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The Mechanism of Green Bleaching Behavior on ESG Stock Price Correlation

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Abstract: The rapid expansion of Environmental, Social, and Governance (ESG) investing has introduced significant market inefficiencies due to the prevalence of greenwashing, where firms manipulate sustainability claims to attract investment. This study examines how greenwashing distorts the ESG-stock price relationship through three interconnected mechanisms across different market layers. At the information layer, greenwashing introduces signal distortion, increasing noise in ESG data and leading to adverse selection. At the cognitive layer, recognition lag arises due to rigid ESG rating methodologies and investors' limited expertise, delaying market correction. At the market layer, the reflexive cycle mechanism drives self-reinforcing valuation inflation, forming speculative bubbles. These mechanisms collectively exacerbate stock mispricing, increase capital costs, and undermine market efficiency. The results make it clear that stronger regulations, third-party ESG verification, and real-time monitoring of environmental data are needed right away to stop greenwashing and boost the credibility of ESG investments.

Keywords: Greenwashing, ESG investment, Stock price correlation

1. Introduction

The global transition toward carbon neutrality has propelled Environmental, Social, and Governance (ESG) investing into a $30 trillion market in 2022, with projection suggesting it will encompass about 25% ($40 trillion) of global assets by 2040[1]. However, this exponential growth masks a critical paradox: the pricing efficiency of ESG markets is increasingly compromised by greenwashing, a practice where firms distort or fabricate sustainability claims to attract capital. This paradox is rooted in the theoretical foundations of ESG data reliability: rating agencies primarily rely on unverified corporate disclosures [2], creating systemic information asymmetry that allows firms to engage in selective disclosure [3]. For instance, Volkswagen's "Dieselgate" scandal—where software manipulation falsified emissions data [4]—and IKEA's illegal logging in ecologically sensitive regions despite its "Forest Positive Agenda" [5] illustrate how greenwashing systematically decouples ESG disclosures from actual performance.

Such distortions create persistent mispricing in equity markets, as investors struggle to differentiate genuine sustainability efforts from strategic deception. This challenge is exacerbated by inherent deficiencies in ESG rating systems: divergent methodologies across agencies [6] enable firms to "shop" for favorable ratings, while the lack of third-party verification [7] delays market recognition of greenwashing. Empirical evidence confirms that exposed greenwashing triggers stock price crashes [8,9], yet the reflexive cycle mechanism perpetuates mispricing—high ESG scores

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attract capital inflows, further inflating valuations [10]. Thus, understanding the mechanisms through which greenwashing disrupts the ESG-stock price relationship is urgent for ensuring market efficiency and advancing sustainability transitions.

Prior literature has predominantly attributed ESG-stock price distortions to information asymmetry or investor irrationality. Existing literature tends to analyze greenwashing-related information distortion or market reactions in isolation, lacking a systematic integration of the "information-cognition-market" dynamic transmission process. This study advances the field by identifying three interconnected interference mechanisms that operate across distinct market layers. This analytical framework expands traditional ESG research, which has primarily focused on information distortion, by incorporating a multi-layered dynamic system encompassing "information-cognition-market." This novel perspective provides deeper insights into the complexity of green finance markets.

2. Literature Review

2.1. The Definition and Motivations of Greenwashing

Greenwashing, defined by Merriam-Webster [11] as misleadingly promoting products, policies, or activities as more environmentally friendly than they actually are. This core concept is academically framed through Lyon and Maxwell's [12] "selective disclosure" theory, where firms emphasize positive environmental actions while concealing negative impacts. Delmas and Burbano's [3]"decoupling theory" further explains this as a strategic disconnect between symbolic commitments (e.g., ESG reports) and substantive practices, often driven by institutional pressures and validated empirically as "high-profile publicity but low-efficiency execution" [13]. Corporate motivations center on dual strategies: signaling genuine sustainability efforts to enhance reputation and impression management through deceptive disclosures to manipulate stakeholder perceptions [14,15]. While signaling reflects authentic environmental performance, impression management constitutes strategic distortion of true impacts [16,2], highlighting greenwashing's role as both a communicative and systemic organizational deception.

2.2. The Negative Impact of Greenwashing on Capital Markets

Empirical research has found that the exposure of greenwashing behavior leads to significant market trust crises. Birindelli et al. [8] confirmed that investor betrayal of trust triggers stock price declines, while Liu et al. [9] further pointed out that such events significantly increase the risk of stock price crashes. This suggests that greenwashing not only damages corporate value but also exacerbates information distortion in capital markets. Notably, high-quality incremental information supply (such as third-party verification) can effectively mitigate market mispricing [7], yet current ESG rating systems have not systematically integrated such mechanisms.

2.3. The Bidirectional Impact of ESG Rating Discrepancies on Stock Returns

Empirical studies based on the U.S. market suggest that discrepancies among ESG rating agencies may trigger a risk premium compensation mechanism. Brandon et al. [17] found a significant positive correlation between ESG rating divergence and stock returns. Due to the lack of quantifiable risk assessment criteria, market participants demand higher expected returns to compensate for potential risk exposure. This conclusion is corroborated by Avramov et al. [18], who emphasize that high ESG discrepancies amplify return volatility risk, thereby increasing capital costs. However, an analysis by Wang et al. [19] on the Chinese market reveals a reverse mechanism: ESG rating discrepancies suppress investor sentiment, reducing trading activity and ultimately leading to a decline in stock

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returns during the lagging period. Tan and Pan [20] further pointed out that ESG rating divergence may trigger the rapid spread of negative sentiment on social networks, forming a persistent suppressive effect on corporate value.

3. Disruptive Pathways of Greenwashing on the ESG-Stock Price Relationship

3.1. Information Layer: Signal Distortion Mechanism and Market Pricing Distortion

The current ESG rating system suffers from dual vulnerabilities: static indicator limitations and data source credibility gaps. First, ratings rely on discontinuous information sources such as annual reports and CSR disclosures, lacking dynamic environmental performance tracking capabilities and third-party audit verification mechanisms [2]. This institutional loophole creates space for signal manipulation, as explained by signaling theory [21], which reveals how firms strategically select disclosure timing and content depth. Second, the positive correlation between firm scale, analyst attention [22,23], and moral licensing pressures drives dominant firms to maintain ESG profiles through implicit tactics like supply chain externalization, even as marginal environmental benefits diminish.

Rating agencies' overreliance on unilateral corporate disclosures leads to blind spots in supply chain traceability and cross-jurisdictional environmental cost-shifting behaviors. The data noise generated by such information asymmetry triggers industry-level adverse selection through institutional isomorphism [24]: firms with genuine environmental benefits are forced out of ESG financing markets due to inability to compete in disclosure dimensions, resulting in a "lemons market" equilibrium where inferior firms dominate.

3.2. Cognitive Layer: Recognition Lag Mechanism and Pricing Correction Failure

Existing ESG assessment frameworks exhibit methodological path dependence, manifested in fixed indicator weights and delayed responsiveness to technological innovation. Constrained by technical verification capacity gaps, rating agencies struggle to incorporate forward-looking environmental performance metrics, creating cognitive lags in evaluating the substantive benefits of emerging green technologies.

Institutional investors face dual cognitive barriers due to insufficient ESG expertise and data access channels: During information identification, they overly anchor on historical ratings, amplifying confirmation bias when negative information emerges. During price correction, they fall into information cascades, where early investors' trading actions trigger herd behavior, causing price adjustment lags relative to information diffusion rates.

3.3. Market Layer: Reflexive Cycle Mechanism and Price Overshooting

High ESG ratings attract capital inflows into passive investment vehicles, creating a self-reinforcing price-rating reflexive cycle. This process drives valuation premiums detached from fundamentals, exemplified by persistent price-to-earnings ratio deviations of ESG index constituents from industry benchmarks. Concurrently, policy-sensitive industries witness ESG label competition, where firms inflate technological claims to secure financing advantages. Rating agencies' delayed verification capabilities exacerbate industry-wide information distortion resonance.

Greenwashing exposures trigger cliff-like rating downgrades, forcing liquidity-constrained institutional sell-offs. When systemic trust crises surpass critical thresholds, the legitimacy of the ESG framework faces query, and markets transition from structural adjustments to systemic sell-offs. Price overshooting manifests as nonlinear relationships between risk premium repricing speeds and the severity of fundamental deterioration.

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4. Future Directions

Based on the research findings, improvements are proposed at both regulatory and market levels. From a regulatory perspective, it is essential to enhance the regulatory framework and strengthen enforcement penalty mechanisms. Specifically, drawing on international best practices, a standardized ESG disclosure framework should be established, requiring firms to provide detailed quantitative targets, such as carbon emissions reduction percentages, implementation pathways, and interim progress reports. Furthermore, a tiered penalty system should be introduced to sanction firms that falsely claim to operate "zero-carbon factories" while failing to meet environmental standards, including restrictions on their eligibility to issue green bonds.

To fully optimize market mechanisms, big data analytics should be explored to develop a corporate environmental database, enabling real-time monitoring of permit records and energy consumption data to detect greenwashing behavior. Additionally, fund management firms should be encouraged to incorporate risk disclosure modules into ESG product prospectuses, explicitly warning investors that "ratings may include non-financial subjective judgments" and other relevant cautionary statements. By addressing these challenges, future research and policy initiatives can contribute to a more transparent and efficient ESG investment landscape.

5. Conclusion

This study, through theoretical analysis and case studies, reveals the complex impact of greenwashing behavior in the ESG investment domain on capital markets. The key findings indicate that firms selectively disclose environmental achievements, such as promoting renewable energy projects while concealing high-pollution operations, and employ ambiguous language, making it difficult for the market to access authentic ESG information. Investors exhibit a significant delay in recognizing greenwashing behavior, which exacerbates mispricing issues and leads to temporary market inefficiencies. Additionally, inflated ESG ratings attract increased capital inflows, further driving up stock prices and reinforcing the perceived credibility of these ratings, ultimately forming a self-reinforcing speculative bubble. The study demonstrates that when ESG ratings deviate from firms' actual environmental performance, a chain reaction similar to the subprime mortgage crisis may occur. The volatility during market correction periods, particularly in high-valuation sectors such as renewable energy and environmental technologies, warrants attention from policymakers.

This research, however, has several limitations. While three disruptive mechanisms have been identified, the study does not quantify their relative impact or interactions. Furthermore, the sample focuses on ESG ratings of publicly listed firms and does not extend to government bonds or sustainable infrastructure projects. Moreover, the study does not systematically compare greenwashing behavior patterns across traditional industries, such as manufacturing, and emerging industries, such as clean energy.

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