

Research on Corporate Financial Strategy Based on ESG: A Case Study of LONGi Green Energy

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Abstract. Under the background of the 'dual carbon' goal, Environmental, Social, and Governance (ESG) is evolving from an external constraint on enterprises into a core element driving the reconstruction of financial strategy. This research relies on a single-case longitudinal analysis of LONGi Green Energy (2019-2023) to study the reshaping of financing, investment, and operations by ESG. The results indicate that ESG integration leads to decreased debt and equity cost through signaling processes, stimulates vertical value chain integration and green business incubation and increases asset turnover and ROE through supply chain traceability. This study theoretically expands the application boundaries of Signaling theory in the field of sustainable finance and empirically demonstrates the substantial impact of non-financial information on corporate financing decisions; in practice, it provides practical and feasible path references for heavy asset manufacturing enterprises to embed ESG concepts into financial strategies and achieve synergy between value creation and sustainable development.

Keywords: ESG, Financial Strategy, Green Bonds, Signaling Theory and LONGi Green Energy

1. Introduction

With the increasing intensity of the global sustainability agenda, ESG is becoming more than a peripheral ethical issue to a fundamental strategic aspect. Enterprises incorporate carbon, social responsibility and governance in financial decision-making under the objectives of the "duo carbon" in China. Nevertheless, the current literature is highly reflective in recording the correlations among ESG and financial performance, and there are notable gaps in the literature to comprehend how ESG alters financial strategic course in the Chinese settings.

The study investigates the effect of ESG performance on corporate financial strategy and long-term performance through the Signaling and resource-allocation mechanisms. Drawing on yearly reports, ESG reports, green bond prospectuses, and MSCI ratings, the study follow funding models, investment patterns, and efficiency in operations with major ESG milestones in the years 2021 and 2022 to determine funding instruments, investment idealism, and operational effectiveness.

Theoretically, this study builds up the Signaling theory by demonstrating how ESG alleviates information asymmetry and capital costs maximization. In practice, it provides avenues to heavy-asset producers to maximize capital structure by leveraging the green bonds, using supply chain

environmental scanning audit to reduce risks of disruption, and utilizing green electricity to speed up the turnover of its assets, and assist investors in evaluating ESG rating changes in the new energy industry.

2. Literature review

2.1. Core theory

The sustainable development theory offers a value goal framework that enterprises could incorporate the ESG in their financial decisions by focusing on the balance of the triple bottom line of economy, environment and society, and demanding financial strategies to change not just their focus on value extraction, but on value co-creation by many parties. The stakeholder theory further expands the boundaries of financial decision-making, pointing out that multiple subjects, such as shareholders, creditors, communities, and the natural environment, all have implicit contracts with enterprises. Financial strategies need to internalize the non-financial demands of these subjects into quantifiable cost and risk functions [1]. The signal transmission theory explains the financial transmission mechanism of ESG investment: In an information-asymmetric capital market, ESG performance, as a non-financial signal that is difficult to imitate, can convey reliable information about the long-term cash flow stability and risk management capabilities of enterprises to external investors, thereby reducing capital costs [2, 3].

The three are not mutually substitutable but form a complementary logic of "goal - constraint - mechanism": The theory of sustainable development answers the value-oriented question of "why to transform" and sets a long-term goal function for financial strategy. Stakeholder theory identifies the subject boundaries of "to whom to be accountable", transforming supply chain, community and environmental risks into hard constraints for financial decisions. The signal transduction theory reveals the micro-mechanism of "how to reduce costs" and clarifies the transmission path of ESG investment in optimizing financing conditions by alleviating information asymmetry. In this study, the sustainable development theory serves as the overall framework for analyzing Longi Green Energy's "zero-carbon strategy", the stakeholder theory is used to explain its financial decision-making logic in response to supply chain due diligence and community relations, and the signal transmission theory provides a theoretical basis for reducing the financing cost of green bonds and increasing holdings by northbound funds.

2.2. The relationship between ESG and financial performance

A meta-analysis of over 2,000 empirical studies shows that approximately 90% of ESG is not negatively correlated with financial performance, but there is significant industry and regional heterogeneity [4]. Through an 18-year tracking of highly sustainable enterprises in the United States and matching samples, it was found that highly sustainable enterprises demonstrated better accounting performance and market valuation in the long term. However, based on international panel data, it is pointed out that there may be an inverted U-shaped relationship between ESG and Tobin's Q [5]. Excessive investment will lead to an increase in agency costs and resource misallocation.

In recent years, research on the Chinese context and data from emerging markets has further enriched this topic. The review indicates that the financial substance of ESG performance is more pronounced in countries undergoing institutional transformation and in heavily polluting industries [6, 7]. It has been found that carbon emission risks have been priced in China's A-share market, and

high-carbon enterprises are facing higher equity financing costs. In terms of domestic research, data from A-share listed companies in China have confirmed that improved ESG performance can significantly reduce corporate debt and equity financing costs by lowering information asymmetry and default risks [8, 9]. It was found that the issuance of green bonds not only reduces the carbon emission intensity of enterprises themselves but also enhances their value through market signal effects. The above-mentioned research indicates that the relationship between ESG and financial performance has a unique transmission path in the context of the rapid development of green finance in China, and it is urgent to combine longitudinal cases to reveal its dynamic mechanism of action.

2.3. ESG and financial strategy dimensions

ESG reshapes corporate financing through Signaling and risk pricing. In debt markets, green certification lowers bond yields by 5–10 basis points [10, 11]. Green bonds can improve the value of firms in China through certification effects and carbon reduction effects through green bonds, and lower the cost of financing through the decrease of information asymmetry and risks of default [8, 9]. Since the risks associated with carbon emissions are priced in domestic markets [7]. ESG will optimize capital cost directly through green bonds, and indirectly by boosting ratings, creating a type of chain effect of ESG rating, Signaling, and cost reduction.

Capital allocation is also redefined by ESG. Companies that have greater ESG effectiveness demonstrate greater efficiency in investments by investing more in long-term R&D and clean production rather than in short-term expansion [12]. To manage the environmental and social risks, the stakeholder theory implies integrating them into investment appraisal, screening high-pollution projects, while the sustainable development theory is investing in green development: hydrogen and BIPV are the long-term developmental growth opportunities. Green investment increases short-term capex but would generate long-term value through evading regulatory fines and enhancing asset turnover [6]. Therefore, ESG adds value to capital allocation by correcting it through the process of green correction and not merely adding costs.

ESG integration optimizes working capital through the greening of supply chains and decarbonization of manufacturing, operationally. The sustainability of the supply chain is better in ESG-leader companies, which will experience less inventory due to green procurement and closed-loop logistics [13]. Audit of suppliers, like checking of conflict minerals traceability and a carbon footprint, are compliance costs but eliminate interference. Green electricity and optimization of processes reduce the unit energy consumption, in the meantime, reducing inventory turnover days. This model is a "green-for-efficiency model that transforms ESG into an efficiency engine that makes environmental compliance and financial performance go hand in hand.

2.4. Literature summary

Most existing studies test the correlation between ESG and performance based on cross-sectional data, lacking dynamic tracking of "abrupt change points" in ESG strategies (such as green bond issuance and zero-carbon target setting), making it difficult to reveal the causal timing and path dependence between ESG investment and financial strategy adjustments. Especially for China's photovoltaic industry, the existing literature has not yet answered how the leap in ESG ratings specifically affects the micro-mechanisms of financing structure optimization, investment direction transformation and operational efficiency improvement. The financial realization path of "cost reduction and efficiency improvement" still needs to be further explored.

This study conducts A longitudinal tracking of Longi Green Energy's ESG strategy evolution from 2019 to 2023 through a single case. It takes the release of the "zero-carbon Factory" in 2021 and the issuance of green bonds in 2022 as key mutation points, and matches the ESG rating changes (BB→A) with the financial data of financing structure, investment direction, and operational efficiency in a time series. Reveal the dynamic transmission mechanism of ESG from "compliance disclosure" to "strategic reconfiguration", thereby making up for the deficiencies of existing cross-sectional studies in causal identification and path characterization.

3. Case study: Longi Green Energy

3.1. Reasons for case selection

Longi Green Energy, as the world's leading enterprise in the market share of photovoltaic monocrystalline silicon wafers and modules (ranking second globally in module shipments in 2023), has typical ESG-financial strategy interaction characteristics: Firstly, it clearly defined the "zero-carbon factory" strategy in 2021 and joined the RE100 initiative, and issued its first green bond in 2022, with clear policy milestones. Secondly, the photovoltaic industry itself is subject to the dual influence of ESG regulation (the EU anti-forced labor Act, conflict Minerals Rules) and subsidies, and its financial strategic transformation has a demonstration effect on the industry. Thirdly, the company's ESG rating has been upgraded from BB in 2019 to A (MSCI) in 2023. The rating change can be compared with the financial data. As a capital-intensive manufacturing industry, the adjustment of its financial strategy is of typical significance for understanding how ESG affects the resource allocation of capital-intensive enterprises.

3.2. ESG strategy evolution and major transformations

2019–2020: Compliance-oriented stage. ESG practices remained at the level of regulatory disclosure, with no systematic governance framework in place. The board secretary's office covered ESG affairs through qualitative narratives of social responsibility in the annual reports and there were no board-level committees, cross-departmental coordination or quantitative metrics.

2021: Strategic turning point. The company has published its first Zero-Carbon Factory white paper, a pledge to achieve value-chain carbon neutrality by 2030 and become a member of the RE100 initiative to source 100% renewable electricity by 2028. As part of the board strategy committee, an ESG task force was formed, which formed a three-layer governance structure (board-task force-business units). To improve the Xinjiang-related ESG controversy, the procurement and operations teams incorporated labor and environmental audits of suppliers in sourcing decisions.

2022: Governance deepening. The company issued green medium-term bonds (coupon 3.25, 40 BP lower than regular bonds) of RMB 1.5 billion and created a green-finance, carbon-neutrality task force, with specific fund-use oversight and environmental-resistance monitoring. TÜV Rheinland's zero-carbon factory certification was obtained, aligning governance with international standards, while ESG disclosure was upgraded from annual-report annexes to standalone sustainability reports.

2023: Value-centre transition. ESG governance was elevated to a board-level sustainability committee directly reporting to the board and deeply integrated with strategic investment, supply-chain management, and new-energy operations (LONGi Hydrogen). A supply-chain traceability and carbon-data platform was launched, pushing ESG compliance upstream to supplier onboarding and contract management, thereby supporting the "green electricity + green hydrogen" business layout.

4. Analysis of the impact mechanism of ESG on financial strategy

4.1. Changes in financial performance indicators (2019-2023)

Table 1. The evolution trajectory of key financial indicators

Annual	ROE (%)	Revenue growth rate (%)	Tobin's Q	MSCI ESG rating
2019	23.9	49.6	2.8	BB
2020	27.2	65.9	3.5	BB
2021	21.4	48.3	4.2	BBB
2022	26.9	60	3.1	A
2023	16.6	0.4	2.4	A

Table 1 shows that after the ESG strategy upgrade in 2021, despite the impact of overcapacity and price competition in the photovoltaic industry in 2023, the ROE still remained at a relatively high level of over 16%, significantly higher than the average level of the manufacturing industry. Tobin's Q reached its peak in 2021, reflecting the market's valuation premium over the ESG strategic transition period. It is worth noting that the revenue growth rate in 2021 remained at 48.3% even after the base increased, and the ESG rating rose in tandem with the improvement in financial performance.

4.2. Financing strategy: green bonds and capital cost optimization

The issuance of green bonds in 2022 was of milestone significance. This bond has been certified by the Green Bond Principles (GBP), with a coupon rate of 3.25%, which is approximately 35 to 50 basis points lower than the yield curve of Chinabond corporate bonds during the same period. It will save around 5.25 to 7.5 million yuan in interest per annum, which is the cost benefit of using green bonds. More importantly, the improvement in ESG ratings has enhanced the overall debt financing structure: the interest-bearing debt ratio has been optimized from 46.2% in 2020 to 38.1% in 2023, and the proportion of long-term debt has risen from 52% to 68%. The optimization of the term structure has reduced liquidity risks. Compared with the average level of the photovoltaic manufacturing industry, this optimization is more significant: the industry's interest-bearing debt ratio generally remained within the range of 45% to 50% during the same period, and the proportion of long-term debt was mostly below 55%. However, Longi Green Energy's two indicators were significantly better than the industry average, reflecting a substantial improvement in the ESG performance on creditors' risk appetite. In terms of bank credit lines, thanks to its ESG performance, it received a 10 billion yuan special credit line for "carbon neutrality" from the China Development Bank in 2022, with the interest rate 10 to 20 basis points lower than the LPR. In the equity market, after the ESG rating was upgraded to BBB in 2021, the shareholding ratio of northbound funds rose from 6.8% to 11.3% in 2022. The increase in holdings by institutional investors verified the effect of ESG as a signal to reduce the cost of equity financing. The weighted average cost of capital (WACC) decreased by approximately 1.2 percentage points from 2021 to 2022.

4.3. Investment strategy: vertical integration and green business expansion

ESG constraints have reshaped the investment landscape, presenting the characteristics of "decarbonization + diversification". Extending upstream: To ensure ESG compliance in silicon

material supply (in response to the controversy over polysilicon in Xinjiang and the EU's anti-forced labor act), from 2021 to 2023, a total of approximately 8.5 billion yuan was invested in silicon material enterprises that meet ESG standards, such as Sichuan Yongxiang and Xinte Energy, by signing long-term green power purchase agreements to lock in a low-carbon supply chain. Horizontal expansion: The investment direction is concentrated on hydrogen energy equipment (electrolyzers) and building-integrated photovoltaics (BIPV). Longi Hydrogen Energy was established in 2021 and has become the world's largest manufacturer of alkaline electrolyzers by 2023. Although this business has suffered short-term losses, it conforms to the long-term growth option logic oriented by ESG. In terms of asset structure, ESG-driven equipment upgrades (such as the transformation of single-crystal furnaces to green electricity-driven) have reduced energy consumption per unit of capacity by 18%, and the fixed asset turnover rate has increased from 1.3 times in 2019 to 1.8 times in 2023, indicating that green investment has enhanced the efficiency of asset utilization [14, 15].

4.4. Operations strategy: supply chain traceability and green manufacturing

Supply chain restructuring driven by ESG directly enhances operational efficiency. In 2021, the supplier ESG management platform was launched, implementing conflict mineral and carbon footprint traceability for key raw materials such as polysilicon and silver paste. Although this increased the supplier audit cost (accounting for approximately 0.3% of the procurement amount), it avoids the risk of supply disruption caused by suppliers' ESG violations (such as environmental penalties and labor issues) (a competitor's production halt in 2022 due to a supplier's environmental violations serves as a negative example). On the manufacturing side, through green electricity substitution and process optimization, the non-silicon cost of monocrystalline silicon wafers decreased by 25% in 2023 compared to 2019, and the inventory turnover days were compressed from 95 days in 2019 to 72 days in 2023, demonstrating that the green supply chain collaboration has enhanced overall operational efficiency and the quality of working capital management.

5. Conclusions

5.1. Research conclusion

This study, through the longitudinal case analysis of Longi Green Energy, finds that: First, the integration of ESG strategies significantly reduces the cost of debt and equity financing through the signal transmission mechanism. The "green premium" effect of green bonds and the ESG special credit lines of banks are truly present in the manufacturing industry. Second, ESG constraints drive investment strategies to shift from horizontal scale expansion to vertical value chain integration and the incubation of new green businesses (hydrogen energy), avoiding long-term regulatory risks and creating new growth poles by locking in green resources and exploring carbon neutrality-related markets. Thirdly, ESG-driven supply chain traceability and operational efficiency improvements (such as green electricity substitution and process optimization) have enhanced asset turnover and ROE, confirming the financial substantive nature of ESG rather than merely a cost burden. Even during the industry's downturn (2023), it can still maintain a relatively high return on capital.

5.2. Management suggestions

For enterprises, ESG should be upgraded from compliance disclosure to a core variable of financial strategy, and an "ESG-budget" linkage mechanism should be established. Carbon costs and ESG risks in the supply chain should be incorporated into the discounted cash flow model of investment decisions. Manufacturing enterprises should pay particular attention to the upfront investment in ESG audits of the supply chain to avoid ESG compliance costs in future international trade (such as the EU CBAM and supply chain due diligence directives). For investors, it is recommended to build a financial valuation model that integrates ESG factors, with particular attention to the capital structure optimization and long-term value creation capacity of enterprises after the issuance of green bonds, rather than merely focusing on short-term ROE fluctuations.

5.3. Research limitations and prospects

This study is limited to a single photovoltaic industry case. In the future, it can be expanded to high-carbon industries such as steel and chemical engineering for comparison, to explore the industry heterogeneity of ESG financial strategy effects. Furthermore, this study did not deeply quantify the specific financial return period (ROI) of ESG investment. Subsequent research can track the excess return relationship between ESG rating adjustment dates and stock price/bond yields through big data methods. With the implementation of the ISSB standards and the new EU ESG regulatory rules, the comparability of ESG financial information will be enhanced, providing a new opportunity for cross-enterprise financial strategy comparative studies.

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