

The Impact of Green Stock Indices and ESG Considerations on Sustainable Finance—A Study of Chinese Green Indices

Xiaofang Huang^{1,a,*}

¹Manulife Fund Management, Shanghai, 200120, China

^acicih168@163.com

*Corresponding author

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Abstract: This research investigates the impact of green stock indices and ESG factors on financial markets, investment strategies, and corporate behavior. Using various research methods, it compares the Huazheng ESG Leading Index to the CSI 300 Index and finds that the former exhibits a higher long-term return rate. The study highlights the growing importance of sustainable finance and green stock indices, emphasizing the need for their development and transparency to support a more environmentally responsible economy. It also addresses the emergence of green indices in China and suggests policy recommendations to promote their growth, particularly in heavily polluting industries and institutional investments.

1. Introduction

In recent years, the Chinese economy has entered a new phase characterized by medium to high growth and a pivotal period of economic structural transformation. The creation of a distinctive Green Finance Index, tailored to the Chinese context, carries significant implications for advancing the green economy through the furtherance of green finance development.

The Green Stock Index serves as a crucial tool for fostering green finance. Drawing from international experience, the Green Stock Index assumes a pivotal role in encouraging publicly listed companies to disclose environmental data, guiding social capital towards the sphere of environmental protection, and ensuring the stability of capital market operations. However, in comparison to the global community, the formulation and evolution of China's Green Stock Index are still in their nascent stages, beset by numerous technical and managerial challenges related to index creation and investment product development. Its capacity to stimulate green growth and fortify pollution prevention through asset pricing and fund allocation remains under-realized.

After years of investigation and practical application, China's current Green Stock Index system predominantly falls into three categories: Sustainable Development Index, Environmental Protection Industry Index, and Green Environment Index. Within these categories, the Sustainable Development Index can be further subdivided into three distinct segments, including the ESG Index,

Corporate Governance Index, and Social Responsibility Index. The Environmental Protection Industry Index, on the other hand, is categorized into three subgroups, encompassing the Environmental Protection Industry Index, Environmental Governance Index, and New Energy Index. Notably, the predominant share of China's extant Green Stock Indices is issued by the China Securities Index Company. As of the year 2023, CSI Index Co., Ltd. has unveiled a total of 49 Green Stock Indices, comprising five Sustainable Development Indices and 44 ESG Indices.

2. Literature review

Green finance and sustainable investment have become important topics in the global financial field, attracting widespread attention from academia and the industry. The Green Stock Index, as a tool to promote the integration of environmental protection, social responsibility, and governance (ESG) factors into investment decisions, has attracted the attention of researchers in China's domestic capital market. The study (Zhang Han, 2023) focused on the release of the CSI 300 Green Leading Stock Index, using the event study method as a tool to analyze the impact of index release on the stock prices of sample companies^[1]. The research results indicate that companies included in the green stock index have garnered positive market reactions. Moreover, the release of the green stock index has had a favorable impact on the market.

The news report (Xie Yiyuan, 2021) emphasizes the importance of establishing a green stock index to guide capital to support sustainable development of the green economy^[2]. The article emphasizes the concept and significance of the green stock index, pointing out that it is an effective tool that can encourage enterprises to focus on environmental protection and sustainable development. The study (Tang Chun, 2021) focused on the effect of green index release on stock prices and analyzed the market response after the release of the green index through event study methods. Research has found that index releases have a positive effect on the stock prices of related companies, further confirming the market influence of green investment factors^[3]. Research (Liu Jiaxue, 2020) focused on the design of equity fund products based on ESG integration strategy. The study provides a method that helps investors implement sustainable investment strategies by exploring how ESG factors affect the construction of investment portfolios^[4]. The study (Xiaofang Huang, 2023) explores the application of green finance in the fund industry, and identifies that green funds have become a crucial vehicle for China to engage in global green finance collaborations^[5]. The study (Huitao, 2021) focuses on the feasibility of green ETF investment based on risk adjusted return evaluation. The research results show that green ETFs may have higher risk adjusted returns in the long term, which provides more attractiveness for green investment^[6]. This indicates that ETFs, as a green investment tool, have potential development prospects in the field of sustainable finance.

This article (Yu Ting, 2018) provides an analysis of the current situation of China's green stock index and proposes development suggestions. The article emphasizes the development potential of the green stock index, while also emphasizing the need to strengthen the transparency of relevant data and index construction^[7]. This article (Zhu Yijie, 2018) studies the development of China's green stock index and proposes relevant considerations. The author believes that China should increase the development and promotion of the green stock index to support the development of the green economy^[8].

In summary, it can be concluded that the development and application of the green stock index in China's domestic capital market is of great significance. The Green Stock Index helps guide capital to support the development of a green economy, while also providing effective tools to promote sustainable finance and environmental investment. These studies provide important insights for a better understanding of the relationship between green stock indices and sustainable finance.

3. Research on the Development of China's Green Stock Index

3.1 The Current Development Status of Green Stock Index

As the global climate change crisis intensifies, the Chinese government has proactively championed sustainable development and environmental protection, integrating green finance into the national development strategy. The green stock index, which reflects companies committed to sustainability and environmental responsibility, has assumed an increasingly pivotal role within the Chinese stock market. Typically, the China Green Stock Index encompasses industries associated with sustainable development, including environmental protection, clean energy, renewable energy, and low-carbon technologies. Constituents of the index undergo a rigorous selection process and are required to meet a comprehensive set of environmental and social responsibility standards. These standards may encompass emission reduction targets, energy efficiency, green technology innovation, and social responsibility, among others. Table 1 displays a portion of the Green Stock Index issued by China from 2008 to 2023.

In terms of historical context, China unveiled its maiden green stock index, the SSE Corporate Governance Index, in 2008. Simultaneously, it introduced the SSE 180 Corporate Governance Index, the SSE Social Responsibility Index, and the CSI ESG Sustainability 40 Index, all of which fall under the sustainability index category.

In January 2018, China introduced the CSI 300 Green Leading Stock Index, which calculates a company's green leadership score based on evaluations of the environmental impact of its production and service processes, green revenue, negative news, and environmental penalties. The top 100 scoring stocks are selected for inclusion. This index represents China's inaugural green index constructed with a multi-dimensional approach, taking into account factors such as the green supply chain, environmental impact variables, green revenue, and environmental risks. It has emerged as the benchmark index for green stocks in the domestic market.

Table 1: Green Stock Index Issuance in China.

Index Code	Index Full Name	Index Abbreviation	Release Time	Number of Samples
000019	SSE Corporate Governance Index	Governance Index	2008-01-02	300
000021	SSE 180 Corporate Governance Index	180 Governance	2008-09-10	100
000048	SSE Social Responsibility Index	Responsibility Index	2009-08-05	100
000970	CSI ECPI ESG Sustainability 40 Index	ESG 40	2010-09-17	40
950081	SSE 180 Carbon Efficiency Index	180 Carbon Effect	2015-10-08	177
931037	CSI 300 Green Leading Stock Index	Green Lead	2018-01-04	100
931088	CSI 180 ESG Index	180 ESG	2018-12-10	143
931890	CSI Lithium Battery Theme Index	Lithium Battery	2022-07-08	40
950238	SSE Photovoltaic Industry Index	SSE Photovoltaic	2022-10-11	30
932223	CSI Yangtze River Delta Green Industry 50 Index	Yangtze River Delta Green 50	2023-10-25	50

3.2 The Significance of Green Stock Index Research

The Green Stock Index serves as a market benchmark designed to assess and monitor the performance of publicly traded companies that excel in various environmental, social, and governance (ESG) criteria. These indices categorize companies primarily based on their methodologies of construction and the ESG factors they take into account. Such indices place a significant emphasis on environmental considerations, which encompass metrics like carbon emissions, resource efficiency, and waste management. The objective is to identify enterprises exhibiting exceptional environmental stewardship. In doing so, these indices enable investors to concentrate on companies operating in the realm of environmental sustainability.

Additionally, these indices evaluate a company's commitment to social responsibility, assessing dimensions such as employee relations, community engagement, and product safety. By doing so, they aid investors in selecting companies that demonstrate a strong commitment to social responsibility.

Another focal point is the governance index, which scrutinizes corporate governance aspects like structural integrity, transparency, and the quality of the board of directors. These governance indices assist in pinpointing companies that exhibit robust governance practices.

Ultimately, these indices provide a holistic evaluation of environmental, social, and governance factors, with the aim of providing a comprehensive assessment of a company's overall ESG performance. In this way, they offer investors a wealth of ESG-related information, facilitating the development of well-balanced investment portfolios.

The scale of green stock issuance is steadily on the rise, accompanied by a proliferation of green bonds and equity financing projects^[9]. This trend offers an expanded array of opportunities for sustainable investments.

3.3 Classification and Construction of Green Stock Index

In accordance with the Green Stock Index classification, green stocks can be categorized into distinct groups, each with a unique emphasis on various ESG factors. This categorization aids investors in gaining a deeper understanding of the diverse landscape within the green stock market.

Environmental-Oriented Green Stocks: These stocks predominantly respond to environmental indicators, with a specific focus on factors like carbon emissions, energy efficiency, and waste management. Companies in the food and beverage sector, such as Kweichow Moutai and Wuliangye, may fall under this category.

Socially Responsible Green Stocks: These stocks garner attention from the Social Responsibility Index, prioritizing elements such as employee relations, community engagement, and product safety. Included within this category might be pharmaceutical companies like Hengrui Pharmaceutical and Mindray Medical.

Governance-Centric Green Stocks: The performance of these stocks is influenced by the governance index, highlighting aspects like corporate governance structure, board quality, and transparency. Bank stocks such as China Merchants Bank and Industrial Bank could be categorized in this group.

Comprehensive ESG Green Stocks: These stocks exhibit strong performance across multiple ESG facets, considering environmental, social, and governance factors holistically. Companies like Ping An in China, Ningde Era, and others may find their place in this comprehensive ESG category.

The creation of a holistic ESG index can furnish investors with a broad spectrum of investment opportunities. Nonetheless, it is equally essential to incorporate specific environmental, social responsibility, and governance indicators to cater to more specialized investor demands. Maintaining transparency in index construction is pivotal, enabling investors to have a lucid

comprehension of the index's composition and the allocation of weight to its constituents. Such transparency fosters increased investor confidence in the index.

Furthermore, regular updates must be instituted to ensure the reflection of shifts in companies' ESG performance. Over time, a company's ESG performance may undergo alterations, necessitating that index construction remains adaptive to these changes. To ensure comprehensive market coverage, it is imperative to encompass various industries within the index, thereby affording investors the ability to identify green investment opportunities across multiple sectors.

4. Empirical Analysis

In recent years, environmental, social, and governance (ESG) factors have gained increasing significance within the realm of investments. In response to this trend, the domestic capital market has taken proactive measures by introducing a series of green stock indices, among which the Huazheng ESG Leading Index (999102.SSI) stands as a prominent example. This index, representative of domestic green stock indices, is characterized by its unique features and compilation principles. It is dedicated to the selection of companies that exhibit elevated ESG levels, strong financial quality attributes, and reduced volatility characteristics, thereby mitigating tail risk and effectively reflecting the overall performance of leading ESG companies across the entire market.

Sample Selection: The index undertakes a meticulous process of sample selection, drawing from the entire stock market. It mandates that chosen companies possess a combination of high ESG standards, robust financial quality characteristics, and a propensity for low volatility. The intent behind this criteria is to sift out companies that excel in various dimensions, taking into account the environmental, social, and governance facets.

Exclusion Criteria: In the realm of A-share listed companies, businesses rated below BB on the ESG comprehensive scale are subject to exclusion. This criterion serves to eliminate companies with subpar ESG performance, thereby diminishing the tail risk associated with the investment portfolio.

Considering ESG risk: The Huazheng ESG Leading Index also takes into consideration the ESG risk associated with individual stocks. In the event that any one of a company's ESG indicators exhibits significant tail risk, that particular company is also omitted from the index. This added step further safeguards the comprehensive ESG performance of component companies within the index.

When comparing the trends of the Huazheng ESG Leading Index (999102.SSI) and the CSI 300 Index, several noteworthy distinctions in their recent performance become apparent. The Huazheng ESG Leading Index exhibits a more stringent approach in sample selection, with a primary focus on ESG factors and financial quality while also excluding tail risk, thereby implying that its performance may be influenced by these strategic considerations. In contrast, the CSI 300 Index encompasses a broader spectrum of stocks, representing a more comprehensive cross-section of the entire market.

Analyzing the trajectories of these two indices can provide investors with valuable insights into the role of ESG factors in investment decisions. It becomes pertinent to investigate whether an ESG-centric investment strategy can outperform the market and how it fares in various market environments, raising questions of considerable significance.

The introduction of the Huazheng ESG Leading Index underscores the significance attributed by the Chinese capital market to ESG factors and the pursuit of high-quality, low tail risk investment opportunities. In comparison to the CSI 300 Index, this index's trends may manifest significant disparities across multiple dimensions, warranting thorough and in-depth research and analysis. Such endeavors will facilitate a more comprehensive understanding of the performance of an ESG-

focused investment strategy and its potential impact on an overall investment portfolio. The main constituent stocks and weights of the Huazheng ESG Leading Index are shown in Table 2.

Table 2: Main constituent stocks and weights of Huazheng ESG Leading Index.

Code	Abbreviation	Weights (%)	Total Market Capitalization(billion)	Industry
600519.SH	Kweichow Moutai	9.622	2168	Food and Drink
601318.SH	Ping An of China	4.555	868	Non-bank Finance
300750.SZ	Ningde era	4.342	815	Electric Power Equipment and New Energy
600036.SH	China Merchants Bank	3.573	820	Bank
000858.SZ	Wuliangye	2.591	584	Food and Drink
000333.SZ	Midea Group	2.438	392	Home Appliances
601166.SH	Industrial Bank	2.393	337	Bank

The industry distribution of the Huazheng ESG Leading Index is shown in Figure 1. The industries with a relatively large proportion in the Huazheng ESG Index are food and beverages, banking, non-banking financial services, power equipment and new energy.

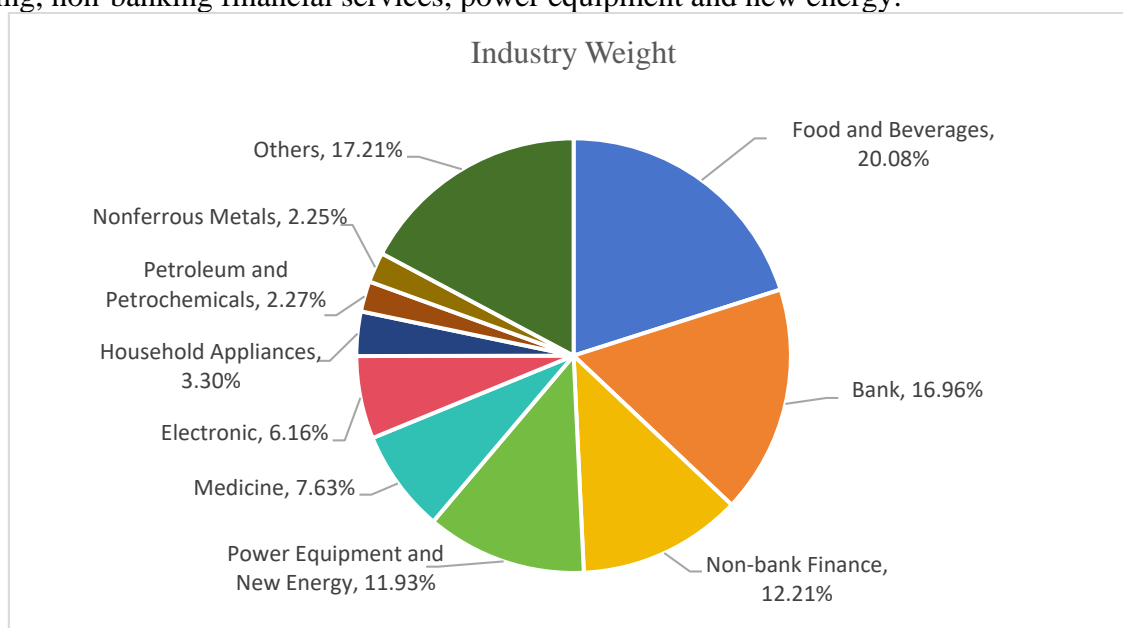


Figure 1: The industry distribution of Huazheng ESG Leading Index.

The Barra style factor exposure of the Huazheng ESG Leading Index and the CSI 300 Index is shown in Figure 2. Compared with the CSI 300, the Huazheng ESG Leading Index has smaller exposure to large market value factors, non-linear market value factors, growth factors, leverage factors, and liquidity factors, while it has greater exposure to momentum factors and reversal factors.

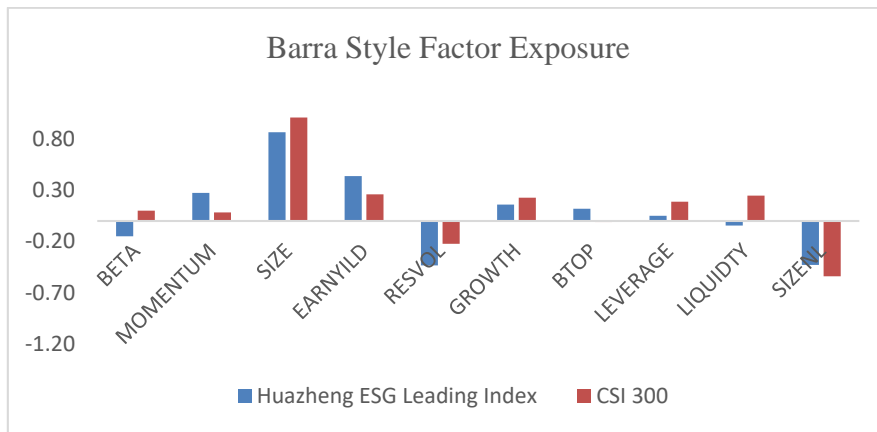


Figure 2: Barra style factor of the Huazheng ESG Leading Index and CSI 300 Index.

In this study, we undertake a comparative analysis of the returns exhibited by the Huazheng ESG Leading Index and the CSI 300 Index. Data for this analysis was collected for the period spanning from January 1, 2020, to September 30, 2023. Since 2020, the Huazheng ESG Leading Index has exhibited a cumulative yield of -1.79%, while the CSI 300 Index has recorded a cumulative yield of -11.14%. It is evident that the Huazheng ESG Leading Index has outperformed the CSI 300 Index. This outperformance is further illustrated in Figure 3, where the cumulative yield of the Huazheng ESG Leading Index surpasses that of the CSI 300 Index significantly.

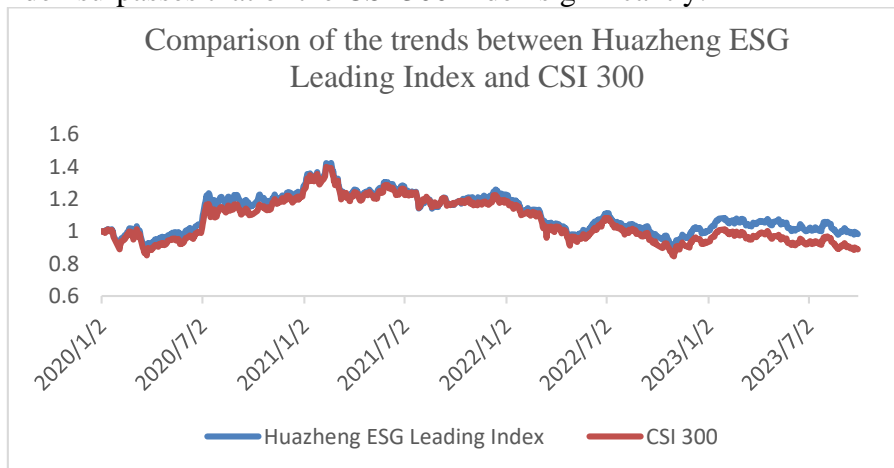


Figure 3: Comparison of the trends between Huazheng ESG Leading Index and CSI 300.

5. Conclusions

This article explores the current trends in green investments within China's domestic capital market, alongside an examination of the features and construction principles of the Huazheng ESG Leading Index (999102.SSI). We have conducted a comprehensive analysis of sample selection, exclusion criteria, and ESG risk considerations for the index, with a particular emphasis on its objective of mitigating tail risks for individual stocks and portfolios, all while reflecting the overall performance of leading ESG companies across the entire market. Furthermore, we have conducted a comparative analysis of the trends in the Huazheng ESG Leading Index and the CSI 300 Index to delve into the role of ESG factors in investment.

Although the performance of the Huazheng ESG Leading Index may not match that of the CSI 300 Index in certain time periods, it may excel over the long term. ESG factors not only assess a company's sustainability but also help in reducing investment portfolio risks. Global research

indicates that ESG indices typically outperform their respective market benchmark indices over the medium to long term, establishing a robust theoretical foundation for ESG investment strategies. Furthermore, ESG investments can be aligned with China's domestic policies and developmental goals. China actively promotes green development in its domestic and foreign policies, advocates ecological civilization, and encourages enterprises to shoulder more social responsibilities. Hence, ESG investments not only help meet international standards but also support China's sustainable development strategy, expedite industrial structure upgrading, and foster green production.

The study of the Huazheng ESG Leading Index and the advancement of green ETFs bear significant importance. Green ETFs, as vehicles for participating in green investments, usually exhibit lower tracking errors due to their ability to closely follow underlying indices. The validation of the investment viability of green ETFs signifies that green investments are highly attractive in the Chinese capital market, with a substantial positive impact on propelling the growth of China's green funds, enhancing green investment practices, and bolstering economic transformation. Consequently, further research and verification of green ETFs are imperative.

The prominence of green investments and ESG factors is on the rise within China's domestic capital market. The Huazheng ESG Leading Index, representing a Green Stock Index, offers investors an investment approach that reduces risks while pursuing comprehensive performance through its unique features and compilation rules. In comparison to traditional market indices, ESG investment strategies are likely to exhibit stronger long-term performance and also align with China's domestic policy direction. Hence, further research and development in this field will play a crucial role in advancing green finance and sustainable investment, ultimately making significant contributions to China's economic development and environmental protection.

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