THE COUNTERPRODUCTIVE CHANNEL OF SUSTAINABLE INVESTING: REASSESSING ESG EFFECTIVENESS THROUGH THE LENS OF "IMPACT ELASTICITY"

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Introduction

As ESG (Environmental, Social, and Governance) investing continues to grow surpassing $30 trillion in global assets[22], academic scrutiny of its real-world effectiveness has become increasingly important. Among the most influential critiques is Hartzmark & Shue's (2022) study, *Counterproductive ustainable Investing: The Impact Elasticity of Brown and Green Firms*[23], which challenges the prevailing logic that ESG capital automatically fosters environmental improvement.

The paper introduces a novel framework called *impact elasticity* to argue that ESG capital may be most effective when allocated to brown firms, i.e., high-emission firms that can reduce emissions significantly if capital constraints are relaxed. Conversely, green firms, which are typically in low-emission sectors, exhibit low impact elasticity: cheaper capital does little to improve their already low environmental footprint.

This thesis outlines the author's intended *replication study* of their research. The goal is to validate their empirical findings, understand the robustness of the impact elasticity concept, and assess the broader implications for ESG strategy design. This replication also aims to test whether the same patterns hold when applied to updated data or different samples, such as firms in emerging markets.

Purpose and contribution of the replication sstudy

This study serves four main objectives:

1. Reconstruct the original analytical models used by Hartzmark & Shue (2022).
2. Validate the existence and magnitude of impact elasticity among brown and green firms.
3. Assess whether ESG capital allocation patterns observed in their study persist over time or across different geographies and sectors.
4. Inform ESG practitioners and policymakers on how to better target capital to maximize environmental outcomes.

In doing so, the study contributes to the transparency and credibility of sustainable finance research and strengthens the empirical foundation for future ESG strategy development.

[22] Global Sustainable Investment Alliance. 2022. Global Sustainable Investment Review 2022. https://www.gsi-alliance.org/wp-content/uploads/2023/04/GSIR-2022.pdf
[23] Hartzmark, Samuel M., and Kelly Shue. "Counterproductive sustainable investing: The impact elasticity of brown and green firms." Available at SSRN 4359282 (2022).

Overview of the original study

Hartzmark & Shue's study builds a corporate finance framework linking capital costs to environmental outcomes. The core concept of *impact elasticity* is defined as:

$$\text{Impact elasticity} = \frac{\partial\ \text{Environmental impact}}{\partial\ \text{Cost of capital}}$$

Key arguments:

- Brown firms (e.g., heavy industry, energy) are more sensitive to capital costs. If provided with cheaper capital, they are more likely to fund green projects and reduce emissions.
- Green firms (e.g., finance, tech, services) already have low emissions. Additional capital tends to have little environmental effect.

Ironically, ESG funds often divest from brown firms and favor green firms, despite the latter's limited marginal environmental benefit. As a result, ESG investing may become counterproductive by reducing financial resources where they could do the most good.

Literature review

The rise of ESG (Environmental, Social, and Governance) investing has generated a rich and rapidly growing body of academic literature. Much of this work has focused on the financial performance of ESG-aligned portfolios (e.g., Pastor, Stambaugh & Taylor, 2022), the effect of sustainability disclosures (e.g., Krueger, Sautner & Starks, 2020), and how ESG preferences influence capital markets (e.g., Bolton & Kacperczyk, 2021). While these studies highlight the momentum of ESG as a mainstream investment philosophy, a growing stream of critical research has begun to question whether ESG capital flows are truly achieving environmental goals.

Among the most influential contributions to this critique is Hartzmark and Shue's (2022) concept of impact elasticity, which shifts attention away from financial metrics and ESG ratings toward a more fundamental question: what is the marginal environmental benefit of allocating capital to a given firm? Their work reveals a major conceptual bias in current ESG strategies which is called an over-reliance on proportional thinking, rather than level-based thinking.

In ESG investing, proportional thinking refers to the tendency to evaluate environmental performance improvements in relative terms (e.g., "Firm A reduced emissions by 70%"), regardless of the absolute scale of impact. This mindset is reinforced by ESG rating agencies and reporting frameworks that emphasize intensity metrics (emissions per unit revenue or assets) and year-on-year percentage improvements.

However, this logic is flawed. As Hartzmark and Shue (2022) demonstrate, a bigger percentage emissions reduction (e.g., 70 percent) by a low-emitting firm (e.g., a bank or software company) may result in a smaller absolute reduction in greenhouse gas (GHG) emissions than a smaller percentage reduction (e.g., 2 percent) by a heavy industrial firm. In other words, ESG strategies that reward green firms for small, cosmetic improvements may ignore the far more impactful environmental gains achievable through modest improvements in brown firms.

This confusion between percentage improvement and absolute impact has real consequences for capital allocation. ESG fund often overweight green firms in their portfolios and divest from brown firms (Pastor et al., 2022). While this may improve the ESG profile of the fund on paper, it does not necessarily reduce global emissions. In fact, by making capital more expensive for brown firms, it may hinder their ability to finance green transitions which is a phenomenon that Hartzmark and Shue identify as counterproductive sustainable investing.

The bias toward proportional thinking is further institutionalized by the ESG rating industry. Agencies such as MSCI, Sustainalytics, and FTSE ESG often score firms based on risk exposure and management practices, rather than actual environmental outcomes. Firms in low-emissions sectors inherently perform better on these metrics, while high-emitting firms are penalized even when making meaningful improvements.

As Berg et al. (2022) show, there is considerable inconsistency and opacity in how ESG scores are constructed. These scores are rarely sensitive to marginal changes in absolute emissions, and as a result, fail to highlight firms with the greatest potential for environmental improvement — i.e., those with high impact elasticity.

Another body of literature highlights the importance of engagement strategies over divestment. Studies by Krueger, Sautner, and Starks (2020), and Dimson et al. (2015) suggest that shareholder engagement can lead to measurable environmental and governance improvements in target firms. Yet in practice, ESG investing remains dominated by screening and exclusion-based approaches, particularly in retail and passive funds.

These practices further tilt ESG capital away from brown firms which are the very firms that are both most capital-constrained and most capable of delivering absolute emissions reductions if given access to affordable financing.

Taken together, the literature reveals a disconnect between ESG investment theory and practice. While proportional improvements in ESG metrics offer attractive optics, they are often ecologically insignificant. The more urgent need and the greater opportunity lie in financing meaningful, albeit modest, changes in brown firms with large environmental footprints. The literature increasingly calls for a shift from relative performance to absolute impact as the core organizing principle of sustainable finance.

This replication study builds on Hartzmark and Shue's (2022) work by empirically testing the presence and implications of this conceptual bias, and aims to provide further evidence for designing ESG strategies that reflect real environmental benefits, not just relative progress.

Methodology and data

The replication study will closely follow the original methodological framework, including data sources, model specifications, and estimation techniques.

Datasets used:

- *S&P Trucost Environmental Data:* Scope 1 and 2 GHG emissions at the firm level.

- *Compustat (via S&P):* Firm-level financials including revenues, total assets, leverage, cost of capital proxies, and returns.
- *MSCI ESG Ratings:* Sustainability ratings and ESG risk scores.

These datasets enable matching financial performance with environmental outcomes and ESG capital allocation. The study covers a multi-year panel, mirroring the original sample period and firm coverage as closely as possible.

Empirical strategy:

- Panel regressions with firm and time fixed effects
- Estimation of firm-specific cost of capital impacts on emissions
- Impact elasticity estimation across firm types (brown vs. green)
- Sub-sample robustness checks and sensitivity analysis

Depending on data availability, the replication may also explore emerging market firms or more recent periods to assess the generalizability of the original findings.

Expected results and hypotheses

Based on the original findings, the replication will test the following hypotheses:

1. H1: Brown firms exhibit significantly higher impact elasticity than green firms.
2. H2: ESG capital is disproportionately allocated to green firms, despite their lower environmental responsiveness.
3. H3: Divestment strategies reduce the potential for emission reduction by financially constraining brown firms.
4. H4: A shift toward "transition finance" — targeting brown firms with credible decarbonization plans — would yield more effective environmental outcomes.

These hypotheses reflect the original study's conclusions but are subject to empirical testing and contextual adjustment in the replication.

Policy and practical implications

If the replication confirms the original findings, it will provide further support for a rethinking of ESG investing practices. Specifically:

- *Divestment should not be the default,* capital withdrawal may entrench brown firms in carbon-intensive technologies.
- *Impact-focused metrics* should guide ESG ratings emphasizing absolute emissions rather than percentage improvements or static risk scores.
- *Engagement strategies* should be emphasized over exclusion, particularly when brown firms show readiness to decarbonize.

Replication will also shed light on whether these recommendations are valid in non-U.S. contexts or under more recent financial and environmental regulations.

Conclusion

This replication study aims to evaluate one of the most interesting, yet provocative, findings in sustainable finance literature, that ESG investing may be missing its mark. By independently testing the *impact elasticity* framework, the author(s) hope to provide clarity on where ESG capital can be most impactful and caution against investing strategies that feel green, but are operationally ineffective.

A better alignment between *capital allocation and environmental responsiveness* is essential if ESG investing is to deliver on its promises. Replication is a step toward ensuring that alignment is grounded in robust evidence.

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