EKOIST Journal of Econometrics and Statistics
**EKOIST** 2024, 41 : 109–117
DOI: 10.26650/ekoist.2024.41.1540173

RESEARCH ARTICLE

# The Effect of ESG (Environmental, Social And Governance) Scores on Company Performance: Evidence from the Manufacturing Industry in Turkey*

Halil İbrahim Akpınar[1], Mehmet Sabri Topak[2]

[1](PhD Student), İstanbul University, Institute of Social Sciences, Department of Business Administration, İstanbul, Türkiye
[2](Assoc. Prof. Dr.), İstanbul University, Faculty of Economics, Department of Business Administration, İstanbul, Türkiye

*This manuscript is based on the PhD dissertation written in Istanbul University, Institute of Social Sciences, Department of Business Administration, named "The Effect of Environmental, Social and Governance Values on Company Performance: A Research on Borsa Istanbul" with updated data.

**ABSTRACT**
This study aims to investigate the impact of Environmental, Social, and Governance (ESG) scores on company performance in manufacturing companies using panel data analysis. The sample comprises data from sixteen companies listed in BIST Industrial Index (XUSIN) over the period 2018-2022. Two models were established in which ROA and Tobin's Q ratios, selected as indicators of company performance, were used as dependent variables. In this context, the study investigated the impact of ESG scores on performance measures both in terms of the performance derived from the companies' intra-period activities and reflected in their financial statements, as well as the stock market performance of their shares. The independent variables included in the models are ESG scores, company size (SIZE), leverage ratio (LEV), current ratio (CR), asset turnover ratio (ATO), interest coverage ratio (ICR), and revenue growth rate (RGR). Based on the findings in the analysis, the final models were estimated by using Driscoll Kraay (1998) standard error method. The study finds that ESG scores have a statistically significant positive impact on both ROA (significant at the 10% level) and Tobin's Q (significant at the 5% level). This indicates that improvements in ESG performance can enhance both profitability (ROA) and stock market performance (Tobin's Q) for companies.

**Keywords:** Sustainability, ESG, Performance, Panel Data Analysis, Borsa Istanbul

## Introduction

Traditional corporate reporting is no longer deemed sufficient to meet the needs of stakeholders. Traditional corporate reporting has been replaced by reporting that includes not only financial information but also non-financial information. Non-financial information is reported within corporate social responsibility reports and independent sustainability reports (Cheng et al., 2014). The Brundtland Report (1987) of the United Nations' World Commission on Environment and Development defines sustainability as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Kuhlman & Farrington, 2010).

Factors such as climate change, scarcity of natural resources, poverty, and population growth influence individuals' investment decisions regarding the future. It is increasingly recognised that all nations must act together to address these issues and establish environmental sustainability. Global frameworks and agreements, such as the UN Framework Convention on Climate Change (1992), the United Nations Sustainable Development Goals (2012), and the Paris Agreement (2015), have guided this process to ensure its smooth and rapid operation. One of the most significant outcomes of these processes is the implementation of a new scoring model known as ESG (Environmental, Social, Governance) (Shih et al., 2023). The ESG scores are directly related to companies' sustainability goals (Şişman & Çankaya, 2021). The reported ESG metrics for each company are based on assessments of environmental (E), social (S), and governance (G) factors. The environmental score (E) reflects the carbon footprint, energy transition efficiency, biodiversity and land use, waste and toxic emissions, and performance in clean technology and renewable energy. The social score (S) reflects stakeholder treatment, supply chain management, employee training, talent

**Corresponding Author:** Mehmet Sabri Topak **E-mail:** msabri@istanbul.edu.tr
**Submitted:** 28.08.2024 • **Accepted:** 04.09.2024

retention, occupational health and safety, product safety, and data privacy and security. The governance score (G) reflects corporate ownership, board structure and independence, executive compensation, business ethics, and corporate culture (Taliento et al., 2019).

Prioritising environmental and social activities by companies is increasingly boosting investor confidence and interest in these companies (Klein & Dawar, 2004). From this perspective, ESG scores are thought to play a significant role in influencing the stock prices of companies. Investors require ESG rating services to view and assess ESG activities. Today, financial institutions that measure and rate ESG performance provide this service. These institutions obtain the data used to calculate ESG scores from publicly reported company data, data voluntarily disclosed by companies to these institutions, civil society organisations, corporate social responsibility reports published by the companies themselves, and news reports about the companies. ESG rating agencies analyse this environmental, social, and corporate governance information and present their findings to all stakeholders (Landi & Sciarelli, 2019).

In a developing country like Turkey, empirical studies examining the relationship between ESG scores and company performance are limited. This is primarily due to the small number of companies in Turkey that regularly publish sustainability reports. Although the number of companies preparing sustainability reports has increased in recent years, reflecting the growing importance of sustainability reports and ESG scores, long-term time series data on ESG scores remain unavailable.

The study conducted to investigate the impact of ESG scores on the performance of companies operating in Turkey consists of four sections. Following the introduction, the sections include a literature review, data set and methodology, and conclusions.

## Literature Review

In this section of the study, research conducted in countries other than Turkey on the subject has been presented first, followed by a summary of studies conducted on companies operating in Turkey.

Alareeni and Hamdan (2020) examined the impact of ESG scores on the financial performance of 505 companies operating in the United States between 2009 and 2018. In their study, ROA, ROE, and Tobin's Q were used as dependent variables, while the ESG scores and its components—E (Environmental), S (Social), and G (Governance)—were analysed as independent variables. Company size, financial leverage, changes in total assets, and asset turnover ratios were included as other independent variables in the models. The analysis revealed that the ESG scores had a statistically significant and positive effect on ROA, ROE, and Tobin's Q. Additionally, the E and S variables had a statistically significant impact on ROA, ROE, and Tobin's Q. While the E and S variables positively affected ROA and ROE, they negatively impacted Tobin's Q. The G variable, on the other hand, had a significant and positive effect on ROA and Tobin's Q, but a negative effect on ROE.

Ting et al. (2020) investigated the impact of ESG scores on financial performance using data from 4,886 companies in 20 developed and developing countries over the period 2014-2018. In their study, in addition to the ESG scores, environmental (E), social (S), and governance (G) variables were treated as independent variables, while Tobin's Q, P/E ratio, and ROE were treated as dependent variables. Dividend yield, debt/equity (D/E), debt/total assets, revenue growth rate, R&D intensity, capital expenditure intensity, advertising intensity, and the logarithms of total assets and revenues were included as other independent variables in the models. The study concluded that ESG had a statistically significant and positive impact on ROA, ROE, and Tobin's Q.

Carmini Pulino et al. (2022) analysed the relationship between ESG scores and company performance for 263 companies operating in Italy between 2011 and 2020. In their study, ESG data were used as independent variables, while ROA and EBIT were used as dependent variables. The number of employees and the debt-to-equity (D/E) ratio were included as control variables in the models. The analysis found that ESG and its components (E, S, G) each had a significant and positive impact on EBIT. It was also concluded that the E score had a significant but negative impact on ROA.

Velte (2017) studied the impact of ESG scores on financial performance by analysing data from 412 companies listed on the DAX30, TecDAX, and MDAX indices in Germany over the period 2010-2014. In the study, return on assets (ROA) was used as the dependent variable, while the ESG scores and its components—environmental (E), social (S), and governance (G) values—were used as independent variables. The study found that the ESG scores had a statistically significant and positive impact on ROA. However, the impact of ESG on Tobin's Q was found to be statistically insignificant. Furthermore, among the ESG components, the G value had a stronger impact on financial performance compared to the S and E values.

Wu et al. (2022) examined the relationship between ESG scores and company performance for 1,379 companies operating in China between 2011 and 2020. In their study, Tobin's Q was used as the dependent variable, while ESG scores, debt-to-asset ratio, company size, company growth rate, executive compensation, company type, and return on equity (ROE) were included as independent variables. The analysis concluded that ESG had a positive and significant relationship with Tobin's Q.

Ortas et al. (2015) explored the relationship between ESG scores and company performance for 198 companies operating in Japan, France, and Spain over the period 2008-2013. In their study, ROA and Tobin's Q were used as dependent variables, while

ESG scores, company size, and leverage ratio were used as independent variables. The analysis revealed that ESG had a positive and significant relationship with both Tobin's Q and ROA.

Lee et al. (2018) investigated the relationship between ESG scores and company performance for companies listed on the South Korean Stock Exchange between 2011 and 2016. In their study, panel data analysis was used, with ESG scores and the environmental (E), social (S), and governance (G) values that constitute ESG treated as independent variables, while ROA, ROE, and Tobin's Q were used as dependent variables in the models. Company sales size, number of employees, and leverage ratio were used as control variables in the models. The study concluded that ESG had a negative impact on ROE and no statistically significant impact on ROA and Tobin's Q. Additionally, the study found that the S had no significant impact on financial performance measures, while the G value had a negative and significant impact on Tobin's Q, and the E value had a negative and statistically significant impact on ROE and ROA.

Dalal and Thaker (2019) examined the relationship between ESG scores and company performance for 65 companies operating in India between 2015 and 2017. In their study, panel data analysis was used, with ROA and Tobin's Q as the dependent variables and ESG scores, leverage ratio, and total asset size as the independent variables. The analysis found that ESG had a positive and statistically significant impact on Tobin's Q and ROA.

Chang and Lee (2022) investigated the impact of ESG scores on company performance for 87 companies operating in South Korea between 2002 and 2020. In their panel data model, Tobin's Q was used as the dependent variable, while ESG scores, company size, number of employees, foreign investment share, and industrial characteristics were included as independent variables. The study concluded that ESG had a significant and positive impact on Tobin's Q.

A summary of some of the limited studies conducted on companies operating in Turkey on this topic is provided below.

Korkmaz and Nur (2023) investigated the impact of ESG scores on the performance of 6 banks listed in the BIST Bank Index between 2013 and 2021. In their study, ESG scores, company size (number of employees), and company age were used as independent variables, while ROA was used as the dependent variable. The analysis found that ESG had a statistically significant and positive impact on ROA.

Karyağdı & Şit (2023) analysed the impact of ESG scores on the cost of capital and financial performance of 13 companies listed in the BIST Sustainability-25 Index for the period 2018-2022. In their study, ESG scores were used as independent variables, while ROA, P/B ratio, and financing expenses/net sales ratio were used as dependent variables in the models. The analysis revealed that ESG had a positive impact on ROA for the companies studied.

Mollaahmetoğlu (2023) examined the impact of ESG scores on the financial performance (ROA and ROE) of 24 companies listed in the Borsa Istanbul 30 index for the period 2010-2020. The study used panel data analysis and found a statistically significant but negative relationship between ESG and ROA, while no statistically significant relationship was found between ESG and ROE.

## Data and Methodology

### Formation of the Data Set

In this study, data from 16 manufacturing companies listed on the Borsa Istanbul (BIST) were used. All of these companies are included in the BIST Industrial Index (XUSIN). A balanced panel data set covering the five periods from 2018 to 2022 was created. While there were 229 companies listed in the XUSIN index as of July 31, 2024 (https://www.borsaistanbul.com/tr/endeks-detay/156/bist-sinai), only 16 companies were included in the study due to the lack of sustainability reports or the irregular publication of such reports by many companies. Consequently, the number of periods in the study was also limited. Due to the annual disclosure of ESG data, the research was conducted based on annual data.

The ESG data used in the study were obtained from the Thomson Reuters Eikon database, while the financial data related to the companies were acquired using the FINNET 2000+ program provided by FINNET Elektronik Yayıncılık Data İletişim San. Tic. Ltd. Company.

### Dependent and Independent Variables

A comprehensive literature review was conducted to select the dependent and independent variables for the study. The most commonly used performance measure for company performance is the Return on Assets (ROA) ratio (Topak, 2018). Additionally, the Tobin's Q variable was used alongside ROA as a performance measure to investigate the impact of ESG on the company's market value. The Tobin's Q ratio accounts for the market value of the company, thus also measuring the performance of the company's stock from the market perspective.

The independent variables included in the models designed to explain the variability in ROA and Tobin's Q are ESG scores

obtained from the companies' sustainability reports, company size, leverage ratio, current ratio, asset turnover ratio, interest coverage ratio, and revenue growth rate. The natural logarithms of ESG scores and company size variables were taken and included in the models.

**Table 1.** Information Regarding the Variables.

| Variables and Notation | | Description | Details |
|---|---|---|---|
| **Dependent Variables** | ROA | Asset Profitability Ratio | Net Profit / Average Assets Total |
| | Tobin's Q | Tobin's Q Ratio | (Book Value of Total Assets – Book Value of Equity + Market Value of Equity) / Book Value of Total Assets |
| **Independent Variables** | ESG | Environmental, Social, and Governance Scores | Derived from the sustainability report, with its natural logarithm applied. |
| | SIZE | Company Size | The natural logarithm of total assets was taken. |
| | LEV | Leverage Ratio | Financial Liabilities / Equity |
| | CR | Current Ratio | Current Assets / Short-Term Liabilities |
| | ATO | Asset Turnover Ratio | Net Sales / Average Assets |
| | ICR | Interest Coverage Ratio | Earnings Before Interest and Tax / Financing Expenses |
| | RGR | Revenue Growth Rate | Percentage Change in Revenue Compared to the Previous Period |

The summary statistics of the dependent and independent variables are included in Table 2. The annual average ROA of the 16 companies within the scope of the research between the 2018-2022 periods was 10.43%. The average Tobin's Q ratio of the companies in the same period is 2.43.

**Table 2.** Descriptive Statistics of Variables

| | Number of Observations | Average | Std. Deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| **ROA** | 80 | 0.1044 | 0.1002 | -0.1731 | 0.3725 |
| **Tobin's Q** | 80 | 2.4332 | 2.1128 | 0.58 | 14.22 |
| **ESG** | 80 | 3.9565 | 0.7113 | 1.45582 | 4.5448 |
| **SIZE** | 80 | 10.3631 | 0.4964 | 9.4648 | 11.5412 |
| **LEV** | 80 | 0.8712 | 0.7689 | 0 | 5.3817 |
| **CR** | 80 | 2.6641 | 3.2655 | 0.48 | 14.91 |
| **ATO** | 80 | 1.2131 | 0.7498 | 0.39 | 4.04 |
| **ICR** | 80 | 6.7760 | 21.6472 | 0 | 190.85 |
| **RGR** | 80 | 1.0319 | 1.4626 | -0.726 | 8.651 |

The results of the correlation analysis for the variables used in the study are presented in Table 3. The direction of the relationship between the ESG scores and the company performance measures, ROA and Tobin's Q, is positive.

## Methodology

The study investigating the impact of ESG scores on company performance employed the panel data analysis method. Two models were established, with the ROA and Tobin's Q ratios selected as indicators of company performance, serving as the dependent variables. The independent variables used in both models are the same, and detailed information about these variables is provided in Table 1.

$$ROAit = \beta_0 + \beta_1 ESG_{it} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 CR_{it} + \beta_5 ATO_{it} + \beta_6 ICR_{it} + \beta_7 RGR_{it} + u_{it} \quad \text{(Model 1)}$$

$$Tobin'sQit = \beta_0 + \beta_1 ESG_{it} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 CR_{it} + \beta_5 ATO_{it} + \beta_6 ICR_{it} + \beta_7 RGR_{it} + u_{it} \quad \text{(Model 2)}$$

To determine the most appropriate panel data model for the dataset used in the study, the presence of unit and/or time effects was first investigated using various tests. The results of these tests are presented in Table 4.

In the model where ROA is the dependent variable, the F-test conducted to investigate the presence of unit effects indicates

**Table 3.** Results of the Correlation Analysis

| | ROA | Tobin's Q | ESG | SIZE | LEV | CR | ATO | ICR | RGR |
|---|---|---|---|---|---|---|---|---|---|
| **ROA** | 1.0000 | | | | | | | | |
| **Tobin's Q** | 0,2326 | 1.0000 | | | | | | | |
| **ESG** | 0.0372 | 0.0901 | 1.0000 | | | | | | |
| **SIZE** | -0.0537 | -0.1520 | 0.4118 | 1.0000 | | | | | |
| **LEV** | -0.3240 | 0.2278 | 0.2975 | 0.0375 | 1.0000 | | | | |
| **CR** | 0.1566 | -0.1368 | -0.7814 | -0.2980 | -0.388 | 1.0000 | | | |
| **ATO** | 0.3055 | 0.2442 | 0.4153 | 0.2358 | -0.0468 | -0.4098 | 1.0000 | | |
| **ICR** | 0.0581 | -0.0122 | -0.2949 | -0.0023 | -0.1709 | 0.1534 | -0.0595 | 1.0000 | |
| **RGR** | 0.3283 | 0.1124 | 0.0644 | 0.2236 | -0.1724 | -0.0835 | 0.3660 | -0.0607 | 1.0000 |

**Table 4.** Tests Used to Investigate the Presence of Unit and/or Time Effects

| Dependent Variables: | | Model 1 ROA | | Model 2 Tobin's Q | |
|---|---|---|---|---|---|
| | Tests | Test Statistics | P-Value | Test Statistics | P-Value |
| Unit Effect | F test | 1.96 | 0.0351 | 8.47 | 0.0000 |
| | LR test | 1.54 | 0.108 | 27.23 | 0.000 |
| | Two-sided LM Test | 1.57 | 0.1054 | 22.24 | 0.0000 |
| Time Effect | F test | 0.48 | 0.7521 | 2.43 | 0.0563 |
| | LR test | 0.00 | 1.0000 | 1.26 | 0.131 |
| | Two-sided LM Test | 0.00 | 1.0000 | 0.00 | 1.0000 |

that the null hypothesis is rejected at the 5% significance level, while the results of the LR test and LM test suggest that the null hypothesis cannot be rejected. Based on the F-test, the presence of unit effects is accepted, whereas the LR and LM tests suggest that there is no unit effect. Given that the null hypothesis is not rejected by the tests other than the F-test, it is concluded that there is no unit effect.

To determine the presence of time effects in Model 1, the results of the F-test, LR test, and LM tests indicate that the null hypothesis cannot be rejected at the 5% significance level in all three tests. In other words, based on the results of these tests, it is concluded that there is no time effect in the model.

In Model 2, where Tobin's Q is the dependent variable, the F-test, LR test, and LM test results indicate a unit effect at the 1% significance level. However, the results of all three tests show that there is no time effect at the 5% significance level in Model 2.

To determine whether the unit effects in Model 2 are random or fixed, the Hausman test (1978) and the Robust Hausman (R-Hausman) test were applied. The results of the Hausman and R-Hausman tests, as presented in Table 5, differ. At this point, the decision was based on the result of the Robust Hausman test. According to the R-Hausman test result, the Random Effects Model is preferred at the 5% significance level.

**Table 5.** Hausman Test

| | Model 2 | |
|---|---|---|
| Tests | Test Statistics | P-Value |
| Hausman | 27.95 | 0.002 |
| R-Hausman | 2.01 | 0.9594 |

The results of the VIF (Variance Inflation Factor) test, conducted to investigate the presence of multicollinearity among the independent variables, are presented in Table 6. All variables have a VIF (1980) criterion below 5.0. The average VIF value is 1.82. Therefore, there is no multicollinearity problem among the variables.

**Table 6.** VIF Test

| Independent Variables | VIF Values |
|---|---|
| ESG | 3.27 |
| SIZE | 2.98 |
| LEV | 1.49 |
| CR | 1.31 |
| ATO | 1.30 |
| ICR | 1.26 |
| RGR | 1.17 |
| VIF Average | 1.82 |

In the panel data models, it is assumed that the error terms have homoscedasticity (equal variance) within and across units, are free from autocorrelation, and there is no correlation between units. Additionally, a normality test must also be conducted. The tests conducted to examine deviations from these assumptions and their results are presented in Table 7.

**Table 7.** Tests Used to Examine Deviations from Assumptions

| | | Model 1 (ROA) | | Model 2 (Tobin's Q) | |
|---|---|---|---|---|---|
| | Tests | Test Statistics | P-Value | Test Statistics | P-Value |
| Normal Distribution Test | Jarque-Bera Test (1987) | 31.27 | 0,000 | | |
| | D'Agostino, Belanger, and D'Agostino Test (1990) | | | 11.36 | 0.0034 |
| Heteroscedasticity Test | White Testi (1980) | 63.10 | 0.0025 | | |
| | Levene (1960), Brown & Forsythe Test (1974) | | | $W_0 = 3.3079$<br>$W_{50} = 1.5678$<br>$W_{10} = 3.3079$ | 0.0004<br>0.1086<br>0.0004 |
| Auto-correlation Test | Durbin-Watson Test | 1.1194 | | | |
| | Bhargava, Franzini, & Narendranathan's DW Test (1982) | | | 2.1401771<br>2.3920081 | |
| BAK Test | Juodis and Reese (2022) Weighted CDw+ Test | 105.64 | 0.0000 | 54.94 | 0.0000 |
| Specification Test | Ramsey RESETF3 Test (1969) | 0.171 | 0.9155 | 8.954 | 0.0000 |

In Model 1, the normality test was conducted using the Jarque-Bera Test (1987), and it was determined that the data did not follow a normal distribution at the 1% significance level. The presence of heteroscedasticity across units was investigated using the White Test, which indicated a heteroscedasticity problem at the 1% significance level. The DW test revealed first-order autocorrelation in the model, as the test statistic was less than 2. The presence of cross-sectional correlation was examined using the Juodis & Reese (2022) Weighted CDw+ test, which confirmed cross-sectional correlation at the 1% significance level. According to the Ramsey Reset test (1969), there are no specification errors in the model, and the model is correctly specified.

In Model 2, the normality test was conducted using the D'Agostino, Belanger & D'Agostino Test (1990), and it was determined that the data did not follow a normal distribution at the 1% significance level. The Levene (1960), Brown, and Forsythe tests (1974) indicated the presence of heteroscedasticity. According to the Bhargava, Franzini & Narendranathan DW test (1982), no autocorrelation was found in the model, as the test statistic was greater than 2. The cross-sectional correlation test, conducted

using the Juodis & Reese (2022) Weighted CDw+ test, confirmed cross-sectional correlation in the model at the 1% significance level. The Ramsey Reset test indicated no specification errors, and the model was correctly specified.

Based on the findings from the tests of deviations from assumptions, robust estimators were applied using Driscroll & Kraay (1998) standard errors to arrive at the final models in both cases. The results of the models are presented in Table 8.

**Table 8.** Regression with Driscoll & Kraay (1998) Standard Errors and Robust Estimators

| Dependent Variables | Model 1 ROA | | Model 2 Tobin's Q | |
|---|---|---|---|---|
| Independent Variables | Coefficient | P-Value | Coefficient | P-Value |
| ESG | 0.0361 | 0.057 | 2.2684 | 0.026 |
| SIZE | −0.034 | 0.021 | −0.5505 | 0.455 |
| LEV | −0.0238 | 0.042 | 0.5546 | 0.010 |
| CR | 0.0112 | 0.120 | 0.2419 | 0.023 |
| ATO | 0.0393 | 0.020 | 0.0187 | 0.974 |
| ICR | 0.00036 | 0.141 | 0.0055 | 0.094 |
| RGR | 0.0168 | 0.070 | 0.0433 | 0.753 |
| Constant Parameter | 0.2356 | 0.027 | -2.02404 | 0.702 |
| F Test | 212.08 | 0.0001 | | |
| Wald chi2(7) | | | 1326.72 | 0.0000 |
| $R^2$ | 0.2909 | | | |
| Overall $R^2$ | | | 0.0246 | |

According to the results of the F-test, which indicates the overall significance of Model 1, the variability in ROA is explained by the independent variables collectively at a 99% confidence level. The independent variables account for approximately 29% of the variability in ROA. The ESG variable is statistically significant at a 90% confidence level and has a positive effect on ROA. In other words, an increase in ESG scores enhances the company's performance (ROA). Among the other independent variables in the model, SIZE, LEV, and ATO are significant at a 95% confidence level, while RGR is significant at a 90% confidence level. An increase in SIZE and LEV negatively affects ROA, while an increase in ATO and RGR positively affects ROA. However, the variables CR and ICR did not have a significant impact on ROA.

In Model 2, the Wald test, which indicates the overall significance of the model, shows that the independent variables collectively explain the variability in Tobin's Q at a 99% confidence level. The independent variables account for approximately 2.5% of the variability in Tobin's Q. The ESG variable is statistically significant at a 95% confidence level and positively affects Tobin's Q. In other words, an increase in ESG scores enhances the company's performance (Tobin's Q). Among the independent variables, LEV and CR are significant at a 95% confidence level, while ICR is significant at a 90% confidence level. An increase in these variables positively affects the Tobin's Q ratio. However, SIZE, ATO, and RGR did not have a significant effect on Tobin's Q.

According to the above study, which looks into how ESG scores affect company performance, higher ESG scores have a positive impact on ROA at a 90% confidence level and Tobin's Q at a 95% confidence level. An improvement in the ESG scores, which encompass the company's environmental, social, and governance aspects, positively impacts the company's performance. The findings of this study, which indicate that an increase in ESG scores positively affects the company's profitability, are consistent with the results of studies conducted by Ortas et al. (2015), Velte (2017), Dalal & Thaker (2019), Alareeni & Hamdan (2020), Ting et al. (2020), Korkmaz & Nur (2023), and Karyağdı & Şit (2023). On the other hand, the results differ from the findings of studies conducted by Lee et al. (2018) and Mollaahmetoğlu (2023).

The positive impact of an increase in ESG scores on the Tobin's Q performance measure, which also considers the company's market value, aligns with the results of studies conducted by Ortas et al. (2015), Dalal & Thaker (2019), Alareeni & Hamdan (2020), Ting et al. (2020), Wu et al. (2022), and Chang & Lee (2022). However, the obtained result is not consistent with the findings of Lee et al. (2018).

## Conclusion

In today's world, the demand from stakeholders for environmental, social, and governance (ESG) scores is steadily increasing. For companies, disclosing this non-financial information has become a voluntary obligation. Investors prefer to invest in companies that are more sustainable and responsible, considering their ESG performance. As the concept of sustainability becomes increasingly important for companies, the relationship between sustainability performance and financial performance has started to be investigated. In this context, the impact of the ESG scores of companies operating in Turkey, a developing country, on their performance and the direction of this impact is important for investors.

The study used data from 16 manufacturing companies listed on Borsa Istanbul. All these companies are included in the BIST Industrial Index (XUSIN). For this purpose, a balanced panel dataset covering five periods between 2018 and 2022 was created. Two models were established in which ROA and Tobin's Q ratios, selected as indicators of company performance, were used as dependent variables. In this context, the study investigated the impact of ESG scores on performance measures both in terms of the performance derived from the companies' intra-period activities and reflected in their financial statements, as well as the stock market performance of their shares. The independent variables used in the established models include company size, leverage ratio, current ratio, asset turnover ratio, interest coverage ratio, and revenue growth rate, in addition to the ESG scores. In the analysis, the presence of unit and/or time effects, multicollinearity issues, specification errors, and deviations from assumptions (heteroskedasticity, autocorrelation, inter-unit correlation) were tested for the models to be established. Based on the findings obtained, the final models were estimated using robust estimators with Driscoll & Kraay (1998) standard errors. The analysis results found both models were significant at a 99% confidence level. The ESG variable is statistically significant at a 90% confidence level for ROA and at a 95% confidence level for Tobin's Q, with a positive impact on both performance measures. The positive developments in the sustainability performance values (ESG) of companies positively affect the company's profitability (ROA) and stock market performance (Tobin's Q). It can be stated that companies with higher ESG scores are better managed and that this positively reflects on their profitability, which in turn positively impacts stock prices. This result may be significant for investors when selecting companies for their portfolios and for company managers regarding the importance of being sensitive to environmental, social, and governance values and preparing sustainability reports.

The study's main limitation is the relatively small number of companies and periods examined. Due to the absence of sustainability reports for many companies or their failure to publish them regularly each year, the research dataset had to be created with a limited number of companies and period lengths. In the future, as more companies publish sustainability reports, there will be a need for studies that include more comprehensive data.

**Peer Review:** Externally peer-reviewed.

**Author Contributions:** Conception/Design of study: H.İ.A., M.S.T.; Data Acquisition: H.İ.A.; Data Analysis/Interpretation: H.İ.A., M.S.T.; Drafting Manuscript: M.S.T.; Critical Revision of Manuscript: M.S.T., H.İ.A.; Final Approval and Accountability: M.S.T., H.İ.A.

**Conflict of Interest:** The authors have no conflict of interest to declare.

**Grant Support:** The authors declared that this study has received no financial support.

**ORCID:**

Halil İbrahim Akpınar 0009-0003-2236-7284
Mehmet Sabri Topak 0000-0003-2753-9834

## REFERENCES

Alareeni, B.A. & Hamdan, A. (2020). ESG impact on performance of US S&P 500-listed firms. *Corporate Governance*, 20(7), 1409-1428.

Belsley, D. A., Kuh, E., & Welsch, R. E. (1980). Regression Diagnostics: Identifying Influential Data and Sources of Collinearity. Wiley.

Bhargava, A., Franzini, L., & Narendranathan, W. (1982). Serial Correlation and the Fixed Effects Model. *The Review of Economic Studies*, 49(4), 533-549.

Brown M. B. & Forstyle A. B. (1974) The Small Sample Behavior of Some Statistics Which Test the Equality of Several Means. Technometrics, 16 129-132.

Carnini Pulino, S., Ciaburri, M., Magnanelli, B. S.,& Nasta, L. (2022). Does ESG disclosure influence firm performance? *Sustainability*, 14(13), 75-95.

Chang, Y. J., & Lee, B. H. (2022). The impact of ESG activities on firm value: Multi-level analysis of industrial characteristics. Sustainability, 14(21), 14444.

Cheng, M., Green, W., Conradie, P., & Romi, A. (2014). The International Integrated Reporting Framework: Key Issues and Future Research

Opportunities. *Journal of International Financial Management and Accounting*, 25(1), 90–119.

Dalal, K. K., & Thaker, N. (2019). ESG and Corporate Financial Performance: A Panel Study of Indian Companies. *IUP Journal of Corporate Governance*, 18(1), 44- 59.

Driscoll, J., & Kraay, A. C. (1998). Consistent Covariance Matrix Estimation with Spatially Dependent Data. *Review of Economics and Statistics*, 80, 549-560. https://doi.org/ 10. 1162/003465398557825.

D'Agostino R.B., Belanger A., D'Agostino R.B., 1990, "Suggestion for Using Powerful and Informative Tests of Normality, *The American Statistican*, 44 (4), 316-321.

Hausman J. A., (1978), Spesification Test in Econometrics, *Econometrica*, 46 (6), 1251.1271.

Jarque C. M., Bera A. K., (1987) A Test for Normality of Observations and Regression Residuals , *International Statistical Review*, 55 (2), 163-172.

Karyağdı, N. G., & Şit, A. (2023) İşletmelerin ESG Performanslarının Sermaye Maliyeti ve Finansal Performansına Etkisi: Bist Sürdürebilirlik-25 Endeksi Üzerine Bir Uygulama. *Bucak İşletme Fakültesi Dergisi*, 6(2), 277-292.

Klein, J.G. & Dawar, N. (2004), Corporate Social Responsibility and Consumers Attributions and Brand Evaluations in Product Harm Crisis. International Journal of Research in *Marketing*, 21(3), ss. 203-217.

Korkmaz, T. & Nur, T. (2023). The Effect of ESG Sustainability on Firm Performance: A View under Size and Age on BIST Bank Index Firms. *Journal of Research in Economics, Politics & Finance*, 8(2): 208-223.

Kuhlman, T.,& Farrington, J., 2010. What is sustainability?. *Sustainability*, 2(11), 3436-3448.

Landi, G., & Sciarelli, M. (2019). Towards a more ethical market: the impact of ESG rating on corporate financial performance. *Social responsibility journal*, 15(1), 11-27.

Lee, J. H., Kang, Y. S., & Kim, S. S. (2018). Corporate social responsibility and financial performance in Korean retail firms. *Journal of Distribution Science, 16*(5), 31-43.

Levene H., (1960), Robust Test for Equality of Variannces in Olkin I., Ghurye G., Hoeffding W., Madow W. G. and Mann H. B. (eds.), Contributions to Probability and Statistics: Stanford, California: Stanford University Press, 278-292.

Mollaahmetoğlu E. (2023). ESG Skorları Finansal Performansı Etkiliyor Mu? Borsa İstanbul'dan Kanıtlar, Teorik ve Uygulamalı Sürdürülebilirlik Çalışmaları, Nobel Akademik Yayıncılık, 179-191.

Ortas E., Alvarez I., & Garayar A. (2015). The Environmental, Social, Governance, and Financial Performance Effects on Companies that Adopt the United Nations Global Compact. *Sustainability*. 7(2) 1932-1956; doi:10.3390/su7021932.

Ramsey, J. B. (1969). Tests for Specification Errors in Classical Linear Least-Squares Regression Analysis. *Journal of the Royal Statistical Society*, 31, 350-371.

Shih, C. M., Gwizdalski, A., & Deng, X. (2023). Building a Sustainable Future: Exploring Green Finance, Regenerative Finance, and Green Financial Technology. *World Scientific Annual Review of Fintech*, 1, 2350002.

Şişman, E. M., & Çankaya, S. (2021). Çevresel, Sosyal ve Kurumsal Yönetişim (ESG) Verilerinin Firmaların Finansal Performansına Etkisi: Hava Yolu Sektörü Üzerine Bir Çalışma. *Çukurova Üniversitesi İİBF Dergisi*, 25(1), 73–91.

Taliento M, Favino C & Netti A. (2019).Impact of Environmental, Social, and Governance Information on Economic Performance: Evidence of a Corporate 'Sustainability Advantage' from Europe. *Sustainability*. 11(6):1738.

Topak, M.S. (2018). Çalışma Sermayesi Yönetiminin Karlılığa Etkisi: BIST Ticaret Endeksi Üzerine Bir Araştırma. *Mali Çözüm Dergisi*, 28, 71-93.

Ting, I. W. K., Azizan, N. A., Bhaskaran, R. K., & Sukumaran, S. K. (2020). Corporate Social Performance and Firm Performance: Comparative Study Among Developed and Emerging Market Firms. *Sustainability*, 12(1), 26-35.

Velte, P. (2017), "Does ESG performance have an impact on financial performance? Evidence from Germany", *Journal of Global Responsibility*, 8(2), 169-178.

White Halbert (1980). A Heteroskedasticity-Consistent Covariance Matrix Estimator and A Direct Test for Heteroskedasticity, *Econometrica*, 48, 817-838.

Wu, S., Li, X., Du, X., & Li, Z. (2022). The impact of ESG performance on firm value: The moderating role of ownership structure. *Sustainability*, 14(21), 14507.

**How cite this article**

Akpınar, H.İ., & Topak, M.S. (2024). The effect of ESG (Environmental, Social And Governance) scores on company performance: Evidence from the manufacturing industry in Turkey. *EKOIST Journal of Econometrics and Statistics*, 41, 109-117. https://doi.org/10.26650/ekoist.2024.41.1540173