZE and ROA. The fact that large firms have more available resources than smaller firms will make them more willing to invest in a sustainable way. The small size of our sample could be the reason why a statistically significant correlation

was not being found. The findings obtained from the study are summarized with the graph below (see Fig. 1).
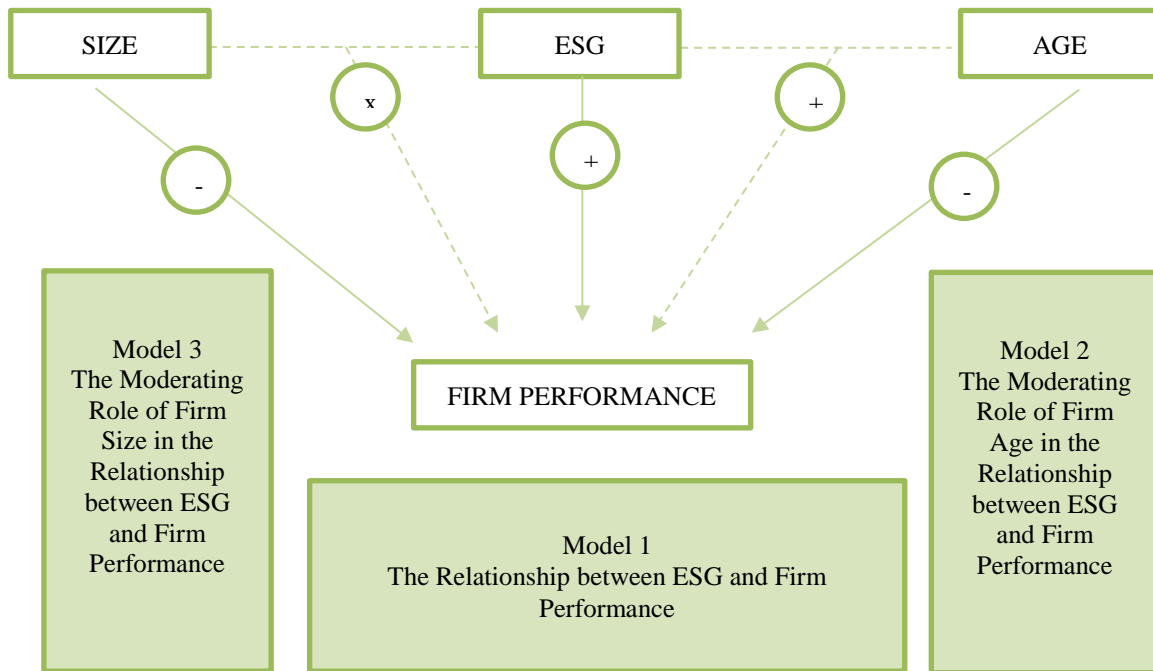

Figure 1. Graphical Summary of Results
Note: +, - & x indicate positive relationship, negative relationship, and no relationship, respectively.

6. Conclusions and Policy Implications

Environmental, social, and governance (ESG) management has started to gain global popularity with government policies and the increasing interest of stakeholders in social contribution activities and sustainability performance. There is still a debate ongoing in the literature about how environmentally-friendly activities affect firm performance. This study examines the relationship between the interaction between ESG score, ESG score and firm age, the interaction variables between ESG score and firm size, and the firm performance variable. This study uses the annual panel data for the period 2013-2021 of six banks listed in the BIST Bank Index. In the study, Pesaran (2004) CDlm was used for cross-sectional dependence, Pesaran and Yamagata (2008) delta test for slope heterogeneity, Pesaran and Shin (CIPS) test, which is a second-generation unit root test that takes into account the cross-sectional effects and slope heterogeneity, for unit root, and the OLS White diagonal method, which takes into account heteroscedasticity and autocorrelation problems, were performed. According to the OLS results, a statistically significant and positive correlation was found between ESG and ROA, and a statistically significant and negative correlation between LnAGE and LnSIZE and ROA. A significant and positive correlation was found between LnESG*LnAGE and ROA, and a statistically insignificant but positive correlation between LnESG*LnSIZE and ROA. The impact of ESG on firm performance is much stronger after the inclusion of the LnESG*LnAGE variable in the model.

Based on the empirical findings, it is safe to say that sustainability initiatives performed by banks listed in the BIST Bank Index has a positive effect on their performance during the relevant period and firm age has a positive moderating role on this effect. The observations show that the disclosure of financial and non-financial resources by firms improves financial performance, which supports stakeholder theory and resource-based view. The outcomes of this study will help firm managers and shareholders, decision-makers, and policymakers assess their awareness of ESG scores and their relationship with firm performance. It can help managers to develop more efficient ESG strategies and evaluate the relationship between the way that use resources and financial performance. It was also found that firm age plays a moderating role in the relationship between ESG and firm performance. This finding is particularly important for younger firms to evaluate their sustainability strategies. Investors may see the positive impact of firms' sustainability-related initiatives on financial performance as a positive signal, which may affect the value of firms. Therefore, sustainability activities are long-term strategies that impact a firm's performance. In this respect, the findings of this study offer policy implications to managers with regard to sustainability activities.

This study focuses on the moderator effect of firm size and firm age on the relationship between ESG scores and firm performance. The limitation of the study is that these are not the only variables that affect firm performance. In addition, another limitation of the study is the sample and period due to the inaccessibility of the data. Future researchers can expand the sample by adding banks operating in other developing countries to the model. In addition, it is recommended for future studies, the impact of ESG scores on performance is examined individually for environmental, social, and governance, and the interaction of other financial variables that are thought to affect firms is investigated.

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
The authors declare that they have contributed equally to the article.

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

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