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**SRI Impacts on Environmental and Financial Performance:
Evidence from European Listed Companies
(The Net-Zero Innovation Fund Model Proposal)**

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EXECUTIVE SUMMARY

This research paper, submitted to the 16th Annual Engaged Management Scholarship (EMS) Conference, presents rigorous empirical evidence on the structural relationship between Socially Responsible Investment (SRI) and corporate performance across European listed companies. Drawing on a comprehensive dataset spanning 2020–2022, the study investigates two fundamental questions: first, whether SRI directly influences the environmental performance of investee corporations; and second, to what extent SRI moderates the relationship between a firm's environmental trajectory and its subsequent financial performance.

The findings are both significant and counterintuitive. While SRI succeeds in driving short-term compliance gains, particularly in emissions management and resource efficiency, it demonstrably fails to incentivize long-term environmental innovation, particularly within carbon-intensive sectors. More strikingly, SRI intensity amplifies the market penalty faced by polluting firms that improve their environmental scores, revealing a structural paradox at the heart of responsible finance.

These empirical contradictions form the evidentiary foundation for the study's central practical contribution: the Net-Zero Innovation Fund (NZI Fund), a hybrid investment vehicle designed to break the cycle of short-termism that afflicts current SRI frameworks. By co-investing in both listed transition leaders and unlisted green-tech start-ups, the NZI Fund proposes a systemic solution to the innovation deficit identified in the data.

RESEARCH BACKGROUND AND CONTEXT

The Rise of Responsible Finance in Europe

The European sustainable investment landscape has undergone a profound transformation over the past decade. The operationalization of the Paris Agreement (2015), the European Green Deal (2019), and the regulatory architecture of the Sustainable Finance Disclosure Regulation (SFDR) and Corporate Sustainability Reporting Directive (CSRD) have fundamentally reshaped the expectations placed upon institutional investors and the companies they finance. Against this backdrop, Socially Responsible Investment has evolved from a niche ethical preference to a mainstream capital allocation strategy with systemic implications for both environmental outcomes and market valuations.

Global sustainable fund assets under management reached \$3.2 trillion in 2024, representing an 8% annual increase according to the United Nations World Investment Report 2025. In the European market, the EFAMA estimates ESG-aligned assets at €11 trillion, while the French SRI Label alone has grown from €12.7 billion across 10 asset management firms in 2016 to €799 billion across over 200 companies in 2024, making it the largest SRI label in Europe by both fund count and AUM.

Yet the spectacular growth of the SRI market has not been matched by equivalent clarity on its real-world environmental impacts. Investment firms possess sophisticated tools for evaluating financial performance, but the mechanisms for assessing and verifying environmental outcomes remain fragmented, inconsistent, and frequently contested. It is precisely this gap, between stated SRI intent and measurable environmental impact, that this research addresses.

The Problem of Practice

The exponential growth of the SRI market has introduced critical operational and fiduciary challenges for asset managers operating in the European context. Three structural tensions define the problem of practice addressed by this research:

- **The Verification Gap:** Capital allocators are increasingly required to demonstrate verifiable evidence of both environmental impact and financial alpha, yet the causal link between SRI allocation and environmental outcomes is methodologically elusive. The heterogeneity of ESG rating methodologies across providers such as LSEG, Bloomberg, Moody's ESG Solutions, and Morgan Stanley creates a measurement landscape characterized by inconsistency and opacity.
- **The Regulatory Compliance Burden:** The mandatory ESG reporting architecture under SFDR and CSRD creates substantial management overhead and compliance costs for investee companies, without necessarily translating into superior environmental or financial performance. Asset managers must simultaneously optimize fund allocation within continuously evolving regulatory parameters while meeting fiduciary obligations to investors.
- **The Strategic Dilemma of Polluting Firms:** Asset managers committed to the Net Zero Asset Managers (NZAM) Initiative or aligned with Paris-Aligned Benchmarks (PAB) face a direct tension. Many of the highest-emitting firms also generate robust Return on Assets (ROA), creating a dual-pronged dilemma: does continued SRI investment in these firms provide meaningful motivation for a successful energy transition, or does it merely signal market validation of unsustainable business models?

The EU Emissions Trading System (EU ETS), governed by Directive 2003/87/EC, further intensifies this pressure. Carbon allowance prices surged by 87% between 2021 and 2024, reaching €80 per tonne of CO₂. This double penalty, simultaneous divestment pressure and rising carbon costs, constrains the financial flexibility that carbon-intensive firms need to invest in the innovation required for their transition.

Research Context and Institutional Setting

This study is grounded in the French SRI Label institutional framework, which serves as one of the most rigorous and expansive SRI labeling systems globally. Established in 2016 by the French Ministry of Economy and Finance, the label applies to both equity and bond funds. The research utilizes data from Amundi — the largest French asset manager and ranked 8th globally in 2022 — as its primary institutional anchor. With €1,904 billion in AUM, Amundi provides a statistically significant and institutionally representative sample for studying SRI dynamics within the European listed equity universe.

The study focuses specifically on 21 equity funds (from a universe of 472 funds carrying the French SRI Label), analyzing the top 10 investee firms per fund, yielding 110 unique listed companies and 279 panel observations across the 2020–2022 period. This sample represents approximately €9.1 billion in cumulative investment (39% of our total €23.5 billion sample), structured as an unbalanced panel reflecting the real-world complexity of multi-portfolio holdings.

RESEARCH OBJECTIVES AND HYPOTHESES

Primary Research Questions

This research is structured around two foundational research questions that address critical gaps in the existing SRI literature:

- **RQ1:** What is the direct impact of Socially Responsible Investment on the environmental performance of investee corporations?
- **RQ2:** To what extent does SRI act as a moderating variable in the relationship between a firm's environmental trajectory and its subsequent financial performance?

These questions are operationalized through four formal hypotheses, derived from a comprehensive multi-thematic literature review spanning SRI financial performance research, the SRI-CSR interdependence literature, and the environmental-financial performance nexus.

Hypotheses Framework

Hypothesis	Statement	Theoretical Grounding
H1	There is a relationship between SRI and the environmental performance of the investee corporation.	Arjaliès et al. (2018, 2020); Hache (2020); Margolis et al. (2009); Liang & Renneboog (2020) addressing the difficulty of isolating causal SRI impact on environmental outcomes.
H2	There is a relationship between SRI and the financial performance of the investee corporation.	Derwall et al. (2005); Revelli & Sentis (2012); Peillex & Comyns (2020); Bénabou & Tirole (2010) encompassing the three competing schools: underperformance, overperformance, and equivalence.
H3	Environmental performance positively impacts the financial performance of the investee corporation.	Margolis et al. (2009); Azzone & Manzini (1994); Nekhili et al. (2021); Djousta Wamba (2022) exploring the contingency factors mediating the environmental-financial nexus.
H4	SRI plays a moderating role in the relationship between environmental and financial performance.	Arjaliès (2018); Beacco (2021); Johnson (2020) addressing the methodological gap in SRI moderation analysis within the environmental-financial performance nexus.

Literature Context: Three Competing Perspectives on SRI Financial Performance

A defining feature of the SRI academic literature is its fragmentation across three distinct schools of thought regarding the financial performance implications of responsible investment strategies. This study situates its empirical contributions within this contested landscape:

The Underperformance (Delegated Philanthropy) School

Peillex and Comyns (2020) find that most empirical studies suggest SRI funds underperform conventional benchmarks, representing an opportunity cost for investors. Ji et al. (2021) document systematic underperformance relative to conventional indices. Bénabou and Tirole (2010) theorize this as “delegated

philanthropy,” where institutional investors consciously trade financial alpha for social utility on behalf of their beneficiaries.

The Overperformance (ESG Premium) School

Derwall et al. (2005) demonstrated that best-in-class portfolios — companies with superior ESG ratings — yield higher annual returns than their worst-in-class counterparts, suggesting that robust ESG integration acts as a driver for long-term value creation. Van Duuren et al. (2016) corroborate this view, finding that heightened investor interest in firms with dynamic CSR policies drives positive market valuations.

The Performance Equivalence School

Revelli and Sentis (2012) and Revelli and Viviani (2015) posit that ethical investment involves neither a distinctive premium nor a systematic penalty. This is empirically supported by Vermeir and Friedrich (2006), who found no statistically significant divergence between CSR-integrated indices and traditional counterparts. Ferrat (2023) more recently confirmed that funds bearing the French SRI Label exhibit returns comparable to non-labeled alternatives.

This study's empirical design is structured to contribute nuance to all three debates by disaggregating results across polluting and non-polluting sectors, a methodological innovation that reveals sector-specific dynamics invisible in aggregate analyses.

RESEARCH METHODOLOGY

Research Design Philosophy

This study adopts a quantitative research design grounded in a hypothetico-deductive approach, a methodology well-suited to the structured investigation of causal relationships in financial and organizational research. The deductive logic proceeds from theory-derived hypotheses to empirical testing via econometric modeling, enabling the study to contribute falsifiable, generalizable insights to both the academic SRI literature and practitioner decision-making frameworks.

The epistemological stance aligns with engaged management scholarship principles: the research is simultaneously rigorous in its quantitative methodology and relevant to practitioners through its direct implications for portfolio construction, regulatory advocacy, and fund design. This dual commitment, to

scholarly rigor and practical impact, is the hallmark of the DBA research tradition within which this study is situated.

Analytical Model

The analytical model is constructed around three core variables whose interrelationships are tested across four econometric equations:

- **SRI Intensity (Independent Variable):** Defined as the ratio between the amount invested by the SRI fund in a listed company and that company's total assets. This operationalization captures the fund's proportionate economic engagement with each investee firm, providing a more robust measure of economic substance than market capitalization-based alternatives.
- **Environmental Performance (Moderating Variable):** Operationalized using the environmental score provided by the London Stock Exchange Group (LSEG), anchored in the Global Reporting Initiative (GRI) framework. The LSEG score draws on 630 distinct data points categorized across 12 thematic dimensions, including carbon emissions, resource efficiency, and environmental innovation. Three sub-components are analyzed independently: Emissions Performance, Resource Use Performance, and Innovation Performance.
- **Market Performance (Dependent Variable):** Operationalized using Tobin's Q ratio, calculated as the sum of market capitalization and book value of financial debt, divided by book value of total assets. Tobin's Q is preferred over accounting-based metrics for its forward-looking nature; it reflects market expectations of future value creation rather than historical cost allocation.

The LSEG scoring methodology is selected over competitors such as Bloomberg or Morgan Stanley Capital International (MSCI) for three specific reasons: its exceptional breadth (630 data points versus competitors' narrower scopes); its GRI alignment, which emphasizes environmental and social impact rather than purely financial materiality; and its established institutional legitimacy in the academic literature, particularly in European sustainable finance research contexts.

Econometric Model Specification

Four econometric equations are derived from the analytical model to operationalize the four hypotheses:

- **Equation 1 (H1):** Environmental Performance = $\alpha_0 + \alpha_1(\text{SRI}) + \Sigma \text{Control Variables} + \varepsilon$
- **Equation 2 (H2):** Financial Performance = $\alpha_0 + \alpha_1(\text{SRI}) + \Sigma \text{Control Variables} + \varepsilon$

- **Equation 3 (H3):** Financial Performance = $\alpha_0 + \alpha_1(\text{SRI}) + \alpha_2(\text{Environmental Performance}) + \Sigma$ Control Variables + ε
- **Equation 4 (H4):** Financial Performance = $\alpha_0 + \alpha_1(\text{SRI}) + \alpha_2(\text{Environmental Performance}) + \alpha_3(\text{SRI} \times \text{Environmental Performance}) + \Sigma$ Control Variables + ε

Equation 4 introduces the critical interaction term (SRI $\times$ Environmental Performance) to isolate and quantify the moderating effect of SRI intensity on the environmental-financial performance nexus. A joint test is subsequently conducted to assess marginal effects: Joint Test = Environmental Performance + (Environmental Performance $\times$ SRI).

Two econometric estimators are employed: Ordinary Least Squares (OLS) regression for baseline relationship testing, and the Seemingly Unrelated Regression (SURE) model for simultaneous estimation of equations that share correlated error structures. The SURE model is particularly appropriate in this context, as SRI intensity influences both environmental and financial performance through pathways that are likely to share unobservable determinants.

Control Variables

To isolate the effect of SRI from confounding structural factors, the following control variables are included across all equations:

Control Variable	Operationalization	Rationale
Economic Profitability (ROA)	Net Income / Total Assets	Proxy for financial slack available for CSR investment; confirmed primary driver in literature.
Firm Size	Logarithm of Total Assets	Larger firms face greater regulatory scrutiny and possess more resources for ESG integration.
Leverage	Total Debt / Total Assets	High leverage constrains environmental capital expenditure; affects Tobin's Q denominator.

Sectoral Sensitivity	Binary dummy: Polluting vs. Non-polluting (ESI Index classification)	Core structural differentiation enabling sector-specific analysis of SRI dynamics.
Geographic Region	Regional classification from Key Investor Documents	Dyck et al. (2019) confirm ESG cultural density of investor's home region affects impact magnitude.

The sectoral sensitivity variable draws on the Environmental Sensitivity Index (ESI), which classifies the following industries as environmentally sensitive (polluting): Machinery & Heavy Equipment, Pharmaceuticals, Chemicals, Aerospace & Defense, Construction, Semiconductors, Metallurgy, Oil & Gas, Transportation, Vehicles & Equipment, Tobacco, and Food & Beverage.

Data Collection and Sample Construction

Data collection proceeded through a non-probabilistic quota methodology, anchored in the institutional universe of Amundi and the French SRI Label. Financial data was sourced from the LSEG database (ESG scores and financial ratios) and each corporation's published annual report. The choice of LSEG as the primary ESG data provider reflects its market leadership, its GRI alignment, and the depth of its historical dataset extending to 2002.

The final panel of 279 observations was constructed from 110 unique listed companies, nested within 21 equity funds. The use of an unbalanced panel reflects the structural reality of multi-portfolio holdings, where different funds hold different companies across different time periods. Winsorization was applied to neutralize the statistical noise from extreme values in the tails of the distribution.

Three primary study limitations are acknowledged: (1) the reliance on portfolio compositions disclosed post-SFDR (January 2023) for backfilling the 2020–2022 period may not fully capture dynamic portfolio rebalancing; (2) the 2022 dataset predates mandatory CSRD reporting, limiting external audit verification; and (3) the single-provider sample may limit market representativeness, though the overall €23.5 billion asset base mitigates this concern substantially.

RESEARCH FINDINGS

The empirical analysis yielded four sets of findings (one per hypothesis), each contributing distinct and actionable insights to SRI literature. The results are notable for their internal consistency and their alignment with a coherent theoretical interpretation rooted in signaling theory, regulatory compliance dynamics, and market psychology.

H1 — SRI and Environmental Performance: A Bifurcated Relationship

Finding: SRI positively drives short-term compliance metrics (Emissions and Resources) but significantly undermines long-term Innovation performance, particularly in polluting sectors. H1 is Partially Supported.

Emissions and Resource Management: The Compliance Effect

The regression analysis confirms a strongly significant positive relationship between SRI intensity and performance on the Emissions dimension ($\beta = +0.653$, $t = 3.39$; $\beta = +1.102$ for polluting firms, $t = 4.87$). Similarly, SRI positively correlates with Resource Use performance ($\beta = +0.565$, $t = 3.03$), with the significant effect across both polluting and non-polluting sectors.

This finding is consistent with signaling theory: firms selected by SRI portfolio managers are those that have already adopted visible, compliance-driven environmental strategies. The regulatory stringency of European frameworks — particularly the SFDR-mandated disclosure regime, and the declining caps of the EU ETS — creates a powerful “regulatory push” that incentivizes firms to optimize their immediate carbon and resource profiles. Doonan et al. (2005) identify regulatory stringency, rather than consumer pressure, as the most significant determinant of actual pollution abatement, a conclusion that this research corroborates in the European listed equity context.

These firms reduce their information asymmetry by demonstrating proactive environmental compliance, thereby attracting SRI capital inflows as predicted by Nekhili et al. (2021) and Crifo and Mottis (2013). The positive correlation between SRI and Emissions/Resources performance thus reflects a successful screening mechanism: portfolio managers are selecting companies that align with immediate regulatory and investor concerns regarding carbon footprint and resource usage.

Environmental Innovation: The Strategic Myopia Paradox

In sharp and significant contrast, SRI intensity demonstrates a profoundly negative relationship with environmental Innovation performance across the entire sample ($\beta = -2.549$, $t = -7.43$), with the effect dramatically amplified within polluting sectors ($\beta = -3.698$, $t = -8.10$). This constitutes the most statistically robust finding in the entire study and its most counterintuitive implication.

High-emission firms, precisely those most in need of technological transformation, do not engage sufficiently in green innovation to attract or retain responsible investment. This innovation deficit has a structural explanation rooted in investment economics: as argued by Azzone and Manzini (1994) and Depret and Hamdouch (2009), the insufficient expected return on green R&D capital expenditure fails to justify the investment required for meaningful technological transition. Without a reduction in cost of equity driven by SRI capital inflow, as theorized by Heinkel, Kraus, and Zechner (2001), who suggest that at least 25% SRI allocation may be required to incentivize production model shifts, polluting firms remain trapped in incumbent, high-emission business models.

Critically, this finding exposes a structural failure in current SRI labeling architecture. The French SRI Label criteria and by extension, the broader European ESG regulatory framework, prioritize backward-looking risk mitigation metrics (emissions reduction, resource efficiency) over forward-looking technological transition indicators (green R&D investment, patent activity, clean technology deployment). The result is a responsible investment ecosystem that inadvertently rewards short-term compliance at the expense of long-term transformation, a form of strategic myopia embedded in the institutional rules of the game.

H2 — SRI and Financial Performance: Market Penalization of Polluters

Finding: SRI negatively impacts the market valuation (Tobin's Q) of invested companies, with the effect uniquely pronounced for carbon-intensive firms. H2 is Supported.

The regression analysis confirms a significant negative relationship between SRI intensity and market performance as measured by Tobin's Q ($\beta = -6.191$, $t = 2.33$ for the full sample; $\beta = -14.692$, $t = -3.21$ for polluting firms). The effect is statistically insignificant for non-polluting sectors, suggesting that the market penalization of polluters is the primary driver of the aggregate result.

This finding carries important theoretical implications. The broader capital market does not view SRI inflows into high-emission firms as a catalyst for value creation. Rather, the “polluter” designation appears to trigger a persistent decline in overall asset attractiveness, as end-investors maintain a binary expectation that “responsible” capital should systematically avoid carbon-intensive entities. The SRI label, in this reading, does not rehabilitate the market image of polluting companies; it may amplify the reputational

discount they face by drawing attention to the tension between their environmental profile and the ESG mandates of their investors.

This interpretation aligns with the “Performance Neutrality” or “Underperformance” schools in the SRI literature (Vogel, 2005; Revelli, 2012; Peillex and Comyn, 2020), confirming that ESG integration does not provide an automatic shield against market skepticism, particularly for firms whose core business model remains structurally at odds with the low-carbon transition.

The control variable analysis identifies three structural drivers of superior market valuation: economic profitability (ROA), firm size, and European domicile. The strong positive effect of ROA confirms that financial fundamentals remain the primary anchor for institutional investors. SRI appears to function, in management decision-making, as a complementary tool for net income generation rather than a substitute for financial performance.

H3 — Environmental Performance and Financial Performance: The Pollution Penalty

Finding: Environmental performance is negatively correlated with market valuation for polluting firms, while the correlation is non-significant for non-polluting firms. H3 is Partially Supported (Sign Reversed).

The relationship between environmental performance and financial performance — long assumed positive in the foundational literature (Margolis et al., 2009; Deborde et al., 2006) — is found to be significantly negative for polluting firms ($\beta = -2.361$, $t = -2.66$ for the full sample; $\beta = -5.454$, $t = -3.22$ for polluting firms). For non-polluting entities, the relationship is statistically indistinguishable from zero.

This sector-asymmetric result challenges a central assumption of the broader ESG literature and offers a nuanced explanation for why the green premium remains elusive for carbon-intensive sectors. Two competing interpretations are consistent with the data. First, investors may perceive high environmental scores in polluting sectors as indicators of greenwashing rather than genuine transformation, triggering heightened skepticism rather than valuation premiums. Second, investors in these sectors may remain anchored to the fundamental operational reality of the firm, where marginal ESG improvements do not offset the structural risks embedded in a 'polluter' status or the growing financial burden of carbon allowances.

The sign reversal relative to theoretical expectations (H3 was hypothesized as positive) is itself a contribution. It suggests that in the current European regulatory context, where SFDR and CSRD impose transparency requirements on polluting firms without mandating genuine transformation, improved

environmental reporting may perversely attract greater investor scrutiny rather than capital inflows. Climate Change Reporting, a key component of environmental disclosure, has been shown to exert a significant negative impact on Tobin's Q, Sales Growth, and Profit Margins in the SBF120 context (Radhouane et al., 2018), a finding that this study extends and confirms.

Notably, ROA exhibits a consistently strong and positive effect on environmental performance regardless of sector (including within polluting industries), suggesting that firms with genuine financial slack deploy it in part toward CSR development. This aligns with Djousta Wamba (2022), confirming that a firm's financial capacity positively shapes its environmental trajectory. The implication for fund managers is clear: economic profitability is a non-negotiable prerequisite for credible environmental engagement.

H4 — SRI as a Moderator: The Amplification of the Pollution Penalty

Finding: SRI intensity plays a critical and statistically significant negative moderating role in the relationship between environmental and financial performance, particularly for polluting firms. H4 is Supported.

The interaction term analysis ($SRI \times Environmental\ Performance$) reveals that higher SRI intensity worsens the market penalty associated with environmental performance in polluting sectors ($\beta = -1.964$, $t = -1.91$ for the full sample; $\beta = -3.197$, $t = -1.90$ for polluting firms). The moderating effects are also significant at the sub-component level for Emissions Performance ($\beta = -1.805$, $t = -2.22$) and Resources Performance ($\beta = -1.474$, $t = -1.86$) interactions, confirming the robustness of the moderation finding.

This result constitutes the study's most theoretically challenging finding. It reveals that the act of investing responsibly in polluting companies, far from serving as a positive signal of engagement and transition, appears to amplify the market's negative assessment of those companies. The mechanism is interpretable through the lens of SRI fund manager behavior: to maintain reputational integrity and avoid “reputational contagion,” portfolio managers adopt an increasingly exclusionary stance toward high-emission firms as SRI intensity grows within those firms' shareholder base. This creates a perverse dynamic where the most heavily SRI-invested polluting firms face the greatest market penalization.

As Cappelle-Blancard et al. (2006) observe, the assumption that firms automatically achieve superior financial performance by adopting virtuous environmental strategies is an illusion in many cases. The findings confirm that in the absence of genuine innovation-led transformation, the very dimension shown to be underperforming under H1, environmental compliance improvements in polluting firms do not generate the market confidence required to improve valuations.

The positive moderating role of ROA across the full sample underscores the primacy of financial fundamentals. Portfolio managers appear to treat robust profitability as a non-negotiable prerequisite for asset allocation, even within responsible investment mandates. This finding validates current selection practice while simultaneously identifying the structural gap it creates: the Innovation dimension, the one most critical to genuine transition, remains unweighted, unmonitored, and unsupported by current SRI frameworks.

The Portfolio Allocation Gap: A Structural Contradiction

Complementing the regression findings, the descriptive analysis reveals a significant structural contradiction in the deployment of SRI capital. Approximately 50% of the sample consists of European firms classified as environmentally sensitive (polluting), yet SRI intensity within these polluting firms is more than twice as high as within non-polluting counterparts.

This finding directly contradicts the stated strategic objectives of the NZAM Initiative, whose signatories pledge to prioritize capital allocation toward low-carbon activities. The empirical reality is that SRI-labeled funds, constrained by the relative rather than absolute selection criteria of the French SRI Label, remain substantially invested in carbon-intensive industries. Because the label's eligibility criteria do not systematically exclude high-emitting entities, its presence does not serve as a definitive guarantee of ecological integrity. For the end-investor, the SRI label may not yet satisfy the dual mandate of environmental transformation and financial outperformance.

This gap between institutional commitment and portfolio reality underscores the study's central policy recommendation: the transition from relative to absolute selection criteria, and from passive compliance screening to active innovation-oriented stewardship.

THE NET-ZERO INNOVATION FUND: TRANSFORMING EVIDENCE INTO IMPACT

The empirical findings of this research do not merely diagnose a structural failure in current SRI practice; they provide the evidentiary foundation for a concrete, actionable solution. The Net-Zero Innovation Fund (NZI Fund) is the practical output of this research: an investment vehicle specifically designed to address the three structural gaps identified in the data.

The Innovation Deficit: Quantifying the Problem

The negative relationship between SRI and environmental Innovation performance — the most statistically robust finding of the study — reflects a broader structural failure in European sustainable finance. Despite France's R&D budget of €36.5 billion in 2021, France ranks only 13th in Europe for corporate R&D investment (EUROSTAT, 2024 Report). More critically, green patents within the EU represent only 2.5% of total public R&D expenditure, a profoundly insufficient allocation given the technological requirements of the Paris Agreement and the European Green Deal.

Polluting companies are caught in a financial pincer: simultaneously divested from responsible investment portfolios (as demonstrated in H2 and H4) and burdened with rapidly escalating carbon costs under the EU ETS. The price of carbon allowances surged 87% between 2021 and 2024, reaching €80 per tonne of CO₂. This double penalty constrains precisely the financial flexibility these firms need to invest in the green innovation that would enable their transition, creating a self-reinforcing cycle of underinvestment that no amount of compliance-oriented ESG scoring can break.

Heinkel, Kraus, and Zechner (2001) suggest that allocating at least 25% of investment toward SRI principles could incentivize polluting firms to shift their production models. In our empirical sample, nearly half of all firms operate in polluting industries, representing a substantial latent opportunity for environmental transformation that current SRI frameworks fail to capture.

Fund Design: The NZI Fund Architecture

The NZI Fund is designed to pivot decisively away from passive ESG scoring and toward impact-oriented finance. It targets a dual-layered portfolio that directly addresses the Innovation deficit identified in the data: *NZI Fund Mission is to Bridge the funding gap between institutional SRI mandates and the environmental innovation required for genuine decarbonization of the real economy.*

Layer 1: Listed Leaders (European Listed Equities)

The first portfolio layer targets high-emission companies, drawn from the sample, that demonstrate robust transition trajectories through measurable R&D investment and green patent activity. Selection from the 2020–2022 data identifies firms such as Sanofi, Airbus, and TotalEnergies as illustrative candidates: carbon-intensive companies that showed the most significant improvements in Environmental Innovation performance during the study period.

This layer provides lower portfolio risk and high liquidity, serving as the portfolio's financial anchor. It ensures fiduciary compliance with institutional investor requirements while creating financial stability that enables exposure to the higher-risk innovation layer.

Layer 2: Greentech Disruptors (Unlisted Start-ups)

The second layer targets high-potential unlisted green-technology start-ups, sourced from the 2024 “Greentech Innovation” laureates and disaggregated into two sub-categories: sector-specific innovation (aligned with the transition needs of the listed companies in Layer 1) and power generation/energy storage (identified by the OECD as the sector meeting the dual requirements of high profitability and urgent climate mitigation).

This layer captures the long-term innovation premium that current SRI frameworks systematically ignore. While individual start-up investments carry higher risk and lower liquidity, the aggregated portfolio effect, diversified across multiple Greentech sectors, provides a return profile uncorrelated with conventional equity market cycles.

The Active Engagement Strategy: Creating a Win-Win Ecosystem

The NZI Fund's most distinctive structural innovation is its Active Engagement Strategy, which creates a symbiotic ecosystem between the two portfolio layers. Patents and technological breakthroughs generated by Greentech start-ups in Layer 2 are channeled directly to the listed companies in Layer 1 through structured engagement agreements. This creates a self-reinforcing innovation loop:

- **For Listed Companies:** Access to proprietary green technology reduces the cost and risk of R&D investment, enabling genuine Environmental Innovation improvement at a pace and cost structure that would be unachievable through organic investment alone.
- **For Green-tech Start-ups:** Institutional backing from the NZI Fund provides capital access and market credibility that unlisted innovation companies typically struggle to secure from conventional investors.
- **For SRI Investors:** The fund generates a positive moderating role for SRI intensity, precisely the dynamic identified as absent in H4, by ensuring that responsible capital flows translate into measurable technological transition rather than mere compliance signaling.

- **For the Regulatory Framework:** The NZI Fund operationalizes the “Double Materiality” principle mandated by CSRD, simultaneously improving the environmental impact of investee firms while enhancing their financial resilience through innovation-led differentiation.

In the optimized NZI Fund scenario, SRI intensity acts as a positive moderator that finally aligns environmental performance with superior financial outcomes, inverting the negative moderation paradox identified in H4 and transforming it into a value creation mechanism.

Selection Methodology and Financial Prudence

To ensure both ecological integrity and financial viability, the NZI Fund applies a multi-step selection process grounded in the analytical tools identified in the literature review:

- **Multi-Criteria Decision Analysis (MCDA):** As recommended by Arjaliès et al. (2018, 2020), MCDA is used to weight and harmonize ESG indicators across multiple rating agencies, mitigating the subjectivity and inconsistency that Johnson (2020) identifies as a primary impediment to credible impact measurement.
- **SMART Objective Framework:** The Specific, Measurable, Assignable, Realistic, and Time-bound (SMART) approach conceptualized by Doran (1981) is applied to define and track sustainability objectives for each portfolio company, creating clear accountability for both environmental and financial targets.
- **Impact Multiple of Money (IMM):** Borrowed from the Private Equity toolkit, as recommended by Liang and Renneboog (2020) and Addy et al. (2019), the IMM model enables the monetization of social and environmental impacts, allowing investors to calculate a specific return on impact for every euro deployed.
- **Strategic Classification Framework:** Investee sectors are mapped into four asset classes based on climate urgency and innovation maturity, utilizing the framework developed by Nguyen and Clostre (2021) for the Harvard Business Review France and endorsed by Stanford University.

Individual company selection further requires scrutiny of ROA and market benchmarks to ensure the fund meets fiduciary requirements, consistent with the finding that economic profitability is the primary driver of environmental engagement capacity.

Regulatory Positioning and Transition from Article 8 to Article 9

A central regulatory recommendation embedded in the NZI Fund design concerns the SFDR classification framework. Given that the SRI label currently encompasses Article 8 funds (those promoting sustainable characteristics without mandating specific sustainable goals), the study recommends a tightening of eligibility criteria to restrict SRI label endorsement to Article 9 funds (those pursuing quantifiable and explicit sustainable objectives).

This recommendation directly addresses the greenwashing risk identified in the data: because Article 8 funds have no obligation to pursue specific environmental outcomes, their inclusion under the SRI label dilutes the label's credibility as an environmental integrity signal. An Article 9 mandate, by contrast, would create verifiable accountability for the Innovation dimension that current labeling frameworks ignore.

The research notes with relevance that several of its recommendations have been independently incorporated into recent European regulatory proposals, including: the enhancement of capital allocation toward innovation (CSRD Omnibus Package, December 2025); encouragement of carbon-transition engagement rather than pure exclusion; implementation of investment thresholds for SRI qualification; and simplification of ESG disclosure for financial market participants.

Five Pillars for SRI Ecosystem Reform

The NZI Fund is embedded within a broader five-pillar reform agenda for the European SRI landscape:

Pillar	Recommendation	Evidence Base and Impact
1	Prioritize Green Revenues	Target assets that generate tangible environmental outcomes. Current label criteria allow Article 8 funds with no environmental mandate; shifting to green revenue targets ensures genuine impact alignment.
2	Optimize Selection	Transition from simple exclusion to “best-in-class” or “best-effort” approaches. Descriptive analysis shows SRI intensity twice as high in polluting sectors, confirming that exclusion alone fails to redirect capital.
3	Active Management	Shift from passive index-tracking to active portfolio management. 40% of the study sample relies on passive management mirroring conventional indices, undermining the depth of sustainability screening.

4	Target Climate-Critical Sectors	Focus capital on high-impact profitable sectors such as power generation and energy storage, identified as meeting both high-profitability and urgent climate mitigation requirements (OECD, 2013).
5	Active Stewardship	Engage directly to influence the strategic direction of portfolio companies toward decarbonization. H4 results confirm that passive SRI investment amplifies market penalties; only active engagement can reverse the moderation dynamic.

ACADEMIC AND PRACTICAL CONTRIBUTIONS

Contribution to the Engaged Management Scholarship Literature

This research makes four distinct contributions to the Engaged Management Scholarship literature, each at the intersection of rigorous empirical analysis and actionable managerial insight:

- **First-of-Kind Empirical Evidence on SRI Moderation:** The study provides the first empirical quantification of SRI's moderating role within the environmental-financial performance nexus. While prior literature identifies the difficulty of measuring SRI environmental impact (Margolis et al., 2009; Arjaliès et al., 2020), no prior study has operationalized and tested this specific moderating pathway in a European listed equity context. The use of panel econometrics: OLS and SURE across 279 observations, establishes a methodological benchmark for future SRI impact research.
- **Disaggregation of Environmental Performance:** By separately analyzing three sub-components of the LSEG environmental score (Emissions, Resources, Innovation), the study reveals a differentiated SRI impact profile that aggregate analyses consistently mask. The negative Innovation effect, statistically robust across both the full sample and polluting sub-sample, is invisible in prior research that relies on composite ESG scores. This disaggregation is both a methodological and theoretical contribution.
- **Sector-Specific Moderation Dynamics:** The finding that SRI moderation effects are concentrated within polluting sectors challenges the assumption of uniform SRI impact across industry classifications. For non-polluting firms, SRI effects on financial performance are consistently insignificant, suggesting that the mechanisms through which SRI creates value (or destroys it) are

sector-specific rather than universal. This finding calls for a fundamental restructuring of academic SRI models to incorporate sectoral heterogeneity as a central design parameter.

- **The Policy-Practice Alignment Finding:** The study identifies that several of its regulatory recommendations have been independently validated by recent European Commission proposals (CSRD Omnibus Package, SFDR simplification, ESRS amendments), confirming the practical relevance of its empirical conclusions and establishing a feedback loop between academic evidence and regulatory design.

Practical Implications for Asset Managers

The findings carry direct and concrete implications for institutional investors operating within European SRI frameworks:

- **Refine Selection Criteria for Innovation:** Current screening methodologies overweight backward-looking compliance metrics at the expense of forward-looking innovation indicators. Asset managers should integrate explicit Innovation performance thresholds into their selection criteria, potentially requiring minimum green R&D investment ratios or green patent filing rates as conditions for SRI label qualification.
- **Transition from Passive to Active Management:** The 40% passive management rate observed in the sample represents a structural impediment to genuine environmental engagement. Active management enables shareholder engagement, proxy voting aligned with ESG objectives, and direct board-level influence on R&D strategy — the mechanisms through which SRI can transition from a compliance signal to an innovation catalyst.
- **Implement Impact Multiple of Money (IMM) Metrics:** The adoption of IMM reporting for SRI portfolios would enable investors to calculate specific environmental returns on each euro deployed, creating the accountability infrastructure required to distinguish genuine impact from compliance signaling. This aligns with the regulatory trajectory toward double materiality reporting under CSRD.
- **Engage Directly with R&D Strategy:** As confirmed by Revelli (2012), the exercise of voting rights to influence corporate strategic direction is crucial for long-term environmental innovation. Asset managers should develop structured engagement programs specifically targeting R&D investment decisions and green technology adoption roadmaps in their polluting-sector holdings.

Implications for Regulators and Policymakers

The study's findings have direct relevance for European regulatory design, particularly in the context of ongoing SFDR, CSRD, and SRI Label reform:

- **Mandate Innovation Weighting in ESG Criteria:** The European Commission and national labeling authorities should require explicit, weighted criteria for environmental innovation in all SRI label eligibility frameworks. Green patents, R&D investment ratios, and clean technology deployment milestones could be mandatory disclosure items, not optional reporting categories.
- **Raise Article 8 to Article 9 Standards:** The SRI label's current accommodation of Article 8 funds, which have no mandate to pursue specific environmental goals, undermines its credibility as an environmental integrity signal. Restricting label eligibility to Article 9 funds would create verifiable accountability and reduce greenwashing risk.
- **Simplify ESG Rating Comparability:** The heterogeneity of ESG rating methodologies across providers creates a measurement environment in which investors cannot reliably compare scores or set meaningful environmental thresholds. Regulators should mandate minimum comparability standards for ESG data providers, including standardized sector classifications, materiality weighting methodologies, and validation protocols.
- **Incentivize Innovation in Polluting Sectors:** Rather than relying exclusively on divestment pressure (which the study shows amplifies market penalties without driving innovation), regulators should design positive incentives such as tax credits for green R&D, preferential EU ETS treatment for patent-active firms, or direct co-investment mechanisms that reduce the cost of capital for polluting firms undertaking genuine technological transition.

Future Research Directions

The study identifies several avenues for future research that would extend and deepen its contributions:

- **Extended Temporal Analysis:** The 2020–2022 study period captures a specific regulatory and market cycle. Future research should extend the panel to incorporate the post-CSRD mandatory reporting period (2025 onwards), enabling analysis of whether mandatory disclosure requirements alter the SRI-Innovation relationship.
- **Multi-Provider ESG Comparison:** Testing the study's findings using alternative ESG data providers (Bloomberg, Moody's, MSCI) would clarify whether the Innovation deficit is an artifact of LSEG's specific scoring methodology or a structural feature of the European SRI landscape.

- **Qualitative Executive Interviews:** Structured interviews with corporate executives and portfolio managers would illuminate the internal barriers to green innovation identified quantitatively in H1, providing the micro-level mechanisms that econometric modeling cannot capture.
- **Physical and Transition Risk Integration:** The rising severity of physical and transition climate risks, 2024 was the hottest year on record, exceeding 1.5°C of warming above pre-industrial levels (Haut Conseil du Climat, 2025), suggests that the financial performance of carbon-intensive firms may deteriorate more rapidly than current models predict. Integrating climate risk metrics (SASB/ISSB standards) into the analytical model would enhance the study's predictive power.
- **NZI Fund Pilot Tracking:** A longitudinal case study tracking the implementation and performance of the NZI Fund, from initial capital deployment through the 2025-2035 investment horizon projected in Figure 1, would provide the first empirical test of whether active innovation-oriented SRI can reverse the negative moderation dynamic identified in H4.

CONCLUSION

This research has navigated the complex and frequently contradictory relationship between Socially Responsible Investment and corporate performance across the European listed equity landscape. By analyzing 110 companies nested within 21 Amundi SRI-labeled equity funds between 2020 and 2022, the study has uncovered a structural “decoupling” between environmental aspiration and financial reality, and between short-term compliance and long-term transformation that lies at the heart of contemporary responsible finance.

The four hypotheses yield a coherent and sobering picture. SRI successfully drives operational compliance, improving Emissions management and Resource efficiency in both polluting and non-polluting firms, through the regulatory push of European ESG frameworks and the signaling mechanism that attracts responsible capital. But SRI demonstrably fails to incentivize environmental Innovation, precisely the dimension that determines whether today's polluting companies become tomorrow's green leaders or tomorrow's stranded assets.

The market's response to this structural failure is unambiguous. It penalizes polluting firms that improve their ESG compliance scores without undertaking genuine technological transformation, and it amplifies this penalty as SRI intensity grows within those firms' shareholder base. The result is a responsible investment ecosystem that inadvertently reinforces short-termism, rewarding visible compliance metrics

while ignoring the invisible investments in R&D and green technology that would make a difference to the trajectory of the real economy.

The Net-Zero Innovation Fund transforms the SRI investor from a passive compliance monitor to an active architect of transition, deploying capital not to certify what polluting firms have already achieved, but to fund what they must become.

By co-investing in the listed transition leaders and unlisted Greentech disruptors whose collaboration can break the innovation deficit, the NZI Fund creates the win-win ecosystem that current SRI frameworks cannot: one in which environmental performance and financial performance are genuinely aligned, and in which SRI intensity acts as a positive moderator rather than a paradoxical amplifier of market penalization.

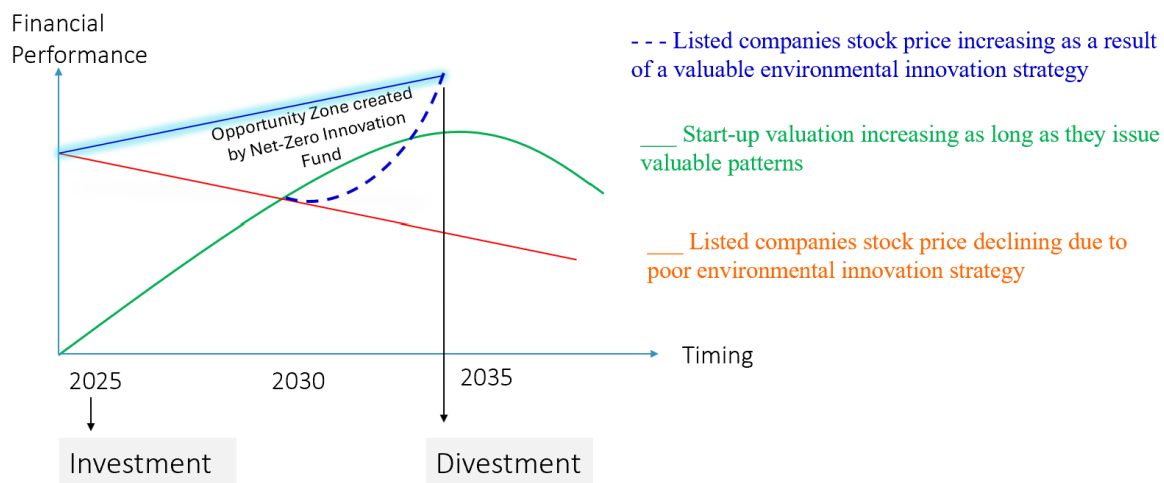
The research's practical contribution, a concrete, evidence-based fund design grounded in original econometric analysis, exemplifies the engaged management scholarship model: rigorous, practice-relevant, and oriented toward lasting impact on organizations, investors, and society. The Net-Zero Innovation Fund is not merely an academic proposal. It is an operational blueprint for the next generation of responsible finance.

TABLE 1 - Results of OLS and SURE Regression Analyses

Variable	Total sample β (t)	Polluting β (t)	Non-polluting β (t)	Hypothesis status
<i>H1: SRI $\rightarrow$ Environmental performance</i>				<i>Partially supported</i>
Emissions performance	0.65** (3.39)	1.10*** (4.87)	0.33 (0.96)	
Resource use performance	0.57*** (3.03)	0.62*** (2.70)	0.80** (2.43)	
Innovation performance	-2.55*** (-7.43)	-3.70*** (-8.10)	-0.98* (-1.72)	
<i>H2: SRI $\rightarrow$ Financial performance (Tobin's Q)</i>				<i>Supported</i>
<i>H3: Environmental performance $\rightarrow$ Financial performance</i>				<i>Partially supported (sign reversed)</i>
Overall environmental performance	-2.36*** (-2.66)	-5.45*** (-3.22)	-0.15 (-0.17)	
Innovation performance	-0.69 (-1.52)	-2.36*** (-2.86)	0.35 (0.78)	
<i>H4: SRI moderates Environmental $\rightarrow$ Financial</i>				<i>Supported</i>
Overall env. performance $\times$ SRI	-1.96** (-1.91)	-3.20* (-1.90)	-0.57 (-0.45)	
Emissions performance $\times$ SRI	-1.81** (-2.22)	-3.00** (-2.31)	-0.69 (-0.61)	
Resources performance $\times$ SRI	-1.47* (-1.86)	-2.56* (-1.94)	-0.35 (-0.37)	

Note. OLS = ordinary least squares; SURE = seemingly unrelated regression. β = unstandardized regression coefficient; t statistics in parentheses. Significance thresholds: * $p < .10$, ** $p < .05$, *** $p < .01$ (two-tailed). Control variables (ROA, firm size, leverage, sectoral sensitivity, geographic region) included in all specifications but omitted from table for brevity. Polluting sectors classified per the Environmental Sensitivity Index. Winsorization applied at the 1st and 99th percentiles.

FIGURE 1 - The NET-ZERO INNOVATION FUND Model Opportunity



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