

## Relationship between ESG Scores, Risk, and Return- An Analysis

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### Abstract

*Responsible investors are not only interested in financial performance of a company but also consider the company's performance towards environmental, social and governance (ESG). They also believe that the long-term returns will come from the effects of the company on the environment and society that will result in sustainability. The purpose of this study is to analyze whether there exists any correlation among the ESG scores, total Risk and the return of the stocks. Analysis is done with the stocks in the information technology (IT) sector and being traded in BSE for whom ESG scores are available. After analysis, it is found that higher ESG scores have no significant impact on the return of the stocks pertaining to IT Sector being traded in BSE. It is also found that there is no strong statistical evidence to say that the stocks having higher ESG scores earn more than the stocks having lesser ESG scores for the period of study. But it is found that statical evidence exists for the inverse association among ESG scores and total risk. Risk reduces with the higher ESG scores.*

**Keywords:** ESG, Risk, Return

### Introduction

Nowadays investors are not only interested in financial performance of a company but also consider the company's contribution towards Environmental, Social and Governance (ESG). Responsible Investing approach makes them to look into the ESG parameters also. In addition, investors believe that the long-term returns will come from the effects of the company on the environment and society that will result in sustainability.

Environmental refers the organization's initiatives towards environmental issues like pollution, waste management, carbon emissions, bio diversity, deforestation, greenhouse gas emissions, etc. Social refers to the organization's impact on society like diversity, women empowerment, human rights, etc in addition to fair view on Human Capital management. Governance refers to the corporate governance i.e. how the organization is being managed. It includes how the investors rights are protected, internal control, executives' compensation, board management practices, statutory compliance, etc.

This study is about the relationship among ESG scores, risk, and return. To do financial analysis on ESG integration, ESG scores plays a vital role. ESG score is a measurement which is based on the evaluation of a given company or fund with respect to ESG factors. The rating agencies that assign ESG scores may have different evaluation standards. But they all come under the same E, S, or G categories.

There are various ESG rating agencies available. Each of them are having their own approach and criteria. Some of the popular ESG scoring agencies are Morgan Stanley Capital International (MSCI), Morning Star Sustainability, Financial Times Stock Exchange-Russell Group -FTSE4Good Index Series, Bloomberg, S&P Global and CRISIL.

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The Securities and Exchange Board of India (SEBI) has granted approval from 13<sup>th</sup> August 2024 to NSE Sustainability Ratings & Analytics Limited to make available ESG ratings in India.

### **Significance of the Study**

This study is important because it assesses how ESG practices affect investor perception. The study offers insights for investors, legislators, and companies looking to balance sustainability. Additionally, it adds to the expanding corpus of research on responsible investing.

The purpose of this study is to analyse whether there is any association among the ESG scores, total risk and return of the stocks. Analysis is done with the stocks in the Information Technology (IT) sector and being traded in BSE for whom ESG scores are available. ESG scores are taken from the website of CRISIL.

### **Literature Review**

Increasing attention to ESG while investing will also help society. Bradford Cornell (2020) pointed out that green technology companies will have lower expenses when investors decide to invest in companies with strong ESG ratings, and a strong ESG rating might act as a buffer against unforeseen changes in environmental regulations and climate shocks.

Shanev S and Ghimere B (2020) used the calendar-time portfolio methodology to document the significance of ESG rating changes. While downgrading appears to be consistently unfavorable for stock performance, improving the ESG rating is linked to comparatively tiny or negligible positive returns.

Mario La Torre, Fabiomassimo Mango, Arturo Cafaro and Sabrina Leothe (2020) have done empirical analysis on correlation of ESG Index and stock returns. They found that the association among ESG Index and stock performance is very weak.

George Serafeim and Aaron Yoon (2020) pointed that the degree of disagreement among ESG raters moderates the consensus ESG rating. According to their findings, companies with higher ESG ratings see less of a market response to good improvement in ratings.

Mahmut Aydogmuş, Guzhan Gülay, Korkmaz Ergun(2022) found that the firm value is positively and significantly correlated with the ESG composite score..

Nektarios Gavrilakis, Christos Floros (2023) found no evidence to say that ESG motivates herding in their sample. They also reported that there was ESG herding practices at COVID-19 in Portugal, Italy, and Greece.

Florian Berg, Julian F. Koelbel, Anna Pavlova, Roberto Rigobon (2024) pointed out that there is a considerable bias due to the noise in the estimations from various rating agencies while examining the impacts of ESG performance.

Ramesh Prasad, Amitava Mondal (2025) analysed the effects of ESG scores in the banking industry and he discovered that ESG scores had a strong and statistically significant positive influence on Indian banks' operational and market performance.

### **Objectives of the Study**

As the responsible investing is considered to be a sustainable investment strategy, the below question arises.

- Whether ESG scores impact the price of the stock and thereby the return on stock is affected

- o Whether ESG scores impact the risk of the stock.
  - o Whether the stocks having higher ESG scores earn more than the stocks having lesser ESG scores
- The objective of the study is to find answers to the above questions. The below null hypotheses are framed to find the relationship of ESG scores with the Return and Risk of the stock.

H1<sub>0</sub>- Expected return of the stock has no relationship with ESG Scores

It is expected that responsible investors will prefer to invest higher in stocks with higher ESG scores. Stocks with higher ESG rankings will be in greater demand. This will cause the price to increase and thereby the return of the stock will be more for stocks with higher ESG scores.

H2<sub>0</sub>- Total Risk of the stock has no relationship with ESG Scores

It is expected that the stocks with higher ESG scores will tend to perform well continuously. So it is expected that the volatility of the stock will be lesser in case of stocks with higher ESG scores.

H3<sub>0</sub>- Stocks having higher ESG Scores earn lesser than the stocks having lower ESG scores

It is expected that responsible investors will tend to invest in stocks with higher ESG scores. The demand for the stocks will be more for stocks having higher ESG scores. So it is expected that the return of the stocks having higher ESG scores will be greater than the stocks having lower ESG scores.

### Research Methodology

Descriptive research design and Secondary data have been used for this research. ESG scores of the stocks are collected from the official website of CRISIL which is an Indian company, subsidiary of American company S&P Global. CRISIL is providing research, analytical ratings, risk and advisory services. Closing price of the stocks have been pulled through Excel.

For the purpose of analysis, ESG scores along with individual scores for Environment, Social and Governance are taken for 1010 stocks in various sectors. ESG data has been collected for ESG scoring period of 2021, 2022 & 2023. In the year 2021, no ESG scores are available for IT sector. In the year 2022, ESG Scores for only 8 stocks are available in IT sector. In the year 2023, ESG scores for 40 stocks are available. So, the analysis is done with the 40 IT stocks for whom ESG data is available for 2023 in CRISIL portal. The daily closing price of the stocks are taken for the period from 1<sup>st</sup> October 2023 to 31<sup>st</sup> July 2025.

Daily Returns are calculated using the formula  $(P_t - P_{t-1}) / P_{t-1}$  where P=Price and t=day

Expected Return is the Mean of the daily returns and the Total Risk is the Standard Deviation of the daily returns.

Excel formulas and Data Analysis Tool pak of Excel are used for analysis. t-Test for correlation is done using the below formula

$$t = r \times \text{SQRT} [(n-2) / (1-r^2)]$$

where:

r is the correlation coefficient which is found out using the formula CORREL in Excel

n is the sample size and n-2 is degrees of freedom

P value is found out using the formula TDIST in Excel

t-Test is done using Data Analysis Tool of Excel

## Data Analysis and Findings

## H1- Expected return of the stock has no relationship with ESG Scores

To analyze whether the expected return of the stock has any relationship with ESG Scores, correlation table is made and given in Fig. 1.

	Expected Return	Environment Score	Social Score	Governance Score	ESG Score
Expected Return	1				
Environment Score	0.037	1			
Social Score	0.010	0.672	1		
Governance Score	0.080	0.476	0.466	1	
ESG Score	0.028	0.939	0.838	0.670	1

Fig. 1

From Fig.1, it is visible that the correlation between Expected Return and the ESG scores have positive relationship. But it is found that there is no strong relationship as the correlation is as low as 0.028 which is nearer to zero. So, there is only weak relationship or almost no linear relationship. The same view is represented in scatter plot also in Fig. 2.

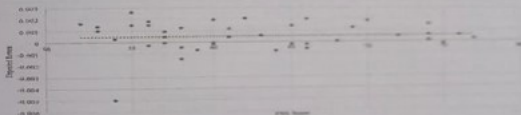


Fig. 2

In Fig. 2, the trend line shows only slightly upward trend which is almost nil and not clearly visible.

To know the statistical significance of the correlation, t-Stat for correlation is found and given in Table 1.

Table 1	H1
Correlation coefficient (r)	0.0278
Correlation Square (Coefficient of Determination)	0.0008
Sample Size (n)	40
Degrees of freedom (n-2)	38
t-Stat= r X SQRT[(n-2) / (1-r <sup>2</sup> )]	0.4323
P value	0.1717

In Table 1, the correlation coefficient has lower value of 0.0278 which is near to zero. The t-Stat is very low value of 0.4323 which is lesser than 2. The P value of 0.1717 is on the higher side and is greater than 0.05. We found that there is no statistical evidence to reject null hypothesis and we fail to reject null hypothesis.

It is evident from the study that higher ESG scores has no significant impact on the return of the IT Stocks being traded in BSE. ESG scores did not influence the investors preference during the period taken for study.

**H2o- Total Risk of the stock has no relationship with ESG Scores**

To analyze whether there is any relationship between Total risk and ESG Scores, correlation table is made and given in Fig. 3.

	Total Risk	Environment Score	Social Score	Governance Score	ESG Score
Total Risk	1				
Environment Score	-0.586	1			
Social Score	-0.413	0.672	1		
Governance Score	-0.730	0.476	0.466	1	
ESG Score	-0.671	0.939	0.838	0.670	1

Fig. 3

From Fig. 3, it is understood that there is negative association among Total Risk and the ESG scores. Also, there is negative association between different components of ESG scores and total risk. There is strong negative relationship as the correlation is -0.671 in case of ESG Score and total risk. The same view is represented in scatter plot in Fig.4 also.

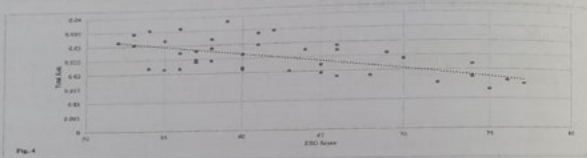


Fig. 4

The trend line in Fig. 4 clearly shows downward trend. With the increase of ESG scores, the Total risk declines.

To know the statistical significance of the correlation, t-Stat for correlation is found and given in Table 2.

Table 2

	H2
Correlation coefficient (r)	-0.6707
Correlation Square (Coefficient of Determination)	0.4498
Sample Size (n)	40
Degrees of freedom (n-2)	38
t-Stat= r X SQRT[(n-2) / (1-r <sup>2</sup> )]	-5.5735
Pvalue	1.09491E-06

In Table 2, the absolute value of t-Stat is high than 2. The P value is 0.00000109 which is much lesser than 0.05. The value is of statistically significance to reject null hypothesis and we reject null hypothesis. There exists negative relationship between ESG scores and Total Risk.

There is static evidence to say that there is inverse relationship exists between ESG scores and Total Risk. Risk reduces with the higher ESG scores. The volatility of the stock reduces if the ESG score is high and vice versa. Responsible investors prefer to buy more or keep the stocks having higher ESG scores which reduces the risk.

### H3- Stocks having higher ESG Scores earn lesser than the stocks having lower ESG scores

To analyze whether the return of stocks vary with the respective ESG scores, stocks are divided into three parts i.e. into terciles based on ESG Scores as below in Table 3.

Table 3

Tercile	T1	T2	T3
ESG Scores limit	58	65	77
ESG Scores Range	<=58	>58 & <=65	>65
No of Stocks	16	11	13
% of stocks	0.40	0.28	0.33

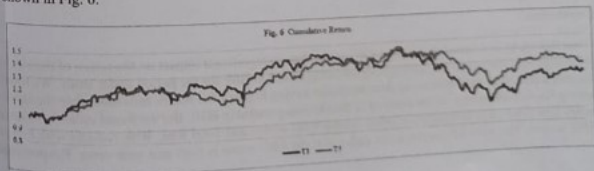
In Table 3, Stocks having ESG scores of 58 or lesser are grouped under the bucket T1. Stocks having ESG scores above 58 but lesser than or equal to 65 are grouped under the bucket T2. Stocks having ESG scores above 65 are grouped under T3. Individual mean of the daily returns for the buckets T1 & T3 are derived for the period from 1<sup>st</sup> October 2023 to 31<sup>st</sup> July 2025.

The daily returns' descriptive statistics of the stock for the buckets T1 & T3 are given below in Fig. 5.

Descriptive statistics	T1	T3
Mean	0.0004	0.0006
Standard Error	0.0007	0.0006
Median	0.0011	-0.0003
Mode	n.a	n.a
Standard Deviation	0.0155	0.0130
Sample Variance	0.0002	0.0002
Kurtosis	1.3897	2.7753
Skewness	-0.3816	0.5827
Range	0.1178	0.1099
Minimum	-0.0561	-0.0431
Maximum	0.0618	0.0668
Sum	0.1990	0.2664
Count	455	455
Largest(1)	0.0618	0.0668
Smallest(1)	-0.0561	-0.0431
Confidence Level(95.0%)	0.0014	0.0012

Fig. 5

To visually understand the performance of the stocks in each bucket, cumulative daily returns of the stocks are derived and then the mean of daily return of the stocks in each bucket are plotted in graph shown in Fig. 6.



From Fig. 6, it is understood that the return of stocks in the bucket T3, which have higher ESG scores are not always higher than the return of the stocks in the bucket T1 which have lesser ESG scores. This can be observed like Orange colour line (T3) is not always above Blue color line (T1). This observation is statistically tested using t-Test for means. The result comes as below in Table 4.

**Table 4**

	T1	T3
Mean	0.000437	0.000586
Variance	0.000241	0.000168
Observations	455	455
Pearson Correlation	0.66874	
Hypothesized Mean Difference	0	
df	454	
t Stat	-0.26736	
P(T<=t) one-tail	0.394657	
t Critical one-tail	1.648217	

In Table 4, the P value of 0.394657 is higher than 0.05. Though the negative t value tells the direction, t value is much lesser and very close to zero. The critical value of 0.394657 is above the t value of -0.26736. So, we do not have statistical evidence to support that the means of T1 & T3 are different. There is no statistical evidence to reject null hypothesis and we fail to reject null hypothesis.

There is no strong statistical evidence to say that the stocks having higher ESG scores earn more than the stocks having lesser ESG scores, in the current study of IT Stocks being traded in BSE. ESG scores of IT sector stocks being traded in BSE, did not influence the investors preference during the period taken for study. This finding supports our findings for first hypothesis (H1) i.e. the expected return of the stocks having higher ESG scores has no significant impact on the return of the stocks.

#### Limitations of the study

The study has been done for the stocks pertaining to Information Technology sector being traded in BSE for the period from 1<sup>st</sup> October 2023 to 31<sup>st</sup> July 2025 to whom ESG scores are available. ESG scores for 40 stocks only is available for Information Technology sector in the portal of CRISIL. So, the study has been made with those 40 stocks alone.

Since the ESG scores are comparable within industry, we have been restricted to one industry i.e. Information Technology. The data is taken for the period from 1<sup>st</sup> October '23 because of the assumption that the ESG scores were published for all the stocks by 30<sup>th</sup> September 2023. There is no comparison made for the periods of pre and post publication of ESG scores regarding risk or return which is open for future studies.

#### Conclusion

From this study, it is found that higher ESG scores has no significant impact on the return of the stocks pertaining to Information Technology Sector being traded in BSE for the period under study. We found no strong statistical evidence to say that the stocks having higher ESG scores earn more than the stocks having lesser ESG scores, in the study of IT Stocks being traded in BSE. But we found statistical evidence to say that there exist inverse association among ESG scores and Total Risk. Risk reduces with higher ESG scores. The volatility of the stock reduces if the ESG score is high and vice versa. Responsible

investors prefer to buy more stocks or keep them which are having higher ESG scores to reduce the risk on sustainability.

It is important to note that ESG scores are not available along with other parameters of the stocks in the websites of BSE and NSE (National Stock Exchange). Lack of information at the vicinity of investors may tend to suppress the importance of ESG scores. It is recommended to publish the ESG scores along with other parameters of the stocks in BSE and NSE websites.

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