

The Influence of ESG Standard on Traditional Stock Index Calculation

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Abstract: A significant number of countries and regions have integrated ESG performance into the calculations of stock indices. There are differences in the performance of major stock indexes and ESG fields in different countries and regions, and whether the index reference ESG performance will be affected. This paper aims to explore the influence the impact of ESG standards on traditional stock indexes. The data of traditional stock index and the ESG stock index were collected from investing.com. Calculate the mean value, standard deviation and unit average rate of return, and then verify through the T-test that there is a significant difference between the average rate of return of the ESG group and that of the traditional stock index group. Finally, it can be concluded that the average rate of return of ESG data is not affected compared with that of the traditional stock index, the standard deviation of ESG data is smaller, that is, its rate of return is more stable, and ESG data has a higher unit risk rate of return, which can prove that its risk is lower.

Keywords: ESG, stock index, ESG investment

1. Introduction

Sustainable finance refers to the process of taking environmental, social and governance (ESG) considerations into account. Over the past few years, sustainable investments have been ascending. This upward trend is propelled by the burgeoning interest of younger generations and a heightened consciousness regarding relevant topics [1]. ESG is a widely accepted concept among enterprises and consumers alike. Many asset owners and consultants encourage us to explore and, if suitable, incorporate ESG factors into our investment portfolios. Consequently, the investment industry at large has, to different extents, widely embraced ESG concepts [2]. The S&P 500 is a stock market index compiled by Standard & Poor's, which can comprehensively reflect the overall performance of the U.S. stock market. It also incorporates ESG standards into data calculations. This index consists of a meticulously selected set of companies. These companies not only meet certain environmental, social, and governance requirements but also serve as representatives of the wider U.S. stock market. You can view it as a more mindful counterpart to the well-known S&P 500 Components Performance index, with an emphasis on sustainable development and ethical business operations [3]. Similarly, traditional stock indexes in other countries also incorporate ESG criteria into their calculations. By comparing the stock index and ESG index of listed companies in the United States, Britain, Japan and China, this paper analyzes their average return rate, standard deviation of average return rate and unit risk return rate. This study can demonstrate the impact of ESG standards on the return, stability and

risk of corporate stock indexes, so as to develop or resist ESG standards to promote corporate profits and sustainable development.

2. Literature Review

2.1. ESG Standard

The "E" aspect within ESG is centered around ecological implications [4]. This includes aspects like climate change, the conservation of the environment and biodiversity, the utilization of water resources, energy consumption patterns, the procurement and use of raw materials, pollutant emissions, environmental resilience, green business operations, and environmental-related outlooks. For the "S" factor in ESG, it is related to fair and compliant employment methods, the growth and development of employees, workplace safety and well-being, community development, land rights and indigenous issues, the preservation of cultural heritage, information security and privacy protection, development and training programs, as well as research and development and innovation. The "G" dimension of ESG comprises ethical norms and behaviors, stakeholder involvement, sustainable development strategies, industry evolution, supply chain management, customer-related obligations, risk management, performance-based pay mechanisms, accounting policies, and measures against unfair competition [5]. When it comes to ESG practices, both investors and consumers are more inclined to choose companies that strictly adhere to ESG standards. ESG standards have a positive impact on promoting corporate performance. It is thought that implementing strict ESG standards can help improve the ESG performance level of enterprises [6]. This view emphasizes the vital strategic importance of ESG standards in driving business success. In the long term, this can bring about various benefits, such as an enhanced brand image, reduced financial risks, and increased investor confidence, further validating the positive relationship between ESG standards and long-term corporate advantages. Since investors and consumers are becoming more environmentally and socially conscious, strict compliance with high-quality ESG standards can act as a competitive advantage, improving a company's reputation and strengthening its market position. Steblianskaia et al. proved that the ESG concept has a positive effect on corporate performance indicators and related costs [7].

2.2. Research on ESG Stock Index Calculation

The stock market exhibits the simultaneous presence of high-risk and high-return features. Given that the stock index serves as a barometer of the stock market, it functions as a crucial reference for investors when formulating their investment strategies [8]. Stock indexes can be affected by many factors, such as the economic situation, policy changes and emergencies. The general steps of ESG stock index calculation are as follows: select a benchmark index. For example, some international ESG indexes take the MSCI Global Investable Market Indexes (GIMI) of MSCI Inc. as the initial reference. Conduct negative screening. Exclude companies that do not meet the requirements according to the company's business fields, controversial topics and other criteria. For instance, the MSCI ESG Leading Index excludes companies in the arms and tobacco industries. Carry out ESG scoring, rating and re-screening. For example, MSCI selects key issues from specific major categories, themes and issues; uses a point-deduction system to evaluate risks and opportunities; divides them into seven grades according to the industry; and selects companies with a rating above BB and a controversy score above 3 points. Weight the constituent stocks. Determine the weighting rules according to the design purpose of the index, geographical distribution, etc. Commonly used methods include weighting by market value and equal weighting. Regularly maintain, update and correct the index. Make dynamic adjustments according to market changes and the ESG performance of companies to ensure that it can accurately reflect the performance of ESG-related stocks.

2.3. ESG Investment

ESG investment is an approach where environmental, social, and corporate governance elements are integrated into the process of making investment choices. By doing so, it has the potential to manage investment risks more effectively and offer advantages to investors [9]. This means that consumers will take less investment risk to make environmentally friendly investments. Adaptive investment strategies should conform to the evolving ESG standards and investors' preferences [10]. This reflects the importance of ESG standards in investment decision-making. As the global focus on sustainability continues to grow, ESG investment is no longer a niche concept. It has the power to reshape entire industries. For instance, companies with high ESG ratings often enjoy more stable operations. They're less likely to face disruptions from environmental disasters due to their eco-friendly practices, and they tend to have more loyal employees because of their strong social policies. Investors are increasingly drawn to these stable, ESG-compliant companies. This, in turn, encourages more businesses to adopt ESG practices. In the future, we can expect ESG investment to become even more mainstream, with more financial products specifically tailored to meet the ESG-driven needs of investors. Regulatory bodies are also likely to play a bigger role, setting more standardized ESG criteria that will further streamline the investment process.

3. Research Methodology

3.1. Samples Selection

On a monthly basis, the S&P 500 and the ESG standard S&P 500 stock indexes from February 2015 to February 2025. On a monthly basis, the FTSE 100 index and the FTSE 100 index under the ESG standard run from April 2021 to February 2025. On a weekly basis, the Nikkei 225 stock index and the Nikkei 225 Stock index are under the ESG standard from June 23, 2024 to February 2, 2025. On a monthly basis, the SCI300 index and the SCI300 index under the ESG standard run from January 2022 to February 2025. The closing price and percentage change rate of the above data are collected.

3.2. Data Collection Methods

The mean value of the percentage change in the above data is calculated, and the difference in return rate between the traditional stock index and the ESG stock index can be known by comparing the mean value. By calculating the standard deviation of the mean percentage change in the above data, we can know the stability of the unit return of the traditional stock index and the ESG stock index by comparing. The rate of return per unit of risk is obtained by dividing the rate of return per unit of data by the standard difference (Table 1).

Table 1: Data calculation of traditional stock index and ESG stock index

	S&P 500	ESG	FTSE 100	ESG	Nikkei 225	ESG	SCI 300	ESG
Average Return	0.010236	0.0105 98	0.00386383	0.005740426	-0.000193939	-0.000690909	0.001744747	-0.002684211
Standard Deviation	0.044546	0.0443 18	0.031258706	0.028713174	0.013959404	0.013495586	0.09550188	0.051624698
Return Per Unit Risk	0.229784	0.2391 35	0.123608124	0.199923074	-0.051195183	-0.013893072	0.018269242	-0.051994706

As the currency units of statistical data are different, the relevant data of SNP500, FTSE100 and SCI300 are selected. Due to the different amount of available historical data, the time span from March to December 2024 is selected. Specific data may vary due to currency value conversion, but the trend of the stock index will not be affected, so only focus on the trend (Figure 1 & Figure 2).

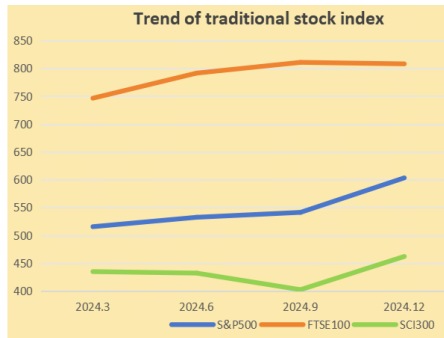


Figure 1: Trend of traditional stock index

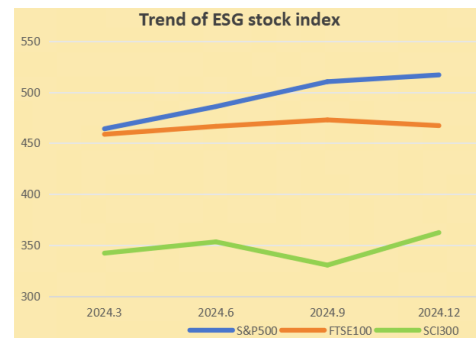


Figure 2: Trend of EsG stock index

3.3. Hypothesis Testing

Set H0: The average return of the ESG group is equal to the average return of the traditional stock index group. H1: The average return of ESG group is significantly different from that of traditional stock index group. Next, T-test is used to calculate.

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} \quad (1)$$

After calculating, $p=0.047$, $0.047 < 0.05$, so the null hypothesis H0 is not valid. And H1 is valid.

4. Result

4.1. Analysis Results of Calculated Data

Through the above data analysis and comparison, in certain nations, the average yield of ESG stock indexes exceeds that of traditional stock indexes. However, in other countries, the average return of ESG stock indexes falls short compared to that of conventional stock indexes. This disparity in performance highlights the complexity of ESG-related investments. The outperformance in some regions could be attributed to factors like a more proactive approach towards sustainable development, with companies in those areas better integrating ESG principles into their business models. On the contrary, in places where ESG stock indexes underperform, it might be due to a slower adoption of ESG practices or a lack of understanding among market participants. At the same time, through the hypothesis test, it can be seen that the traditional stock index is not affected by the inclusion of ESG standards. Then, by comparing the standard deviation of the return rate, it is found that the standard deviation of ESG data is smaller; that is, the degree of dispersion of its data is lower, which can prove that its return rate is more stable. By comparing the rate of return per unit risk, we can find that ESG data has a higher rate of return per unit risk, which can be regarded as a better risk-adjusted return performance, which can indicate that the risk is relatively small to a certain extent.

4.2. Analysis Results of Line Chart Data

By comparing the above chart, the trend of the S&P 500 curve is to rise slowly and then rise quickly, while the trend of its ESG index is to rise quickly and then rise slowly. The trend of the FTSE100 is the first fast rise and then a slow rise and finally a small decline; its ESG index is the first slow rise and then a small decline. The traditional stock index trend of SCI300 is to start with a small decline and then a rapid decline and then a rapid rise, while its ESG stock index curve is to start with a slow rise and then a sharp rise. We can find that there is no strong correlation between the trend of the traditional stock index and the trend of the ESG stock index; that is, there is no positive or negative correlation.

5. Conclusion

This paper explores the influence of ESG standards on traditional stock index calculation. By collecting the traditional stock index and ESG stock index data of the United States, the United Kingdom, Japan and China, the mean, standard deviation and unit risk-return rate are calculated, and a T-test is conducted. The results show that the average return rate of the ESG stock index in some countries is higher than that of the traditional stock index in some countries, but the traditional stock index is not affected by the inclusion of the ESG standard. At the same time, the standard deviation of ESG data is smaller, the rate of return is more stable, the rate of return per unit risk is higher, and the risk is relatively small. Moreover, there is no obvious correlation between the trend of traditional stock index and the ESG stock index. The conclusion shows that the ESG standard has a certain effect on the return, stability and risk of the stock index. However, the sample selection time span in this paper is limited, which may not fully reflect the long-term trend; in addition, only the stock index data of four countries are selected, and the sample range is narrow and the representative is insufficient. In future studies, the sample scope can be expanded to cover more countries and longer time span data, and the impact of ESG standards on stock indexes can be further studied by industry classification, so as to reveal the relationship between ESG standards and traditional stock indexes more comprehensively.

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