IJAAF; Vol. 10, No. 3, Summer 2026, Serial 36

Ferdowsi University of Mashhad

Iranian Journal of
Accounting, Auditing & Finance

Quarterly

RESEARCH ARTICLE

The Impact of ESG Performance on Capital Market Sensitivity

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How to cite this article:
Kardan, B. and Nazaridavaji, H. (2026). The Impact of ESG Performance on Capital Market Sensitivity. Iranian Journal of Accounting, Auditing and Finance, 10(3), 95-111. doi: 10.22067/ijaaf.2026.48066.1621
https://ijaaf.um.ac.ir/article_48066.html

ARTICLE INFO

Article History
Received: 2025-10-03
Accepted: 2026-01-18
Published online: 2026-07-12

Abstract

This study examines the effect of environmental, social, and governance (ESG) performance on capital market sensitivity (CMS) among firms listed on the Tehran Stock Exchange. To assess how ESG performance influences firms' stock responses to market fluctuations, CMS was evaluated using three key indicators: beta, price volatility, and the Sharpe ratio. An analysis of 151 companies listed on the Tehran Stock Exchange from 2014 to 2023 was conducted in this quantitative, descriptive-analytical study. In addition to analyzing the direct effects of ESG performance on CMS, advanced econometric models were used to examine the moderating effects of inflation and economic sanctions. There was a statistically significant negative correlation between ESG performance and sensitivity to the capital markets. Stock price volatility was lower, and Sharpe ratios were greater for companies that performed well on ESG dimensions. In addition, the research on inflation and penalty intensity moderating effects showed that in bad political and economic circumstances, the impact of ESG performance on market sensitivity changes, either amplifying or diminishing, depending on the environmental factors. By concentrating on the Iranian capital market and incorporating the moderating effects of economic and political factors into the relationship between ESG performance and CMS, this study extended the existing literature on ESG and capital market risk management in emerging economies. Moreover, the study's applicability to investors and corporate managers made it more relevant.

Keywords:
ESG, CMS

https://doi.org/10.22067/ijaaf.2026.48066.1621

NUMBER OF REFERENCES
26

NUMBER OF FIGURES
0

NUMBER OF TABLES
8

Homepage: https://ijaaf.um.ac.ir
E-ISSN: 2717-4131
P-ISSN: 2588-6142

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1. Introduction

The ESG framework has gradually evolved into a comprehensive framework for evaluating corporate performance across all ESG dimensions and has increasingly become a key criterion for investors (Zhao et al., 2018). This framework not only influences investment decisions but may also directly affect CMS. Sustainable and responsible investment opportunities are increasingly sought after by investors (Wu et al., 2022). According to Landi and Sciarelli (2019), companies with strong ESG performance are more likely to respond to market changes than others, driven by the growing demand for such investments. At the same time, firms that place greater emphasis on ESG-related issues tend to experience lower levels of risk, including ESG risks (Devalle et al., 2017). By allocating capital to such firms, investors may reduce the overall risk of their portfolios. This risk reduction, in turn, contributes to lower sensitivity of these firms' stock prices to market fluctuations (Sassen et al., 2016). Investors are increasingly favoring companies with strong ESG performance as ESG's importance grows. Investing behavior is expected to shift towards sustainable principles, resulting in higher valuations for companies. Accordingly, short-term volatility in stock prices may result from changes in investor expectations and increased competition for investments in ESG-oriented companies (Bermejo Climent et al., 2021).

In today's investment world, relying only on financial returns is no longer enough. Non-financial factors, such as ESG issues, have become important in investors' decision-making (Torricelli and Bertelli, 2022). In this situation, Iran is in a unique position as an economy in transition, facing many problems, including rising inflation and economic sanctions. The economic sanctions against Iran and the large swings in inflation have made it harder for businesses to operate and have affected investors' choices. Investor trust could be boosted if companies pay attention to ESG factors in these situations. Several contextual elements, such as business ownership structures, governmental involvement in the economy, and the degree of capital market growth, may influence the Iranian capital market's responsiveness to ESG variables. Consequently, the current study examined the influence of ESG performance on CMS in Iran. Considering Iran's specific economic conditions, including economic sanctions and high inflation, the need for research on the effect of ESG on CMS in this nation is especially evident. Since most research has focused on reputational risk (ESG) and financial performance (Sabouri and Allahyari, 2023), this study is notable. This research found that ESG reporting affects investors' risk perceptions (Bakhtiari, 2024), business performance risk (Aldieri et al., 2023), and investment efficiency (Hu et al., 2023). No study has, though, looked at this issue in the Iranian capital market.

Additionally, the study's main contribution is the examination of the moderating effects of economic sanctions and inflation on the correlation between ESG performance and sensitivity to capital markets. Thus, the study used these elements to investigate the impact of ESG on capital market responses to sanctions and extreme price volatility. This method may help Iranian politicians and investors make better judgments by making the results more applicable to their real-world situations. There is a lack of research in the Iranian capital market regarding the moderating effects of sanctions and inflation on the relationship between ESG and market sensitivity. Additionally, there is no investigation into the mechanisms through which ESG impacts market sensitivity in the context of sanctions and high inflation. Thus, the study contributes to the body of knowledge in this area by filling a gap in the literature. In other words, although both financial and non-financial factors have been shown to influence CMS in Iran, the present study demonstrates that, alongside financial activities, the environmental dimension of non-financial activities may also affect CMS in the Iranian context. Two other areas that could help improve future studies are refining methods for measuring CMS and developing ESG indices relevant to Iran's context. Concurrently, this study aids Iranian scholars, politicians, and market participants in the capital market by illuminating the effect of ESG

on the market in light of Iran's unique economic conditions, thereby enabling better decision-making. In today's complex financial markets, many factors affect asset values; it is crucial to identify and quantify them. Examining the relationship between ESG performance and CMS contributes to a clearer understanding of the role of non-financial factors in asset pricing. Investors, analysts, and lawmakers can all benefit from this kind of data when making decisions. This area of study also broadens understanding of investment and finance by posing new questions about how different ESG dimensions affect market sensitivity and interact with other economic variables. The study helps fill the gap in the Iranian capital market left by prior research. Furthermore, these kinds of studies not only contribute to what is already known but also lay the groundwork for future research. Overall, examining the relationship between ESG performance and CMS contributes to a more comprehensive understanding of financial market behavior and supports more informed investment decisions. With this information in hand, the boundaries of financial research can be pushed, and even more sophisticated financial products can be created. In light of the growing importance of ESG in investment decision-making and Iran's unique economic environment, analyzing the impact of ESG on corporate social responsibility is of great interest. Through a review of existing literature and an analysis of data collected from Iranian firms, this study attempts to shed light on the factors that moderate the impact of ESG on CMS in Iran. Therefore, the research questions addressed in the present study are as follows:

Is there a significant relationship between ESG factors and CMS among Iranian firms? Which factors influence the strength of this relationship? Do economic sanctions and inflation exert a moderating effect on the relationship between ESG performance and CMS?

2. Theoretical background and hypothesis development

ESG, as a central concept in the contemporary business environment, has increasingly influenced firm size and growth. Companies that follow ESG principles and perform better in ESG areas often have significant advantages over their competitors (Wu et al., 2022). Companies that follow ESG principles may be able to access new sources of funding, build stronger relationships with customers and business partners, and reduce the risks associated with climate change and social issues. In addition, companies that focus on ESG usually have a better image and credibility, which makes it easier to find and keep qualified workers. As a result, these companies are often able to grow faster and more sustainably than their competitors (Torricelli and Bertelli, 2022). On the flip side, if ESG principles are not adequately addressed, the firm's size can decrease. The Nasdaq (2019) reports that companies risk sanctions, heavy fines, and declining consumer demand if they damage the environment, violate workers' rights, or fail to maintain transparent corporate governance. A decrease in firm size, an increase in operational expenses, and a decrease in market share are all possible outcomes of these issues. According to Aydoğmuş et al. (2022), investors are increasingly investing in companies that adhere to ESG principles and avoiding those with poor ESG performance. One of the main factors influencing an organization's ownership structure is the firm's size. A smaller number of key shareholders, such as the founders, their families, or early-stage investors, tend to hold the majority of the shares in a smaller corporation. Among the reasons for this concentration of ownership are the need for seed money, the desire to keep management in charge, and the desire to save on monitoring costs. Owners of smaller businesses with larger responsibilities and a greater interest in maintaining the company's autonomy and character are more likely to be involved in management (Boshnak, 2025).

Companies' ownership arrangements also change as they grow bigger. Rahman and Hossain (2023) found that a wider variety of investors own a greater percentage of shares in large corporations.

Van Duuren et al. (2016) suggested that large enterprises are more attractive to institutional investors, and financial resources are needed to support growth and expansion. These companies often have institutional shareholders who want to get the most out of their money and have a lot of say in how the company runs. According to Akgun et al. (2021), managers' decision-making, information disclosure transparency, and investors' responses to changes can be influenced by the kind and concentration of ownership. The ownership structure of firms with a small number of large shareholders is less affected by market changes than that of firms with more dispersed ownership (Rahimzadeh et al., 2022). According to Zhou et al. (2022), these powerful shareholders tend to think in the long run and prioritize the development of long-term value. There is a greater likelihood that businesses with a dispersed ownership structure will be sensitive to market changes than companies with many small shareholders. Faster, more noticeable shareholder reactions to news and events are common in such organizations because no single shareholder has sufficient power to influence corporate decisions. The presence of institutional investors, such as pension funds and insurance companies, also plays an important role in shaping market sensitivity. The decisions of these investors are usually more influenced by their greater wealth and knowledge. They may place greater value on ESG factors because of their propensity for long-term, sustainable investments. Firm performance and information transparency can both be improved by institutional investors, thereby lessening the impact of market fluctuations (Bolibok, 2024). Shan et al. (2025) demonstrated that implementing ESG practices enhances financial stability and market attractiveness while also incurring additional operating costs. Investments in innovation and capital expenditures are also likely to rise among companies with better ESG performance. While investing in innovation can yield promising results, it is associated with more uncertain outcomes and has a smaller impact than capital expenditures, which greatly improve financial performance. Moreover, the financial performance of non-state-owned and non-polluting firms appears to be more sensitive to fluctuations in ESG performance. Similarly, Yang et al. (2025) reported a positive relationship between ESG performance and the use of an abnormally positive tone in annual reports. Mechanistic investigations also show that managers of companies that perform well in ESG areas are likely to use overly positive rhetoric, largely due to personal gains from equity-based pay. In an effort to alleviate the pressure from broader coverage by financial analysts and to enhance perceptions shaped by analysts' reports, managers of firms with higher ESG performance also tend to adopt a more aggressive tone in their annual disclosures.

Accordingly, in light of the foregoing discussion, a firm's ESG performance may directly influence its stock price. In addition, market regulators have increasingly recognized the importance of ESG considerations and have undertaken initiatives to encourage firms to disclose ESG-related information and to establish unified standards in this area. Such measures have contributed to greater market transparency and enhanced investor confidence (Bissoondoyal-Bheenick et al., 2023). In the end, ESG considerations have a significant role in how investors react to changes in the capital markets (Pu, 2023). There is less market volatility and more competitive advantage for firms that follow ESG principles and perform well in this area (Zhao et al., 2018). In light of the foregoing, the following is the formulation of the research hypothesis:

H1: ESG performance has a negative and statistically significant effect on CMS.

Moreover, consistent with the existing literature (Sabouri and Allahyari, 2023; Bakhtiari, 2024; Aldieri et al., 2023; Hu et al., 2023; Yang et al., 2025; Shan et al., 2025), the effect of ESG performance on CMS may be moderated by different environmental, economic, and political conditions. In particular, inflation and economic and political sanctions may alter the strength or direction of the ESG effect. Under conditions of high inflation, economic pressures, and rising operating costs, firms' resources and capacity to implement ESG strategies may be constrained (Bissoondoyal-Bheenick et al., 2023). In other words, inflation may constrain firms' financial

resources and pose challenges to implementing sustainable development projects, investments in green technologies, or social programs, thereby weakening the positive effect of ESG performance on reducing CMS.

On the other hand, economic sanctions and political pressures may restrict firms' access to international financial markets, foreign suppliers, and overseas investors (Pu, 2023). These constraints not only increase firms' operational and financial risks but also moderate the capacity of ESG performance to reduce volatility and enhance investor confidence. Simply put, when faced with sanctions-related pressures, even companies that excel in ESG metrics may not fully benefit from ESG's buffering impact on CMS. The importance of ESG factors is further highlighted by the fact that inflation and sanctions could increase economic uncertainty and systemic risk. Some protection against market volatility may be available to companies with strong ESG practices (high transparency, effective risk management, and sustainable performance). However, it will likely be less than under normal conditions. Hence, sanctions and inflation are moderating factors that might make ESG performance less effective at reducing market sensitivity or more effective. Therefore, when studying the relationship between ESG performance and CMS in emerging nations, it is important to carefully account for this moderating effect. In light of this, it is important to consider environmental and economic factors when studying the impact of ESG on market sensitivity; otherwise, our findings may be flawed. Inflation and sanctions can act as moderating factors, helping explain how ESG issues affect market stability and investor confidence.

3. Methodology

Using current financial data, this study employed a causal-correlational design and a quasi-experimental, ex post facto research methodology within the framework of positive accounting research. From the perspective of its nature and objectives, the research was applied, as applied studies aim to develop practical knowledge in a specific field. At the same time, with respect to data collection and analytical procedures, the study followed a causal–correlational approach.

3.1. Study population

In this research, all companies listed on the Tehran Stock Exchange between 2014 and 2023 were included in the statistical population.

3.2. Sampling method

Elimination sampling was employed systematically. After applying the following criteria, the final research sample was selected:

1. Firms had been listed on the Tehran Stock Exchange by the end of 2013.
2. Firms had provided complete financial information required for this study throughout the research period.
3. Firms were not classified as investment companies, banks, insurance companies, or other financial intermediaries.

Based on the information collected as of the end of 2023, the final sample was determined in accordance with Table 1.

3.3. Data collection methods and instruments

The required data for this study were collected from multiple sources, depending on their nature. Information related to the research literature and theoretical foundations was obtained from library-based sources, academic journals, and relevant online resources. Firm-level information, specifically balance sheets and income statements, was used as the primary research instrument.

Table 1. Number of firms in the statistical population and application of sample selection criteria

Description	Firms Excluded Over the Entire Period	Total Number of Firms
Total firms listed on the Tehran Stock Exchange		408
Exclusion of financial intermediation, financing, insurance, and investment firms	88	
Exclusion of firms that entered the stock exchange during the study period	55	
Exclusion of firms with trading suspension exceeding three months (due to the use of stock price volatility variables)	144	
Statistical population		151

Tadbir Pardaz[1], Rahavard Novin,[2] and other databases linked to the Tehran Stock Exchange, as well as reports issued by the Tehran Stock Exchange Organization, provided the raw data needed to test the research hypotheses. These data were obtained through direct reference to the sources, primarily by reviewing disclosure reports available on the CODAL platform, and were subsequently collected manually. In addition, comprehensive discs from the Tehran Stock Exchange Organization and rdis[3] website were consulted, along with other relevant sources as necessary.

3.4. Data analysis procedure

The data analysis was conducted using a panel data structure, combining cross-sectional and annual observations. To test the research hypotheses, multivariate linear regression techniques were employed. Descriptive and inferential statistical methods were applied to analyze the collected data. The descriptive analyses were performed using frequency distribution tables. In contrast, the inference analyses were conducted using the F-Limer test, the Hausman test, normality tests, and multiple linear regression.

3.5. Research model

To test the research hypothesis, Model (1) was employed as follows:

Model (1)

$$MS_{it} = a_0 + a_1 ESG_{it} + a_2 Over.Con_{it} + a_3 lev_{it} + a_4 GRW_{it} + a_5 size_{it} + a_6 age_{it} + a_7 roa_{it} + a_8 loss_{it} + a_9 \mathrm{BSIZE}_{it} + a_{10} \mathrm{CFO}_{it} + a_{11} TA_{it} + a_{12} Inflation_{it} + a_{13} Sanction_{it} + a_{14} Year_{it} + a_{15} Industry_{it} + \varepsilon_{it}$$

3.6. Research variables

3.6.1. Independent variable

ESG: Environmental, social, and governance reporting

The weighted framework employed in this study to measure ESG performance was adopted from Fakhari et al. (2018) and is specified as follows:

$$\mathrm{ESG} = 0.337\mathrm{E} + 0.388\mathrm{s} + 0.275\mathrm{G}$$

In this study, ESG represents the composite score of ESG reporting (according to Table 2). E denotes the environmental dimension score, S represents the social dimension score, and G refers to the governance dimension score.

1 https://etadbir.portal.trade/
2 https://rahavard365.com/
3 rdis.ir

Table 2. Indicators of environmental, social, and governance dimensions

Governance Dimension Indicators	Social Dimension Indicators	Environmental Dimension Indicators
Protection of shareholders' rights	Health, safety, and productivity	Pollution, emissions, and waste
Committees	Labor rights	Energy, efficiency, and water
Risk management	Stakeholder social perception	Biodiversity
Performance-based compensation	Product health and safety	Climate change
Ethics and codes of conduct	Non-discrimination and social inclusion	Environmental risk assessment
Corporate governance disclosure	Customer and supply chain social issues	Service and supply chain environmental issues
Regulatory compliance	Compliance with human rights principles	Environmental training
Board composition	Social development and philanthropy	Environmental management systems
Investment risk management	Corporate social responsibility investment	Environmental disclosure
Related-party transactions	Brand protection and anti-competitive behavior	—
Number of board meetings	Social learning and training	—
Corporate website availability	Social disclosure	—
Information timeliness	—	—
Ownership structure	—	—
Future plans	—	—
Employment reporting	—	—

After reviewing the board of directors' reports and the accompanying explanatory notes, a value of one was assigned if any of the indicators or their subcomponents were disclosed. In the final stage, each of the three dimensions was scored separately, and the aggregate ESG score was calculated using the weighted scheme $ESG = 0.337E + 0.388S + 0.275G$, through which the final ESG score was obtained.

3.6.2. Dependent variable

CMS (MS)

Beta: Beta is one of the most widely used indicators for measuring a stock's sensitivity to market movements. Compared to the market, a stock with a higher beta is more volatile.

Volatility: Volatility reflects the degree of price fluctuations of a stock or an index over a specific period. Higher volatility indicates greater market sensitivity.

Sharpe Ratio: An index of excess return relative to risk, derived from the standard deviation. When volatility increases while returns remain constant, the Sharpe ratio declines, indicating higher market sensitivity and is calculated as follows:

$$\text{Sharpe Ratio} = \frac{R_i - R_f}{\sigma_i}$$

where:

- R_i= The average annual return of the company i's stock
- R_f= the risk-free rate (in this study, the rate of Iranian government bonds was used)
- σ_i= The standard deviation of the company i's stock returns over the study period

3.6.3. Moderating variables

Sanction Intensity: The number of imposed sanctions, including financial, banking, oil-related, and other types, measures the severity of sanctions. Sanction intensity represents the level of

economic pressure and international restrictions imposed on a company or country, measured quantitatively. The sanction intensity index is derived based on the number and severity of sanctions imposed by recognized international and governmental institutions. The numerical scale of this index is normalized to range from 0 to 1, where 0 indicates no sanctions, and 1 represents the highest level of sanctions.

Inflation: In this study, inflation is measured using the annual Consumer Price Index (CPI). This index reflects the general price level of goods and services consumed by households in each year and is used as a continuous variable in the model. Using the annual CPI allows for the assessment of the impact of overall price levels on the study variables.

In Regression Model 2, the inflation and sanctions variables were entered as continuous variables to accurately capture their quantitative effects on the dependent variable. Using dummy variables for these factors could have led to excessive simplification and the loss of valuable quantitative information, thereby reducing the precision of the estimated effects. Therefore, including these variables as continuous variables was deemed more appropriate given the research objectives and the nature of the data. This approach allows examination of actual effects and small variations in variable values, resulting in more reliable and meaningful analytical outcomes.

3.6.4. Control variables

Managerial overconfidence (Over.CON): This study used an index based on excessive investment in assets to quantify managerial overconfidence. This metric follows the work of Schrand and Zechman (2012) by accounting for out-of-the-ordinary investments in assets, and is calculated as the residuals from regressing total asset growth on sales growth, with each industry-year's estimates assessed independently. The indicator is set to 1 if the regression residual is greater than 0, and to 0 otherwise. The use of this measure is grounded in the premise that, in firms where asset growth exceeds sales growth, managers tend to invest more aggressively than their peers, reflecting higher levels of managerial overconfidence.

$$Assets.Gr_{it} = a_0 + a_1 sales.Gr_{it} + \varepsilon_{it}$$

LEV (Financial Leverage): Leverage is the ratio of total liabilities to total assets for a given year.

Age (Firm Age): Firm age is defined as the length of time elapsed from the firm's establishment to the year under examination.

Size (Firm Size): Firm size is measured as the natural logarithm of total assets.

ROA (Return on Assets): ROA is calculated as net income divided by total assets for the current year.

GRW (Sales Growth): Sales growth is measured as the difference between current-year sales and prior-year sales, divided by prior-year sales.

Loss (Loss Indicator): During the past year, this variable equals 1 if the firm reported a loss and 0 otherwise.

TA (Asset Turnover): A firm's asset turnover is calculated by dividing its sales by its total assets.

Bsize (Board Size): Board size is defined as the number of board members in the year under review.

CFO (Operating Cash Flow): Operating cash flow is measured as operating cash flow divided by total assets.

Year: Year dummy variable.

Industry: Industry dummy variable.

4. Data analysis

4.1. Descriptive statistics

A qualitative analysis of CMS was conducted using data from 151 companies over the period 2014–2023. According to Table 3, the mean values of the dependent variables indicate that beta, with an average of 0.764, exhibits the highest mean among the sensitivity indicators, followed by stock price volatility (VOL) with a mean of 0.592 and the Sharpe ratio (SHARP) with a mean of −0.989. These findings suggest that, within the sample, variations in firms' systematic risk (beta) are more pronounced than those reflected in the other indicators. At the same time, risk-adjusted performance, as measured by the Sharpe ratio, is relatively lower. A metric of stock price volatility shows 1.847 standard deviations, followed by the Sharpe ratio at 1.780, and beta at 0.774. This trend shows that companies' sensitivity to changes in the capital market varies widely. The independent variables indicate moderate dispersion and notable differences among firms in terms of ESG. A standard deviation of 1.236 is associated with the mean ESG performance score of 2.785. Mean values and acceptable levels of dispersion are also displayed by other control variables, such as board size (BSIZE), leverage (LEV), sales growth (GRW), and profitability (ROA). As the skewness and kurtosis statistics indicate, some variables have asymmetric distributions with relatively high values; for example, board size and stock price volatility. We should consider robust regression methods in future analyses. We find that indicators such as ESG_INFLATION and ESG_SANCTION have positive mean values and considerable dispersion in our descriptive statistical analysis of the interaction variables and market sensitivity measures. Thus, the effects of macroeconomic conditions and sanctions on firms' ESG performance are heterogeneous. This means the data are not normally distributed because both the Jarque-Bera statistics and their p-values are zero for every variable. Because of this, multiple regression models are well-suited to studying how ESG performance affects CMS, given the dataset's high dispersion and variability.

Table 3. Descriptive statistics of quantitative research variables

Variable	Mean	Median	Maximum	Minimum	Std. Dev.	Unit
BETA	0.764	0.765	4.180	-2.340	0.774	Index
ESG	2.784	2.625	8.539	1.100	1.235	Score
AGE	1.601	1.638	1.857	1.079	0.151	Log (years)
BSIZE	5.013	5.000	7.000	0.000	0.288	Number
CFO	0.124	0.102	0.726	-0.460	0.146	Ratio
GRW	0.471	0.372	18.169	-0.909	0.739	Percentage
INFLATION	0.330	0.412	0.523	0.090	0.164	Percentage
LEV	0.527	0.523	1.725	0.031	0.216	Ratio
LOSS	0.072	0.000	1.000	0.000	0.260	Dummy (0/1)
OVERCON	0.287	0.000	1.000	0.000	0.452	Dummy (0/1)
ROA	0.170	0.139	0.699	-0.400	0.161	Percentage
SANCTION	3.602	3.688	4.787	2.079	0.742	Index
SIZE	6.671	6.557	9.510	4.827	0.761	Log (assets)
TA	0.259	0.218	0.932	0.006	0.185	Ratio
ESG_INFLATION	0.915	0.790	3.242	0.099	0.631	Interaction
ESG_SANCTION	10.062	9.070	40.880	2.287	5.096	Interaction
VOL	0.592	0.075	24.234	-0.993	1.847	Percentage
SHARP	-0.988	-0.760	0.710	-45.550	1.780	Ratio

4.2. Multicollinearity test

To examine multicollinearity among the explanatory variables in the models, the variance inflation factor (VIF) test was used. All models' multicollinearity test results are identical because the explanatory variables are identical. Based on the calculated statistics, the VIF values for all variables

and the overall mean VIF across the regressions are below the 5 threshold. Consequently, there is no evidence of multicollinearity among the explanatory variables, indicating that multicollinearity does not pose a concern in the specified regression models.

4.3. Correlation matrix results

Pearson correlation coefficients were employed to examine the relationships among the variables included in the models. This test assesses the pairwise associations between the variables, and its results are reported in the correlation matrix presented in Table 4. The diagonal elements of the matrix, which represent the correlation of each variable with itself, are equal to one, indicating perfect correlation. Stronger positive correlations are observed near 1, whereas weaker correlations are observed near 0. Negative values indicate inverse relationships between variables. Correlation coefficients were positive and statistically significant at the 99% confidence level, indicating that the variables were related.

4.4. Estimation of the research model

Table 5 presents the results of the diagnostic tests for the first research model. The F-test, Hausman test, Breusch-Pagan test, serial correlation examination, and model specification test are all examples of these tests.

To assess the feasibility of pooling the data, the F-Limer test was applied. The null hypothesis of this test assumes that the data are poolable. The test statistic equals 1.276, which is greater than the critical F value. Accordingly, the null hypothesis is rejected, and it is concluded that the model should be estimated using panel data techniques.

Subsequently, the Hausman test was employed to determine whether a fixed-effects or random-effects specification is more appropriate. The test statistic for the Beta model is reported as 382.41, and the results for the other indicators are also statistically significant. Given that these values exceed the critical χ^2 values, the null hypothesis of random effects is rejected, indicating that the fixed-effects approach is the most suitable estimation method.

The Breusch–Pagan test was used to determine whether the regression residuals are homoskedastic. The results show that the test statistic is 92.672, which exceeds the critical χ^2 value. Therefore, the null hypothesis of homoskedasticity is rejected, implying the presence of heteroskedasticity in the regression residuals.

Based on the diagnostic test results, the research model was estimated using the fixed-effects approach. Table 6 reports the estimation results for the first model. CMS is negatively impacted by ESG performance, and the effect is statistically significant. Specifically, for the beta (Beta) indicator, the coefficient on ESG is −0.252 with a p-value of 0.0000, implying that a one-unit increase in ESG performance is associated with a 0.252-unit reduction in beta. There is a statistically significant difference between firms with higher ESG performance and firms with lower systematic risk. Regarding the volatility of stock prices (Vol), the ESG coefficient is −0.0647, with a p-value of 0.0218. This indicates a strong correlation between stronger ESG performance and lower volatility in business returns, which in turn leads to more stable capital markets. For the Sharpe ratio (Sharpe), the ESG coefficient is −0.0811 with a p-value of 0.0218. This negative and statistically significant effect indicates that higher ESG performance is associated with a decline in the risk-adjusted return ratio. Rather than a decrease in absolute returns, this reduction is attributed to lower risk and market volatility. Some financial and economic variables, on the other hand, have distinct impacts. Sanctions (SANCTION) raise CMS, as shown by their positive and statistically significant impact on all indices (p-value = 0.0000).

Table 4. Result of diagnostic test of the first model

	Beta	Sharpe	Vol	ESG	AEG	BSIZE	CFO	GRW	INFLATION	LEV	LOSS	OVERCON	ROA	SANCTION	SIZE	TA
Beta	1.000															
Sharpe	0.004	1.000														
Vol	0.572	0.001	1.000													
ESG	0.191	0.018	0.002	1.000												
AEG	0.000	0.012	0.002	0.024	1.000											
BSIZE	0.003	0.623	0.015	0.030	0.010	1.000										
CFO	0.098	0.017	0.061	0.030	0.044	0.002	1.000									
GRW	0.016	0.053	0.000	0.178	0.081	0.071	1.540	1.000								
INFLATION	7.580	0.316	0.648	0.073	0.097	0.022	1.171	0.005	1.000							
LEV	0.021	0.077	0.173	0.184	0.000	0.121	0.178	0.118	0.037	1.000						
LOSS	0.004	0.000	6.960	0.288	0.032	0.004	0.000	0.010	-0.017	0.612	1.000					
OVERCON	0.059	0.913	0.017	0.114	0.014	0.005	3.670	0.004	0.070	-0.123	0.075	1.000				
ROA	0.289	0.000	0.007	0.001	0.291	0.010	0.006	0.001	-0.073	-0.018	-0.021	0.080	1.000			
SANCTION	0.015	0.016	0.168	0.090	0.001	0.311	0.056	0.000	-0.060	0.001	-0.115	0.041	-0.107	1.000		
SIZE	0.993	0.234	0.086	0.066	0.001	0.010	0.011	0.057	-0.002	-0.125	-0.025	0.913	-0.020	0.33	1.000	
TA	0.000	0.000	0.133	0.86	0.075	0.052	0.002	0.339	0.062	-0.306	0.983	-0.073	-0.055	-0.0472	-0.017	1.000

Table 5. Results of diagnostic tests for the first model

Test Name	Beta (Chi² or F)	P-Value	Sharpe (Chi² or F)	P-Value	Volatility (Chi² or F)	P-Value
Poolability Test (F-Limer)	1.276	0.018**	1.258	0.025**	2.510	0.000***
Hausman Test	382.41	0.000***	34.73	0.000***	85.14	0.000***
Breusch–Pagan Test	92.672	0.000***	84.470	0.000***	177.142	0.000***

Note: The null hypotheses of the tests assume pooled data and homoskedasticity; * denotes significance at the 90% confidence level, ** at the 95% confidence level, and *** at the 99% confidence level**.**

As inflation rises, investors may be more hesitant to invest in risky assets, as evidenced by a negative and statistically significant correlation between inflation and the beta indicator ($p = 0.0023$). Other variables, such as firm age, board size, financial leverage, and sales growth, are largely insignificant. Overall, the results demonstrate that improvements in ESG performance are significantly associated with reductions in CMS. ESG plays an important role in mitigating systematic risk and promoting investment sustainability through lower beta values and reduced volatility. The overall model statistics indicate that the R-squared and adjusted R-squared values are moderate, suggesting that the model variables explain some of the variation in market sensitivity. At the same time, additional factors may also influence it. Moreover, the overall significance level of the model is 0.000, which is below the 5% threshold, confirming that the model is statistically significant.

Table 6. Estimation results of the first research model

Variable	beta		sharp		vol	
	Coefficient	***P-Value***	**Coefficient**	***P-Value***	**Coefficient**	***P-Value***
ESG	-0.252	0.000***	-0.064	0.000***	-0.081	0.021**
OVERCON	0.026**	0.179	-1.215	0.179	-0.787	0.000***
LEV	0.233	0.203	0.874	0.203	-0.010	0.976
GRW	-0.002	0.928	0.054	0.928	0.052	0.360
SIZE	0.073	0.348	0.096	0.348	-0.272	0.009***
AGE	-0.073	0.877	0.620	0.877	0.295	0.513
ROA	0.201	0.439	1.114	0.439	-1.976	0.000***
LOSS	-0.134	0.162	0.407	0.162	-0.167	0.542
BSIZE	-0.093	0.270	-0.069	0.270	-0.078	0.395
CFO	-0.268	0.165	0.140	0.165	0.981	0.031**
TA	0.369	0.050**	0.621	0.050**	-0.433	0.191
INFLATION	-1.161	0.002***	0.677	0.002***	-0.471	0.385
SANCTION	0.343	0.000***	0.123	0.000***	1.032	0.000***
C	-0.205	0.833	-3.663	0.833	-0.457	0.578
R-squared	0.277		0.298		0.446	
Adjusted R-squared	0.171		0.196		0.365	
S.E. of regression	0.704		1.596		1.471	
Sum squared resid	581.751		2987.381		2536.131	
Log likelihood	-1344.346		-2443.811		-2333.766	
F-statistic	2.628		2.915		5.529	
Prob(F-statistic)	0.000***		0.000***		0.000***	

4.5. Additional analyses

The severity of sanctions and inflation's moderating effect on the ESG relationship and CMS were investigated in Model 2, as well as in additional analyses, the results of which are presented in Table 4.

Model 2

$$MS_{it} = a_0 + a_1 ESG_{it} + a_2 Inflation_{it} + a_3 ESG * Inflation_{it} + a_4 Sanction_{it} + a_5 ESG * Sanction_{it} + a_6 \text{BSIZE}_{it} + a_7 age_{it} + a_8 roa_{it} + a_9 \quad _{it} + a_{10} loss_{it} + a_{11} \text{CFO}_{it} + a_{12} TA_{it} + a_{13} lev_{it} + a_{14} Over.Con_{it} + a_{15} GRW_{it} + a_{16} size_{it} + a_{17} Year_{it} + a_{18} Industry_{it} + \varepsilon_{it}$$

Table 7 reports the results of the diagnostic tests for the first research model. These tests include the poolability test, the Hausman test, and the test for homogeneity of variance. To examine whether the data could be pooled, the F-Limer test was employed under the null hypothesis of pooling. Test statistics of 1.276 for beta, 2.546 for Sharpe, and 1.682 for volatility were calculated. Since the calculated F values exceed the critical values, the null hypothesis is rejected, indicating that the first model should be estimated using panel data techniques.

Subsequently, the Hausman test was applied to determine whether a fixed-effects or random-effects specification is more appropriate. The test statistics are 382.41 for beta, 84.39 for Sharpe, and 91.87 for volatility. Based on the calculated values, the null hypothesis is rejected at the 99% confidence level in favor of the random-effects model in all three cases. Therefore, the fixed-effects approach is identified as the most appropriate method for estimating this model.

To assess homoskedasticity, the regression residuals were tested with the Breusch-Pagan test. For beta (163.4), Sharpe (132.79), and volatility, the test statistics are 92.672, 163.4, and 132.79, respectively. As these values exceed the critical χ^2 values, the null hypothesis of homoskedasticity is rejected at the 99% confidence level. Accordingly, the residuals of this regression exhibit

heteroskedasticity.

Table 7. Results of diagnostic tests for the first model

Test Name	Beta (Chi² or F)	P-Value	Sharpe (Chi² or F)	P-Value	Volatility (Chi² or F)	P-Value
Poolability Test (F-Limer)	1.276	0.000***	2.546	0.000***	1.682	0.000***
Hausman Test	382.41	0.000***	84.39	0.000***	91.87	0.000***
Breusch–Pagan Test	92.672	0.000***	163.40	0.000***	132.79	0.000***

Note: The null hypotheses of the tests respectively assume pooled data and homoscedasticity.

This study measured CMS using three indicators—beta (Beta), price volatility (Volatility), and the Sharpe ratio (Sharpe) and examined firms' ESG performance as the primary independent variable. To assess the effect of ESG under varying economic and political conditions, two key environmental factors were incorporated into the model, namely inflation and economic sanctions. The results indicated that ESG performance directly mitigated CMS. One of the key contributions of this study was the analysis of the moderating effects of inflation and sanctions on the relationship between ESG performance and market sensitivity. The results reported in Table 8 indicated that:

Inflation (ESG_INFLATION) weakened ESG's protective effect on CMS. The positive coefficients for Beta (0.049, $p < 0.05$), Sharpe (0.737, $p < 0.05$), and Volatility (0.286, $p < 0.05$) suggested that, under inflationary conditions, systematic risk and price volatility among firms with high ESG performance increased relative to normal conditions, thereby moderating the risk-reducing effect of ESG. This finding implied that ESG's capacity to mitigate risk was constrained in inflationary environments, underscoring the need for policymakers to account for this interaction.

Economic sanctions (ESG_SANCTION) also operated as a key moderating factor. The positive coefficients for Beta (0.091, $p < 0.05$), Sharpe (0.064, $p < 0.05$), and Volatility (0.075, $p < 0.05$) indicated that, under sanction conditions, the protective effect of ESG diminished. Even firms with high ESG performance were exposed to higher levels of systematic risk and price volatility. This result highlights the study's innovation, as it demonstrates that ESG's capacity to mitigate market risk is contingent on prevailing political and economic conditions. Among the control variables, leverage (LEV), operating cash flow (CFO), return on assets (ROA), and excessive accounting conservatism (OVERCON) exerted significant effects on CMS. Low Beta and Volatility were linked to higher liquidity and leverage, whereas ROA helped keep prices stable. In contrast, excessive conservatism increased systematic risk. Other control variables, including firm age (AGE), firm size (SIZE), and total assets (TA), did not exhibit statistically significant effects. The findings indicate that ESG is a risk-mitigation mechanism and a tool for controlling market volatility; however, its effectiveness varies with conditions, particularly during periods of inflation and economic sanctions. The results suggest that risk assessment and investment decision-making should incorporate not only firms' ESG performance but also the surrounding economic and political environment. This part of the study makes a meaningful contribution to the existing literature on ESG and capital market risk management by emphasizing the importance of contextual factors in financial decision-making.

Table 8. Estimation results of the second research model

	beta		sharp		vol	
Variable	**Coefficient**	***P-Value***	**Coefficient**	***P-Value***	**Coefficient**	***P-Value***
ESG	-0.117	0.000***	-0.248	0.043	-0.001	0.000***
INFLATION	-0.126	0.383	0.430	0.026**	-0.151	0.574
ESG_INFLATION	0.049	0.038**	0.737	0.028**	0.285	0.045**
SANCTION	0.366	0.106	0.637	0.413	-0.462	0.157
ESG_SANCTION	0.090	0.018**	0.063	0.036**	0.074	0.027**
BSIZE	-0.001	0.957	0.058	0.025**	0.054	0.341
AGE	-0.257	0.272	0.176	0.588	0.994	0.029**
ROA	0.073	0.407	0.093	0.000	-0.268	0.009***
LOSS	0.189	0.525	1.067	0.276	-1.983	0.000***
CFO	-1.146	0.067*	1.585	0.056*	-1.275	0.000***
TA	-0.024	0.486	-0.021	0.592	-0.085	0.406
LEV	-0.251	0.000***	-1.211	0.000***	-0.788	0.000***
OVERCON	0.411	0.001***	0.187	0.626	1.264	0.000***
GRW	0.227	0.000***	0.856	0.246	-0.016	0.960
SIZE	-0.008	0.957	-0.339	0.137	0.291	0.403
C	-0.500	0.000***	-4.370	0.000***	-1.060	0.000***
R-squared	0.278		0.300		0.447	
Adjusted R-squared	0.171		0.196		0.366	
S.E. of regression	0.704		1.595		1.470	
Sum squared resid	581.064		2980.079		2530.869	
Log likelihood	-1343.552		-2442.167		-2332.370	
F-statistic	2.605		2.900		5.481	
Prob(F-statistic)	0.000***		0.000***		0.000***	

5. Discussion and conclusion

The Iranian capital market has faced many problems in recent years, including the harsh consequences of economic sanctions, high inflation, and economic shifts. There is a lack of empirical research in Iran examining how ESG performance affects CMS, even as ESG becomes increasingly important globally. This study found that ESG performance could be a useful tool for developing systematic risk management in emerging markets by examining the impact of ESG on Iranian enterprises' ability to weather market volatility and increase their resilience. In addition, ESG performance can be a useful tool for managing systematic risk in developing markets. This study finds the extent to which ESG mitigates CMS changes under unfavorable political and economic circumstances. Moreover, ESG has different effects on CMS depending on the severity of economic and political conditions. From this perspective, the present research extends the existing body of knowledge on ESG and capital market risk management in Iran and offers a novel analytical framework that may be utilized by investors, corporate managers, and policymakers as a practical guide for financial and investment decision-making. Therefore, this study examined the impact of ESG performance on CMS in Iran. The findings of the present study indicated that ESG performance—encompassing ESG dimensions—played a substantial role in reducing CMS. In particular, companies that performed better on ESG metrics had better Sharpe ratios, lower beta values, and less price volatility. According to these findings, companies that follow ESG principles are better able to withstand market changes and reduce their overall risk. Companies that prioritize ESG issues have been found to have a leg up in the marketplace and to achieve longer-term growth (Wu et al., 2022; Torricelli and Bertelli, 2022). Similarly, Aydoğmuş et al. (2022) emphasized the importance of investor attention to ESG-oriented firms, which aligns with the present study's evidence regarding the reduction of CMS.

One of the innovative aspects of this study was the examination of the moderating role of environmental factors, including inflation and economic sanctions, in the effect of ESG performance

on CMS. The findings indicated that inflation and sanctions may weaken the protective effect of ESG on market sensitivity. In other words, under adverse economic and political conditions, even firms with high ESG performance may be exposed to increased market volatility. These results are consistent with studies such as Zhao et al. (2018) and Bolibok (2024), which demonstrated that environmental conditions and ownership characteristics can moderate the influence of ESG on market behavior. In addition, the corporate ownership structure was found to play an important role in CMS. Overall, the findings suggest that ESG performance is a key factor in investment decision-making and in reducing firms' systematic risk. Firms with strong ESG performance benefit from greater competitive advantages, are less exposed to market volatility, and enjoy higher levels of investor confidence. Based on the empirical evidence, the research hypothesis proposing a negative and statistically significant effect of ESG performance on CMS was supported. Beyond providing further evidence of ESG's direct effect, this study also showed that contextual and environmental factors significantly moderated the relationship. Consequently, when evaluating risk and making investment decisions, investors, managers, and lawmakers should consider ESG performance and the environmental and macroeconomic conditions in which enterprises operate. Last but not least, this study adds to the body of knowledge on ESG factors in capital market risk management by showing that ESG is more than just a social or ethical metric; it's a tool for making markets less sensitive and more financially stable for businesses. Consequently, firms should regularly disclose information related to their ESG performance. Such disclosure is likely to strengthen investor confidence and reduce stock price volatility. The establishment of domestic ESG standards and adherence to international ESG frameworks may further reinforce ESG's protective effect on market sensitivity. In addition, investors and investment funds should incorporate firms' ESG performance as a core criterion for assessing investment risk and return. Allocating capital to ESG-oriented firms may help mitigate the high-risk volatility of the Iranian market and generate more stable long-term returns. At the same time, firms and investors should account for the influence of economic and political factors, such as inflation and sanctions, on the effectiveness of ESG. For example, risk-mitigation strategies, including activity diversification and prudent financial management, may help offset adverse environmental effects. In addition, a prominent limitation of this study is the use of ESG coefficients from Fakhari et al. (2018), which may not fully reflect recent changes across all industries.

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