

# Impact of ESG Rating of Companies on the Portfolio Performance

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## Abstract

*Socially responsible investing is becoming more popular among people because people are becoming more concerned about the environment and society. Socially responsible investors screen the company by considering the ESG factors. The question raised is whether socially responsible investing improves the portfolio performance and how the funds perform during uncertain times like the Covid-19 pandemic. Since many critics of ESG funds say that the ESG funds' performance highly depends on Software and Service company stocks, so the relevance of Software and Service companies in the fund has been analyzed in this research. The portfolios have been formed by using the Markowitz mean-variance portfolio model, and the performance of the minimum variance portfolio has been studied. The fund performance has been analyzed using the Sharpe ratio, and the result concludes that the ESG fund performance with minimum variance has an abnormally high Sharpe Ratio of 10.8. A similar type of performance was identified during the Covid-19 pandemic. The abnormally high Sharpe ratio will encourage investors to move towards socially responsible investing.*

**Keywords:** Socially responsible investing, Markowitz's modern portfolio theory, ESG risk rating, Efficient frontier, Best in class approach, Sharpe ratio

## Introduction

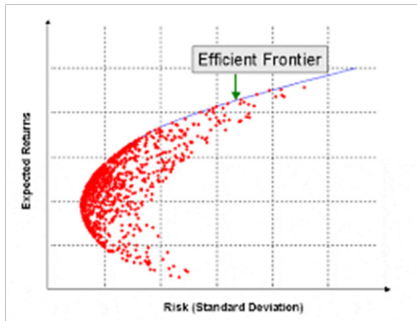
(Shook) Environmental, Social, and Governance stand for ESG. These non-financial considerations are increasingly being applied by investors to recognize material risks and growth opportunities as part of their analysis process. In general, ESG metrics are not part of compulsory financial statements, although businesses are gradually revealing details in their annual report or a separate sustainability report.

ESG investing is an emerging investing strategy used by many fund managers. ESG stands for environmental, social, and governance. Companies with low ESG Risk Ratings are considered to be more responsible towards the environment, society, and governance. This ESG Risk Rating shows the companies attempt to integrate the environmental, social, and governance issues into their business strategy and business model. (Hale) The investments in socially responsible investing have reached \$20.6 billion in the US in the year 2019.

This quantitative study tries to find out how the ESG factor affects the fund's financial performance by studying the risk and return on portfolio solely constructed based on the ESG Risk Rating. Many critics say that ESG funds outperform the benchmark because of the high proportion of Software and Service company stock in the ESG fund. The relevance of Software and Service company stocks in the ESG fund is studied in this report. The impact of the global pandemic on the ESG fund solely constructed by considering the ESG Risk Rating has been quantitatively studied in the report.

This quantitative analysis has used the stocks from the S&P 500 index as the benchmark for the funds made by considering the ESG Risk Rating and the funds made by not considering the ESG Risk Rating.

The ESG Risk Rating has been obtained from Sustainalytics. There are three major stock picking strategies for ESG funds, i.e., Exclusionary, Single theme, and Best in class strategy. (Hayat and Orsagh) Best in class strategy has been used to select the stock for the ESG fund made in this report. (Fink) BlackRock uses best this Best class approach while constructing an ESG fund.



**Figure 1: Efficient Portfolio Frontier**

**Review of Literature**

(Bugg-Levine and Emerson) Many people want to address the social and environmental challenges. Still, many don't have the resource to make enough donations, so it is an efficient way to redirect the investor's assets to investments that preserve their wealth and also directly tackle problems of environmental degradation and poverty. There are many mainstream investors who don't accept this idea of Impact Investing and believe that these are the problems that governments and charities should tackle. Normally, the term Impact Investing is so wide, and the understanding of it varies from investor to investor.

(Siew, et al) In recent years, in response to a higher demand for transparency from stakeholders, several businesses have committed to sharing information relating to their environmental, social, and governance (ESG) activities. The goal of this paper is to examine the effect of such reporting on construction companies' financial performance. The paper finds that most of the publicly traded construction companies analyzed have low reporting levels. In contrast, construction companies that issue non-financial reports largely outperform those that do not have various selected financial ratios. However, there is no clear link between financial performance and ESG ratings.

(Gibson, et al) The study investigates the relationship between ESG rating disagreement and stock returns using ESG ratings from seven separate data providers for a sample of S&P 500 companies between 2010 and 2017. We find that stock returns are positively linked to disagreement with the ESG rating, indicating a risk premium for companies with higher disagreement with the ESG rating. The relationship is motivated mainly by disagreement on the environmental dimension. The practical implications of our results for the equity cost of capital of companies and fund managers and asset owners using ESG investment strategies are discussed.

(Sarkis and Wang) The objective of this paper is to examine whether the environmental and social supply chain operations of companies are related to their financial results. A sample-based on Newsweek's green list of the top 500 US companies is used. For an empirical study of the relationships, information from the Bloomberg environmental, social, and governance (ESG) and COMPUSTAT financial databases are used. Including social and environmental supply chain management, integrated sustainable supply chain management efforts are positively related to corporate financial results calculated by the return on assets and equity return. A time lag of at least two years may have positive effects.

(Giese, et al) The relationship between companies with strong environmental, social, and governance (ESG) features and corporate financial results has been the subject of several studies. However, they have also struggled to demonstrate that positive correlations can explain the behavior when made. Using MSCI ESG rating data and financial variables, they checked each of these transmission channels. This showed that the ESG data of companies was transmitted both through their systemic risk profile (lower capital costs and higher valuations) and their idiosyncratic risk profile to their valuation and performance (higher profitability and lower exposures to tail risk). The study indicates that improvements in the ESG features of a business can be a useful financial predictor. For integration into policy benchmarks and financial assessments, ESG ratings may also be appropriate.

## Methodology

### Research Type

The quantitative method with Correlational study of ESG Risk Rating and the stock performance of the companies.

### Research Design

The research studies the relationship and the impact of ESG Risk rating on the performance of the portfolio. Also, the research analyses the relevance of Software & Service companies in the portfolio performance of the ESG Fund.

To carry out the research, the required data is the stock return of each company used in the portfolios and the ESG Risk Rating of all companies. For the construction of the portfolios, the study has used Markowitz's Modern Portfolio method, and to analyze the portfolio performance, the study has used the Sharpe Ratio.

The S&P 500 index is used as the benchmark for the portfolios.

The statistical tool used to do the research is Microsoft Excel and Microsoft Power BI.

### Markowitz's Modern Portfolio Theory

Investors are risk-averse and always wanted to construct a portfolio by minimizing the risk for a given expected return. Studying individual stocks' risk and return characteristics alone is not sufficient for an investor while considering a fund for investment. The risk and return characteristics of the portfolio have to be considered while creating a portfolio.

Markowitz Model introduced a concept called an efficient portfolio. An efficient portfolio is a portfolio in which the portfolio's return will be highest for a given portfolio risk. The set of efficient portfolios with the lowest risk level for a given expected return forms an efficient portfolio frontier. Any portfolio to the efficient portfolio frontier's rights suboptimal portfolios because the risk will be higher than the efficient portfolio for a given return.

The X-axis represents the expected return by considering the average annual return, and the Y-axis representing the risk using the standard deviation. The minimum variance portfolio is the portfolio with the least risk with the given securities in the portfolio.

$$R_p = \sum_{i=1}^n w_i r_i, \text{ Where } \sum_{i=1}^n w_i = 1 \quad (1)$$

$R_p$  = Return on Portfolio

$w$  = Weight of individual securities

$$\sigma_p^2 = [w_1 \quad \dots \quad w_n] \begin{bmatrix} \sigma_{11} & \dots & \sigma_{1n} \\ \vdots & & \vdots \\ \sigma_{n1} & \dots & \sigma_{nn} \end{bmatrix} \begin{bmatrix} w_1 \\ \vdots \\ w_n \end{bmatrix} = w' \Sigma w$$

**Figure 2: Portfolio Variance**

$r$  = Return of individual securities

$\sigma_p^2$  = Portfolio Variance

$w$  = vector of the weights of the  $n$  assets.

$w'$  = transpose vector of  $w$

### Best in Class Approach

ESG funds can be built mainly through three major approaches, namely Exclusionary, Single theme, and Best in class approach. This study uses Best in class approach. By considering Best in class approach, the company has to be only better than its competitors. Best in class approach does not exclude industry groups such as Oil and Gas industry or Aerospace & Defense, but rather invests in the companies that put more effort into meeting the environmental and social, and governance standards than their peers in the respective industries. This approach has been followed by BlackRock and many other investment management companies while making an ESG Fund.

Six major industry groups are considered for investment in the study. The industry groups chosen are Software and Service, Real Estate, Utilities, Diversified Financials, Pharmaceuticals, and Banks. Two different funds are constructed for investment. The first one is by considering the ESG Risk Rating provided by Sustainalytics (ESG rating agency), and the other fund does not consider the ESG factor for investment. The industry average of ESG Risk Rating is found by taking the average ESG Risk Rating of companies in the S&P 500 in the respective industry group. Companies with ESG Risk Rating below the industry average are considered for ESG fund. Two companies with ESG Risk Rating lower than the industry average from the chosen six industry group has been taken for an investment in a Fund made by considering ESG Risk Rating. For the fund constructed without considering the ESG factor, the companies with ESG Risk Rating higher

than the industry average have been considered for investment. Two companies have been selected from the chosen six industry groups.

### ESG Risk Rating

ESG Risk Rating information has been collected from Sustain analytics (a Morning star company). The ESG Risk Rating provided by Sustain analytics has been used as a single measurement unit to assess ESG Risk. The ESG Risk Rating does not follow Best in class approach, but instead, it provides a company’s absolute ESG risk. The ESG Risk Rating is comparable among peers.

The ESG Risk Rating is classified across five risk levels: negligible, low, medium, high, and severe. The rating scale is from 0-100, with 100 being the most severe.



**Figure 3: ESG Risk Rating**

### Sources of Data

- Sustain analytics (ESG Risk Rating of the Companies)
- Yahoo Finance (Stock Price of the Companies and the S&P 500 Index)
- U.S. Department of The Treasury (Risk-free rate of return)

### Results and Discussion

#### Industry Groups Selected

Given below are the six significant industries selected from the S&P 500 index. And most of the companies in the S&P 500 are from these six industries.

**Table 1: Industry Group**

Industrial Group	Industry Average of ESG Risk Rating	Number of companies
Software & Services	18.09767442	43
Real Estate	14.50666667	30
Utilities	31.69642857	28
Diversified Financials	20.88	25
Pharmaceuticals	23.9625	24
Banks	25.20555556	18

### Fund Constructed by Considering the ESG Risk Rating

Below is the list of companies from the chosen six industries with ESG Risk Rating below the industrial average of the S&P 500 companies. These twelve companies will constitute the ESG Fund.

**Table 2: Fund Constructed by Considering the ESG Risk Rating**

Industry Group	Companies	ESG Risk Rating
Software & Services	Microsoft Corp.	14.7
	Salesforce.com	11.2
Diversified Financials	Berkshire Hathaway	17.1
	Moody's Corp	12.2
Pharmaceuticals	Agilent Technologies Inc	16.6
	Perkin Elmer	20.7
Banks	JP Morgan Chase & Co.	24.8
	Huntington Bancshares	21.1
Real Estate	Prologis	9.7
	Welltower Inc.	11.5
Utilities	Exelon Corp.	24.1
	NextEra Energy	29

### Fund Constructed without Considering the ESG Risk Rating

Below is the list of companies from the chosen six industries with ESG Risk Rating above the industrial average of the S&P 500 companies.

**Table 3: Fund Constructed without Considering the ESG Risk Rating**

Industry Group	Companies	ESG Risk Rating
Software & Services	Facebook Inc.	31.4
	Twitter Inc.	24.8
Diversified Financials	BlackRock	22.9
	Charles Schwab Corporation	25.3
Pharmaceuticals	Pfizer Inc.	29.6
	Zoetis	24.3
Banks	Citigroup Inc.	26.3
	Bank of America Corp	26.3

Real Estate	American Tower Corp.	18.1
	Crown Castle International Corp.	18.4
Utilities	Duke Energy	33
	American Electric Power	34.4

**Fund Constructed by Considering the ESG Risk Rating with no Software and Service Companies**

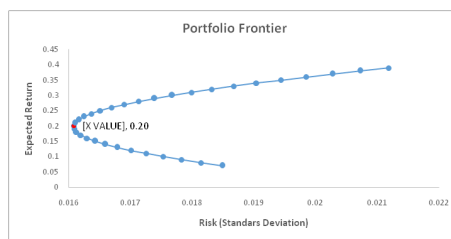
Below are the companies from the chosen five industries without companies from Software and Service Companies with ESG Risk Rating below the industrial average of the S&P 500 companies. This is done to check how the ESG fund will perform without the Software and Service companies.

**Table 4: Fund Constructed by Considering the ESG Risk Rating with no Software and Service Companies**

Industry Group	Companies	ESG Risk Rating
Diversified Financials	Berkshire Hathaway	17.1
	Moody's Corp	12.2
Pharmaceuticals	Agilent Technologies Inc	16.6
	PerkinElmer	20.7
Banks	JP Morgan Chase & Co.	24.8
	Huntington Bancshares	21.1
Real Estate	Prologis	9.7
	Welltower Inc.	11.5
Utilities	Exelon Corp.	24.1
	NextEra Energy	29

**Portfolio Performance before Covid-19 Pandemic**  
**Portfolio Frontier for Fund Constructed by Considering the ESG Risk Rating before Covid-19 Pandemic**

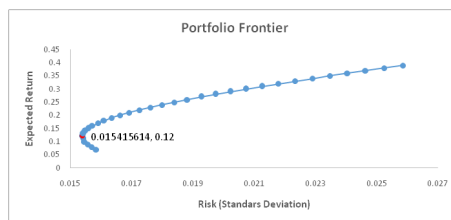
The Efficient Portfolio Frontier is constructed using Markowitz's Modern Portfolio Theory for the fund with low ESG Risk Rating companies before the Covid-19 pandemic. The Standard deviation and the return for the minimum variance portfolio are 0.016083939 and 0.20, respectively.



**Figure 4: Portfolio Frontier for Fund Constructed by Considering the ESG Risk Rating before Covid-19 Pandemic**

**Portfolio Frontier for Fund Constructed without Considering the ESG Risk Rating before Covid-19 Pandemic**

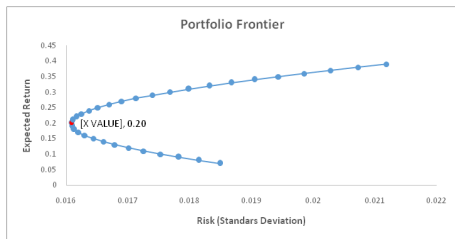
The Efficient Portfolio Frontier is constructed using Markowitz's Modern Portfolio Theory for the fund with high ESG Risk Rating companies before the Covid-19 pandemic. The Standard deviation and the return for the minimum variance portfolio are 0.015415614 and 0.12, respectively.



**Figure 5: Portfolio Frontier for Fund Constructed without Considering the ESG Risk Rating before Covid-19 Pandemic**

**Portfolio Frontier for Fund Constructed by Considering the ESG Risk Rating with no Software and Service Companies before Covid-19 Pandemic**

The Efficient Portfolio Frontier is constructed using Markowitz's Modern Portfolio Theory for the fund with low ESG Risk Rating companies before the Covid-19 pandemic. The Standard deviation and the return for the minimum variance portfolio are 0.016083939 and 0.20, respectively. This fund does not have Software and Service Companies, which is done to study the relevance of Software and Service companies before the Covid-19 pandemic.



**Figure 6: Portfolio Frontier for Fund Constructed by Considering the ESG Risk Rating with no Software and Service Companies**

**Sharpe Ratio for Minimum Variance Portfolio**  
**Table 5: Sharpe Ratio for Minimum Variance Portfolio**

Portfolios	Portfolio Return	Portfolio Standard Deviations	Sharpe Ratio
Fund constructed by considering the ESG Risk Rating	0.20	0.016083939	10.86799653
Fund constructed without considering the ESG Risk Rating	0.12	0.015415614	6.486929578
Fund constructed by considering the ESG Risk Rating with no Software and Service Companies	0.18	0.01616815	9.895999147
S&P 500 Index (Benchmark)	0.091719	0.020755283	3.455503136

The performance of the minimum variance portfolio is evaluated by using the Sharpe Ratio. S&P 500 Index is used as the benchmark and has the lowest Sharpe Ratio. The best performing fund is the Fund constructed by considering the ESG Risk Rating, which has the highest Sharpe ratio of 10.867 for its minimum variance portfolio. The Sharpe Ratio percentage difference of ESG fund from the S&P 500 Index is 104%.

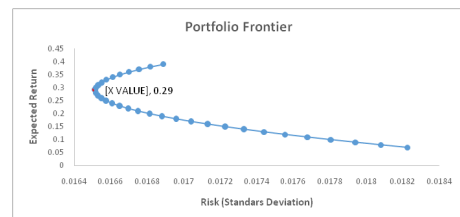
The performance of the fund constructed by considering the ESG Risk Rating with Software and Service company performed slightly better than the Fund constructed by considering the ESG Risk Rating with no Software and Service company with Sharpe Ratio 10.867 and 9.895 respectively. This shows that the Software and Service companies may influence the Sharpe Ratio of the ESG Fund, but the influence by the Software and Service companies is less significant.

Fund constructed without considering the ESG Risk Rating does not perform as well as fund constructed by considering the ESG Risk Rating. The Shape Ratio for the given funds is 6.48 and 10.86, respectively.

**Portfolio Performance During Covid-19 Pandemic**

**Portfolio Frontier for Fund Constructed by Considering the ESG Risk Rating during Covid-19 Pandemic**

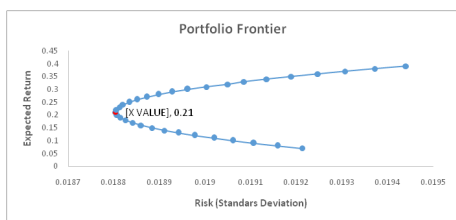
The Efficient Portfolio Frontier is constructed using Markowitz’s Modern Portfolio Theory for the fund with low ESG Risk Rating companies during the Covid-19 pandemic. The Standard deviation and the return for the minimum variance portfolio are 0.01651624 and 0.29, respectively.



**Figure 7: Portfolio Frontier for Fund Constructed by Considering the ESG Risk Rating during Covid-19 Pandemic**

**Portfolio Frontier for Fund Constructed without Considering the ESG Risk Rating during Covid-19 Pandemic**

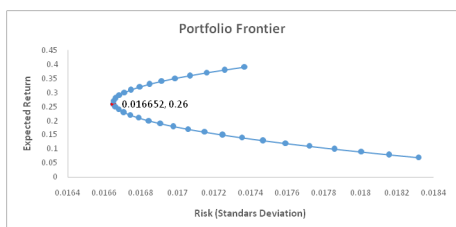
The Efficient Portfolio Frontier is constructed using Markowitz’s Modern Portfolio Theory for the fund with high ESG Risk Rating companies during the Covid-19 pandemic. The Standard deviation and the return for the minimum variance portfolio are 0.018804667 and 0.21, respectively.



**Figure 8: Portfolio Frontier for Fund Constructed without Considering the ESG Risk Rating during Covid-19 Pandemic**

**Portfolio Frontier for Fund Constructed by Considering the ESG Risk Rating with no Software and Service Companies during Covid-19 Pandemic**

The Efficient Portfolio Frontier is constructed using Markowitz’s Modern Portfolio Theory for the fund with low ESG Risk Rating companies during the Covid-19 pandemic. The Standard deviation and the return for the minimum variance portfolio are 0.016652 and 0.26, respectively. This fund does not have Software and Service Companies, which is done to study the relevance of Software and Service companies during the Covid-19 pandemic.



**Figure 9: Portfolio Frontier for Fund Constructed by Considering the ESG Risk Rating with no Software and Service Companies during Covid-19 Pandemic**

**Table 6: Sharpe Ratio for Minimum Variance Portfolio during Covid-19 pandemic**

Portfolios	Portfolio Return	Portfolio Standard Deviations	Sharpe Ratio
Fund constructed by considering the ESG Risk Rating	0.29	0.016516	17.0227
Fund constructed without considering the ESG Risk Rating	0.21	0.018805	10.69682

Fund constructed by considering the ESG Risk Rating with no Software and Service Companies	0.26	0.016652	15.08184
S&P 500 Index (Benchmark)	0.185945	0.022733	7.790296

The performance of the minimum variance portfolio is evaluated by using the Sharpe Ratio. S&P 500 Index is used as the benchmark and has the lowest Sharpe Ratio. The best performing fund during the Covid-19 pandemic is the fund constructed by considering the ESG Risk Rating, which has the highest Sharpe ratio of 17.0227 for its minimum variance portfolio.

The performance of the fund constructed by considering the ESG Risk Rating with Software and Service company during Covid-19 performed slightly better than the fund constructed by considering the ESG Risk Rating with no Software and Service company with Sharpe Ratio 17.022 and 15.081 respectively. This shows that the Software and Service companies may influence the Sharpe Ratio of the ESG Fund by the influence by the Software and Service companies are less significant.

Before the covid-19 pandemic, the percentage difference between the Sharpe Ratios of fund constructed by considering the ESG Risk Rating and fund constructed by considering the ESG Risk Rating with no Software and Service Companies is 9.40%. Still, during the Covid-19 pandemic, the percentage difference of Sharpe Ratio of both these funds is 12.09%. This shows that the relevance of Software and Service companies in fund performance during the Covid-19 pandemic has increased.

Fund constructed without considering the ESG Risk Rating does not perform as well as Fund constructed by considering the ESG Risk Rating. The Shape Ratio for the given funds is 10.696 and 17.022, respectively.

**Suggestions**

Even during crises, we could expect the risk involved in funds constructed by considering the ESG factor to be less than the funds constructed without considering the ESG factors. It is believed

that the inclusion of the ESG factor while investing will increase because of the accelerating climate change and the Covid-19 pandemic. This research could be further extended to private equity funds. The emerging private companies have a huge potential to grow, so we could expect that if the private equity fund managers consider ESG factors, they could benefit the environment and society to a greater extent compared to blue-chip companies with stable growth potential while investing.

### Conclusion

Socially responsible investing will benefit society and the environment and generate a better return for a given risk. The presence of software and service companies improved the performance of the overall fund during the Covid-19 pandemic. It is believed that the inclusion of the ESG factor while investing will increase because of the accelerating climate change and the Covid-19 pandemic. It is recommended for all the fund managers to bring in the element of ESG Risk Rating while investing to minimize the risk.

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