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# Green Revenues, Greener Margins: The Global Financial Impact of Eco-Friendly Products

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## Abstract

I examine revenues from eco-friendly products and their impact on corporate profitability and environmental policies in a large cross-country sample. Following multiple quasi-exogenous shocks to eco-friendly revenues, which reached $4.7 trillion in 2023, (1) firms improve profitability, enhance cash flows, and reduce CO2 emissions, and (2) profitability effects are stronger during economic downturns and in countries with greater climate vulnerability and climate risk awareness. Socially-oriented institutional investors significantly boost sustainable revenue generation, while managerial incentives show limited impact. These findings highlight the importance of sustainable revenues in aligning financial gains with environmental goals and adapting to evolving consumer preferences.


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Keywords: Eco-friendly products, sustainable revenues, emissions, responsible investors

JEL Classifications: F30, G30, G38, Q50, Q54



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December 18, 2024

**Abstract**

I examine revenues from eco-friendly products and their impact on corporate profitability and environmental policies in a large cross-country sample. Following multiple quasi-exogenous shocks to eco-friendly revenues, which reached $4.7 trillion in 2023, (1) firms improve profitability, enhance cash flows, and reduce $CO_2$ emissions, and (2) profitability effects are stronger during economic downturns and in countries with greater climate vulnerability and climate risk awareness. Socially-oriented institutional investors significantly boost sustainable revenue generation, while managerial incentives show limited impact. These findings highlight the importance of sustainable revenues in aligning financial gains with environmental goals and adapting to evolving consumer preferences.

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# 1 Introduction

Investor concerns about the long-term threats posed by environmental externalities to business viability, coupled with growing consumer demand for environmentally friendly products and stringent regulatory pressures, underscore a pivotal shift in market dynamics, prompting firms to prioritize sustainability within the global business landscape (e.g., Gasparini and Tufano, 2023; Azar, Duro, Kadach, and Ormazabal, 2021; Krueger, Sautner, and Starks, 2020). Yet, despite extensive research on corporate environmental activities, potential opportunities arising from environmental challenges have received limited attention.[1] This oversight is significant given that the benefits of addressing these challenges could substantially outweigh the costs, thereby facilitating a green transition (e.g., Carbon Disclosure Project, 2019).[2]

To capitalize on these opportunities, firms are increasingly embracing eco-friendly products, revenues from which reached $4.7 trillion in 2023 and are comprising an ever-growing share of total revenues. For instance, the share of new consumer packaged products that incorporate sustainability benefits rose from 28% in 2017 to 48% in 2021 (NYU Center for Sustainable Business, 2024). This growth is fueled by rising demand for sustainable products—projected to generate over $12 trillion annually by 2030—as well as support from influential institutional investors like BlackRock and policy initiatives such as the European Green Deal (McKinsey&Company, 2022). Although eco-friendly revenues grow both in size and as a proportion of overall sales, their impact on corporate financial and environmental outcomes, as well as motivations behind firms' emphasis on eco-friendly products, remain largely underexplored, which are the questions I address in this paper. As consumer demand, investor priorities, and regulatory preferences shift toward sustainability, sustainable revenues can have profound effects on firms' competitiveness and long-term viability.

The pursuit of eco-friendly revenues is rooted in the recognition that long-term business success is increas-

[1] Apart from several studies examining the impact of consumer ESG preferences on firms (e.g., Meier, Servaes, Wei, and Xiao, 2023; Dai, Liang, and Ng, 2021a), much research on corporate environmental behavior focuses on costs arising from environmental challenges like $CO_2$ emissions (e.g., Azar et al., 2021; Bolton and Kacperczyk, 2021; Hsu, Li, and Tsou, 2023), ESG ratings (e.g. Dyck, Lins, Roth, and Wagner, 2019; Liang and Renneboog, 2017), institutional investor influence (e.g., Dikolli, Frank, and Guo, 2022; Pastor, Stambaugh, and Taylor, 2021), and mechanisms such as capital markets and ESG-linked pay (e.g., Shive and Forster, 2020; Cohen, Kadach, Ormazabal, and Reichelstein, 2023).

[2] This report estimates that the potential value of climate-related opportunities among the 500 largest firms exceeds $2.1 trillion over the next five years, compared to $311 billion in related costs. These opportunities are primarily driven by anticipated revenue growth from increased demand for low-emission products and services, as well as enhanced competitive positioning in response to shifting consumer preferences.

ingly intertwined with sustainability. Companies cite a variety of reasons in their reports for offering sustainable products, including mitigating environmental impact, improving financial performance, and enhancing competitiveness—all consistent with theoretical studies that initiatives aligned with stakeholder expectations can foster both financial and social returns (e.g., Bénabou and Tirole, 2010; McWilliams and Siegel, 2001). For example, Unilever's 2022 annual report highlights that its sustainability-linked brands grew 46% faster than its conventional lines, contributing 75% of the company's total sales growth and advancing its goal to halve the environmental footprint of its products by 2030.[3]

Consumer preferences further support this trend toward sustainability: over 46% of consumers report buying sustainable products to reduce their environmental footprint (PwC, 2024), with sustainable products commanding at least a 12% premium globally (Bain&Company, 2023). In addition, prior research suggests that environmental controversies negatively impact sales (e.g., Houston, Lin, Shan, and Shen, 2024; Environmental Defense Fund, 2019), while ESG-conscious firms benefit from enhanced consumer loyalty (Servaes and Tamayo, 2013; Luo and Bhattacharya, 2006), pricing power (Creyer and Ross, 1997), product differentiation (Flammer, 2015b; Albuquerque, Koskinen, and Zhang, 2019), increased trust (e.g., Flammer, 2018; Flammer and Kacperczyk, 2019), and employee productivity (Edmans, 2011), among other advantages. However, such initiatives may also reflect agency conflicts (e.g., Bebchuk and Tallarita, 2022; Cheng, Hong, and Shue, 2023; Masulis and Reza, 2015), indicating that investments in sustainable products could adversely affect firms.

I obtain data on sustainable revenues from FTSE Russell from 2008 through 2023 for 3,480 firms from 46 countries, which allows for an in-depth analysis of consumer demand for eco-friendly products and its influence on corporate cash flows. Unlike $CO_2$ emissions, which primarily reflect environmental impact, and aggregated ESG ratings, which can be subjective (Berg, Koelbel, and Rigobon, 2022), sustainable revenues offer a transparent and direct measure of environmental engagement and its economic value, and are less susceptible to greenwashing as they are based on actual sales figures. Highlighting their novelty, sustainable revenues exhibit low correlations with ESG ratings and emissions.

I first examine whether eco-friendly products have any meaningful effects on environmental and financial outcomes. To isolate the effects of sustainable revenues from other firm-specific factors, I rely on the adoption of

[3]The internet appendix A1 provides various corporate statements on green products, frequently highlighting strong consumer demand and efforts to achieve net-zero greenhouse gas emissions.

green public procurement (GPP) laws, the primary goal of which is to reduce environmental impact by requiring government purchases of goods and services to meet certain environmental criteria. In doing so, these laws encourage suppliers to offer eco-friendly products and adopt sustainable practices, directly boosting corporate sustainable revenues and allowing for observed changes in outcomes variables to be more credibly attributed to sustainable revenues rather than underlying firm characteristics. 24 of the 46 countries in the sample adopt such laws between 2003 and 2021.

Using a stacked event-study based difference-in-differences approach with multiple high-dimensional fixed effects to control for unobserved firm heterogeneity as well as time-varying industry and country characteristics (Cengiz, Dube, Lindner, and Zipperer, 2019; Cunningham, 2021), I find that sustainable revenues increase significantly within three years of GPP law enactment. During the same period, affected firms show a significant reduction in $CO_2$ emissions, the largest contributor to climate change (Intergovernmental Panel on Climate Change, 2021). This effect is observable only after the GPP laws take effect, with an average cumulative decrease of 38.27% within the three-year post-adoption period. These results are consistent with the argument that sustainable revenues enable firms to incorporate environmental goals into their operational activities.

Are eco-friendly products financially sound? Ex-ante, it is not clear that such products maximize shareholder value. While sustainable products often fetch a premium and can be used for competitive advantage, resulting in higher profitability (e.g., Flammer, 2015b; Ferrell, Liang, and Renneboog, 2016; Lins, Servaes, and Tamayo, 2017), they can also reflect self-serving motives by executives seeking to enhance their reputation (Cheng et al., 2023). Further, these products are often costlier to produce, potentially reducing firm value (Brogaard, Gerasimova, Kim, and Rohrer, 2024).

I find a substantial improvement in profitability for the affected firms in the post-adoption period, with profit margins increasing by 71.79 % within the (0, 3) event window. Firms also enjoy a significant increase in cash flows and valuations, indicating that the market perceives the affected firms as having stronger growth potential and valuable intangible assets, such as brand reputation or environmental innovation capabilities. The rise in growth opportunities—evident in significantly higher sales and market share gains—further suggests that these firms are successfully capitalizing on consumer demand for environmentally-friendly products and fostering customer loyalty. This aligns with theory suggesting that firms can leverage environmental sustainability for product differentiation,

establishing a competitive advantage (e.g., Bénabou and Tirole, 2010; Frynas and Yamahaki, 2016). Further, the increase in sales per employee points to potentially higher productivity and more efficient workforce management.

I next examine whether revenues from eco-friendly products can provide firms with protection during economic downturns (van Binsbergen, 2016; Engle, Giglio, Kelly, Lee, and Stroebel, 2020). Eco-friendly products resonate with consumers' preferences for environmental responsibility, and this loyalty may lead to less elastic consumer demand (Albuquerque et al., 2019; Lins et al., 2017; Albuquerque, Koskinen, Yang, and Zhang, 2020). However, during economic hardship, consumers might become more price-sensitive, potentially substituting sustainable products with cheaper alternatives. My findings show that sustainable revenues are notably resilient during periods of economic downturn, measured by recession and crisis periods, suggesting that sustainable revenues may act as a buffer for firms by reducing demand elasticity during adverse economic conditions.

Not all countries share the same urgency toward addressing environmental challenges, and perceptions of climate change threats vary significantly (e.g., World Bank, 2021). These cross-country differences can influence consumer demand, and thus the premium firms can extract from consumers, for eco-friendly products. I find that sustainable products perform particularly well in countries where climate change is perceived as a significant threat. For example, in countries with high levels of belief that climate change causes significant harm, firms experience an average 33.63% increase in profitability, in contrast to losses observed in countries with lower concern for climate issues. This suggests that in these environments, consumers and investors may place a premium on eco-friendly products, boosting sales and supporting higher valuations. This weaker consumer demand in low-climate-awareness countries may explain regional disparities in green product development. Finally, firms in more climate-vulnerable countries exhibit higher profitability from eco-friendly revenues, potentially driven by heightened demand for sustainable solutions that address local environmental challenges, resource constraints, or regulatory pressures.

I conduct several robustness tests to ensure the consistency of these results and find that they remain robust across alternative samples, eco-friendly revenue shocks, and estimation methods, each providing unique advantages. First, I undertake a nearest neighbor matching strategy where I match firms subject to GPP laws with other firms in terms of the natural logarithm of total assets, ROA, total institutional ownership, ESG ratings, and leverage based on the year before the law's adoption and within the same industry. This matched sample controls

for observable firm characteristics prior to treatment, enhancing comparability between treated and control firms.

Second, to address potential endogeneity concerns further, I use an instrumental variable (IV) approach where I instrument sustainable revenues by distributing them quasi-randomly across countries with the passage of GPP laws and similar attention to environmental issues—natural climate disasters (e.g., Kruttli, Tran, and Watugala, 2024; Gustafson, He, Lel, and Qin, 2024) and political environments (e.g., Gormley, Jha, and Wang, 2024; Pagano and Volpin, 2005). While the DiD design identifies causal effects of GPP laws, the IV estimation accounts for unobserved factors influencing both eco-friendly product adoption and firm performance, strengthening the causal interpretation of green revenues' impact and complementing the DiD analysis.

Third, I use green funding initiatives and the Paris Climate Agreement as additional shocks to revenues from eco-friendly products. Across all these tests, the results remain robust, confirming the consistency of findings across different exogenous shocks and strengthening the validity of the link between sustainable revenues and observed financial and environmental outcomes. Overall, these findings emphasize the economic and strategic value of sustainable product lines, highlighting their role in enhancing financial resilience, fostering customer loyalty, and providing a competitive edge in the market.

Based on these results showing that firms offering eco-friendly products can reduce carbon emissions and improve profitability, I next examine the characteristics driving revenues from these products. While companies with greater sustainable investments and peer effects exhibit higher sustainable revenue percentage, institutional investors emerge as a key driver: moving from the bottom to the top quartile of institutional ownership correlates with a 33.92% increase in sustainable revenue percentage, with a stronger effect from socially responsible institutions (SRIs).

To address potential endogeneity concerns with SRI ownership, I use the MSCI ACWI Select ESG index additions as an exogenous shift in such ownership, and find that SRI ownership, but not ownership by other institutional investors, increases following inclusion of a firm's shares in the index. More importantly, using this inclusion as an instrumental variable, I observe a statistically and economically significant increase in sustainable revenue percentage. Given the passive nature of funds tracking the index, this finding suggests that institutional influence occurs through engagement rather than selecting firms already high in green income, aligning with studies on institutional influence over ESG issues (e.g., Pastor et al., 2021; Broccardo, Hart, and Zingales, 2022).

## 2 Related Literature

This paper sits at the intersection of studies on consumer ES preferences and corporate revenues (e.g., Meier et al., 2023; Houston et al., 2024), valuation effects of ES policies (e.g., Flammer, 2015a; Ferrell et al., 2016; Albuquerque et al., 2020), and negative corporate environmental externalities (e.g., Shive and Forster, 2020; Azar et al., 2021; Hsu et al., 2023).

I build on studies linking corporate ES policies to consumer demand. Meier et al. (2023) and Houston et al. (2024) use barcode data to connect ES controversies to consumer demand at the firm and household levels, while Christensen, De George, and Joffre (2023) focuses on social events, and Zheng and Zheng (2023) uses foot-traffic data to study the impact of ES controversies on revenues. Other studies, such as Dai et al. (2021a), Schiller (2018), and Bisetti, She, and Zaldokas (2024), show that corporate customers are attentive to suppliers' ES policies. I complement these studies in several important ways.

First, declines in total revenues following ESG controversies, as documented in prior research, may capture losses in segments unrelated to consumer ESG preferences. Alternatively, these findings might reflect the inability of firms to offset declines in "green" segments with increased revenues from non-green segments, raising questions about whether such revenue drops truly represent an eco-conscious, consumer-driven penalty. By focusing on revenues from eco-friendly products rather than aggregated sales, I provide further insights into how consumer ESG preferences, reflected in demand for sustainable products, affect corporate cash flows and drive value creation—an area that remains underexplored (e.g., Gillan, Koch, and Starks, 2021; Starks, 2023).[4] This approach also tests the customer loyalty channel more directly, avoiding reliance on broader ESG ratings or advertising expenditures (e.g., Lins et al., 2017; Albuquerque et al., 2019). Second, I analyze changes in both corporate profitability and environmental policies following exogenous increases in sustainable revenues. My focus on revenues from sustainable products enables a closer alignment with theories on consumer ES preferences (e.g., Bénabou and Tirole, 2010; Kotchen, 2006; Baron, 2001). Third, by employing a cross-country sample, I examine how country-level factors shape consumer demand for eco-friendly products and influence their profitability. Fourth, I investigate whether sustainable products provide protection during economic downturns, and lastly, by isolating the financial impact of sustainable products, I offer new insights into how targeted environmental strategies, such as GPP laws,

[4]Environmental factors can also affect discount rates (e.g., Albuquerque et al., 2019; Pastor et al., 2021).

translate into tangible revenue streams and affect cash flows.

In a contemporaneous working paper, Klausmann, Krueger, and Matos (2024) investigate sustainable revenues but focus largely on portfolio-level stock returns and the role of sustainable patents, while Bassen, Shu, and Tan (2023) and Kruse, Mohnen, and Sato (2024) explore sustainable revenues in relation to stock returns. My study diverges in several important dimensions. I emphasize real outcomes, such as $CO_2$ emissions, and employ multiple quasi-natural experiments based on regulatory changes and natural disasters to establish causality. Additionally, I examine how eco-friendly product revenues impact valuations across economic cycles and diverse cultural and regulatory contexts. By including a broad set of financial metrics—profitability, cash flows, market-to-book ratio, sales, and market share—my study also offers a more comprehensive view of financial performance.

Further, I extend the literature on the valuation implications of corporate ES activities by focusing on the profitability of sustainable revenues and how this effect varies over economic conditions and across countries (Lins et al., 2017). My findings show that sustainable product sales exhibit inelastic price sensitivity in environmentally aware markets (Bansal and Roth, 2000; Delmas and Toffel, 2008), indicating a robust consumer base that values sustainability, which can explain why firms in some countries lag in eco-friendly product development. Additionally, sustainable product sales offer protection during economic downturns, highlighting their role as a potential hedge for investors mindful of climate risks (Engle et al., 2020; Pastor et al., 2021).

Finally, this paper contributes to discussions on mitigating negative environmental externalities (e.g., Albuquerque et al., 2020; Azar et al., 2021), as the findings suggest that developing eco-friendly products can help firms internalize such externalities as $CO_2$ emissions. This suggests that eco-friendly products reflect a genuine environmental impact rather than greenwashing and may align with both shareholder welfare and market-value maximization (Hart and Zingales, 2017). Further, I add to the literature on institutional investors' influence on corporate sustainability, showing that these investors not only drive ESG practices (e.g., Dimson, Karakas, and Li, 2015; Azar et al., 2021; Dyck et al., 2019) but actively capitalize on sustainable revenue opportunities in response to environmental challenges. Lastly, my findings support the effectiveness of policies such as GPP laws and green funding initiatives in advancing sustainability, suggesting that institutional investors and policy reforms can work together to support the green transition.

# 3 Data and Sample Construction

I obtain data on sustainable corporate revenues from FTSE Russell Green Revenues Data Model, which defines corporate sustainable revenues as the portion of a company's revenue derived from products and services that contribute to the global green economy. This encompasses activities that promote environmental sustainability, such as renewable energy generation, energy efficiency, pollution control, sustainable agriculture, and water management. The model assesses firms' sustainable revenues using the Green Revenues Classification System (GRCS), providing a detailed perspective on diverse green activities.[5] After merging the sustainable revenue dataset with corporate financial, ESG, and institutional ownership data from Refinitiv and FactSet, the final regression sample consists of 36,634 firm-year observations, covering 3,480 unique firms across 46 countries from 2008 to 2023.[6]

There are two important features of this database. First, it explicitly distinguishes firms that report zero sustainable revenues from those with missing sustainable revenue data, ensuring that I do not mistakenly assume missing data to represent zero sustainable revenues—a misclassification that could significantly distort regression estimates. Consistent with this, I find that these two groups of observations are systematically different in terms of firm size, investments, and institutional ownership, as reported in Table IA1 in the internet appendix. Second, there is a notable increase in the average sustainable revenue percentage since 2016. To control for annual variations and potential structural changes in the data before 2016, all regressions include year fixed effects.[7]

ESG ratings and $CO_2$ emissions are standard metrics employed in the literature to assess corporate environmental impacts (e.g., Dyck et al., 2019; Liang and Renneboog, 2017; Azar et al., 2021; Bolton and Kacperczyk, 2021). Sustainable revenues, however, capture a company's active innovation in sustainable product lines and reflect efforts to capitalize on opportunities posed by environmental challenges. They have two additional ad-

[5]See Kruse et al. (2024) for a detailed overview of this dataset. Sustainable revenue data is primarily sourced from publicly disclosed documents (e.g., annual and sustainability reports) and verified directly by FTSE Russell with companies to ensure accuracy. GRCS, while highly aligned with the EU Taxonomy, is more comprehensive, assessing revenues against six environmental objectives—climate change mitigation, adaptation, resource protection, circular economy, pollution control, and biodiversity—without harming others. It categorizes revenues into 10 sectors, 64 sub-sectors, and 133 micro-sectors, providing a detailed perspective on diverse green activities.

[6]I exclude countries with fewer than 20 observations, banks, and the pre-2008 data for the regression analysis given data on sustainable revenues are available for very few firms until 2008. The missing information on institutional ownership and ESG characteristics are the main limiters of the regression sample size.

[7]I also employ two methods to address the potential impact of a backfilling bias in the green revenue dataset. First, the GRCS database indicates whether green revenue is self-reported by the firm or estimated by the data vendor. For robustness, this indicator is used as a control variable throughout the analysis. Second, I impute each firm's green revenue percentage for the pre-2016 period using the corresponding estimated minimum and maximum values of this variable based on the data each firm reported in the post-2015 period. In both cases, the main results remain robust.

vantages. First, unlike ESG ratings, they offer a direct and precise measure of economic value derived from sustainable practices, facilitating more efficient capital allocation toward the green economy. They also rely on objective sales data tied to specific products, reducing susceptibility to biases inherent in ESG ratings (Berg et al., 2022). Second, unlike industry-specific $CO_2$ emissions, which are highly industry-specific and may not fully reflect a firm's broad environmental activities, sustainable revenues provide a comprehensive measure of a firm's environmental impact. Sustainable revenues exhibit low correlations with ESG ratings and $CO_2$ emissions, as reported in Table IA2 in the internet appendix, indicating that they contain new information.

[Table 1 here]

Table 1 displays a country breakdown of this sample, The data show that U.S. firms make up 23.46% of the sample, with Japanese and British firms comprising 11.71% and 8.46%, respectively. The main variable of interest throughout the analysis is the sustainable revenue percentage, defined as the percentage of revenues derived from environmentally friendly products. Norway reports the highest average sustainable revenue percentage at 16.11%, followed by Brazil at 14.04% and Denmark at 12.67%. In 2023, revenues from eco-friendly products reached \$4.7 trillion, making up 6.43% of total revenues. U.S. firms accounted for \$1.13 trillion of this total, followed by Chinese firms with \$0.85 trillion and Japanese firms with \$0.61 trillion. Table 2 presents summary statistics for the key variables used in the analysis. The average sustainable revenue percentage among firms is 6.86%, with a standard deviation of 18.52%, indicating significant variation in the extent to which firms generate revenue from environmentally friendly activities. On average, firms generate \$333 million in sustainable revenues and have institutional ownership of 44.19%, with 17.68% of ownership held by socially responsible institutional investors that are signatories to the United Nations Principles for Responsible Investment (UN PRI).

[Table 2 here]

# 4 Effects of Sustainable Revenues on Corporate Policies

This paper examines how consumer demand for sustainable products affects corporate profitability and environmental policies. However, establishing a clear causal relationship is challenging. A simple OLS approach

could yield biased estimates due to endogeneity concerns such as reverse causality and omitted variable bias. For instance, firms with stronger profitability or established environmental policies may be more inclined to invest in sustainable products, creating a correlation between sustainable revenues and profitability (or environmental policies) that does not necessarily reflect a causal impact of sustainable sales.

To address these challenges, I rely on the adoption of green public procurement (GPP) laws, which provide a source of variation exogenous to firm fundamentals. These laws serve provide a valuable source of exogenous variation, as they mandate that government agencies to prioritize environmentally friendly products and services, creating a shift in demand that is driven by policy rather than firm-specific characteristics. This policy-driven shift provides an exogenous shock to firms' green revenue, as the increase in demand for green products following GPP adoption is largely independent of the firms' existing strategies, profitability, or environmental policies. For robustness, I examine two additional policy initiatives that stimulate sustainable corporate product offerings, the green funding initiatives and the Paris Climate agreement, and report the results in Section 4.7. However, a caveat with the latter initiative is that it can impact not only sustainable revenues but also other aspects of firm behavior, making it difficult to isolate the direct impact of an exogenous increase in demand for eco-friendly products.[8]

I employ a stacked event-study based difference-in-differences (DiD) analysis to examine firm outcomes surrounding the GPP law adoption (Cengiz et al., 2019; Cunningham, 2021). By comparing firm outcomes before and after the adoption of GPP laws, this approach helps establish a causal link between sustainable product demand—induced by GPP laws—and changes in corporate outcomes. I confine the analysis window to two years before and three years after the adoption of GPP laws to minimize contamination from other factors, and employ a conservative set of fixed effects in the baseline specification. These are firm fixed effects to control for unobserved heterogeneity among firms, industry×year fixed effects to address industry growth options, year fixed effects to control for trends over time. For inference, I use robust standard errors that are clustered by firm because the unit of analysis is at the firm level. Time-varying firm-level control variables are also included (the natural logarithm of total assets, institutional ownership, the ratio of capital expenditures to total assets, return on assets, board independence, ESG controversies score, executive gender diversity, and whether the CEO pay is tied to ESG

[8]The enactment dates for these events are detailed in Table IA3 in the internet appendix.

goals), with their coefficients suppressed for brevity.

## 4.1 Effects on Revenues from Sustainable Products

The underlying assumption in using GPP laws is that they increase sustainable corporate revenues. Column (1) in Table 3 confirms an improvement in sustainable corporate revenue percentage post-implementation, with statistically significant increases in sustainable revenues as a portion of total sales in the three years following the adoption of GPP laws. For example, in year $T + 1$, the coefficient estimate is 0.731 ($p$-value $= 0.017$), corresponding to an average increase of 10.65% in sustainable revenue percentage. Over the three years following GPP law adoption, the cumulative increase reaches 2.41, representing an average rise of 35.14%. Further, this uptick occurs significantly only in the aftermath of the GPP law adoption, supporting a causal interpretation. The dynamic effects, shown in Figure 1a, confirm the parallel trends assumption, as no significant differences are observed between affected and unaffected firms in the year preceding the GPP law adoption.

[Table 3 here]

The increase in sustainable revenue percentage after the adoption of GPP laws may result from higher sustainable revenues, a decline in total revenues, or a combination of both. The next column confirms a significant rise in the level of sustainable revenues during the post-adoption period, with a positive and statistically significant coefficient for the three years following GPP law adoption. For instance, sustainable revenues increase by \$0.057 billion in year $T+2$ ($p$-value $= 0.009$), reflecting an average growth of 17.12%. These findings, illustrated in Figure 1b, indicate that GPP laws directly boost demand for sustainable products, prompting firms to shift focus from other offerings to eco-friendly goods and services. Firms appear to adjust their strategies to meet this demand by reallocating resources to green product lines and investing in sustainability-driven innovation.

[Figure 1 here]

## 4.2 Effects on Carbon Emissions

Subsequently, I assess changes in corporate environmental policies within three years of the GPP law adoption. I focus on $CO_2$ emissions as they represent the principal greenhouse gas (GHG), are the largest contributor

to climate change (Intergovernmental Panel on Climate Change, 2021), and climate policies increasingly target carbon reduction.

Column (3) of Table 3 reports a substantial reduction in total $CO_2$ emissions as a percent of sales for affected firms immediately following the adoption of GPP laws, with a cumulative decrease of 38.27% over the three years. The coefficient estimates are all negative and statistically significant except for year T+3. Further, there are no effects on $CO_2$ emissions prior to the adoption of GPP laws as shown by the insignificant coefficient estimate on $T-1$ and Figure 1c. This temporal pattern reinforces the causal interpretation of GPP laws in driving emission reductions. I observe a similar decline for direct $CO_2$ emissions and the level of total emissions (unreported). Overall, these results provide strong evidence that following an increase in the share of sustainable revenues in the aftermath of the implementation of GPP laws, firms reduce their $CO_2$ emissions, likely through operational adjustments or the adoption of greener production technologies.

### 4.3 Effects on Profitability, Cash Flows, and Growth

Analyzing whether revenues from sustainable products contribute to the firm's bottom line is the focal point of this study, as they offer a tangible measure of the economic value derived from green products. Accordingly, I examine changes in the operational success of sustainable revenues in response to an exogenous shift in demand for sustainable products created by GPP laws. Prior studies show that consumers pay attention to ESG controversies (e.g., Meier et al., 2023; Houston et al., 2024; Dai et al., 2021a), implying that green products can affect corporate cash flows. In the broader literature, ESG activities are found to improve firm valuation (e.g., Flammer, 2015a; Ferrell et al., 2016; Lins et al., 2017), but there is also evidence contradicting this claim (e.g., Masulis and Reza, 2015; Di Giuli and Kostovetsky, 2014). Further, eco-friendly products often entail substantial costs to establish and maintain revenue streams, which can exert downward pressure on profits (e.g., Brogaard et al., 2024).

[Table 4 here]

To assess the financial impact of green product initiatives, I use multiple measures that capture different dimensions of firm performance: profitability, cash flows, the market-to-book ratio, sales per employee, and market share. Results analyzing changes in these metrics following GPP law adoption are reported in Table 4,

which shows a delayed but substantial impact of green product initiatives on financial and operational metrics. The first column presents evidence of a sustained increase in profitability in the years following the enactment of GPP laws, with a cumulative increase of 71.79% in overall profitability for the affected firms within the (0, 3) time window. Dynamic effects are illustrated in Figure 1d. This finding implies that firms capitalize on the initial demand for green products, but this effect appears to diminish in subsequent years, likely due to increased competition as other firms introduce similar offerings, which gradually erodes the initial profitability advantage. I also observe a notable improvement in cash flows in the second column, as indicated by the ratio of free cash flows to equity, with statistically and economically significant coefficients in both $T+1$ and $T+2$. For example, firms affected by GPP laws experience a 17.37% increase in cash flow efficiency of capital in year $T+1$, underscoring that green product lines are not only generating positive cash flows but also improving the firm's cash generation relative to equity (1.579, $p$-value = 0.008). Dynamic effects on cash flows shown in Figure 1e suggest no significant differences in cash flows between affected and other firms prior to the adoption of GPP laws.

Further, there is a statistically significant positive effect on the market-to-book ratio in the years immediately following the adoption as reported in column (3), suggesting that firms impacted by GPP laws experience an increase in market valuation relative to their book value. For example, year $T$ has a coefficient estimate of 0.508 ($p$-value $< 0.001$), which is equivalent to a 18.01% increase in the market-to-book ratio for an average firm. These dynamic valuation effects, as visualized in Figure 1f, suggest that the market perceives these firms as having improved growth prospects and stronger competitive positioning due to the anticipated demand for green products.

Column (4) shows no significant decrease in total revenues, suggesting that the increase in the sustainable revenue percentage and the decline in $CO_2$ emissions in Table 3 are not due to a decrease in total revenues. In fact, total revenues increase significantly: there is a statistically significant increase in total sales of approximately 4.8% in year $T+1$ and 3.3% in $T+2$, pointing to a strong demand for sustainable products. This suggests that firms not only shift toward sustainable products but also experience overall revenue growth, reinforcing the economic benefits of adopting eco-friendly strategies.

The next column presents evidence of gains in sales per employee, reflecting enhanced labor productivity and operational efficiency linked to green product lines. This increase in productivity complements the revenue growth

observed in the previous column for the same years. Building on this, the final column highlights a positive impact on market share, further underscoring the strategic advantage of sustainable products. As sustainable revenues grow, affected firms capture a larger portion of the global market, suggesting that environmentally conscious consumers increasingly prefer their products over others. This expansion in market share demonstrates that firms effectively leverage green offerings as a key differentiator, attracting a loyal customer base and strengthening their competitive positioning, akin to the effects observed among U.S. firms after trade liberalization (Flammer, 2015b).

Overall, these results show that revenues from green products, spurred by GPP laws, contribute meaningfully to firm performance across several key metrics. The affected firms show sustained increases in cash flow efficiency and boosts in profitability and market value, suggesting that green initiatives are financially viable and enhance firms' operational and financial success. Sustainable revenues drive revenue growth, market share expansion, and workforce productivity in the aftermath of an exogenous increase in sustainable revenues.

## 4.4 When and Where do Sustainable Revenues Matter?

To assess the resilience of financial performance from sustainable revenues, I examine how profitability responds to changes in the economic, regulatory, and social landscape. This analysis is essential to understanding when green products offer firms a unique differentiation, helping capture loyal, eco-conscious consumers. For brevity, I combine post-adoption years into a single variable, *TreatPost*, and focus on profitability but similar results hold for other definitions of profitability.

The first factor I consider is economic cycles. Theoretical studies suggest that ESG activities may serve as a hedging tool, potentially stabilizing firm performance during economic downturns due to less elastic consumer demand (e.g., van Binsbergen, 2016; Albuquerque et al., 2019; Engle et al., 2020). The use of revenues from eco-friendly products offers a more direct test of this effect compared to prior studies that often rely on broader ESG activities and advertising expenses to assess firm performance during economic downturns. If sustainable revenues provide similar resilience, I would expect an exogenous increase in sustainable revenues—such as that driven by GPP laws—to correlate with stronger profitability during recessionary periods. To test this hypothesis, I examine whether the increase in profits associated with GPP-driven sustainable revenues is amplified during economic downturns.

Column (1) in Table 5 uses crisis periods, instances where the country is subject to a banking, currency, or fiscal crisis, obtained from Nguyen, Castro, and Wood (2022). It shows that profitability increases during crisis periods for the affected firms, as the coefficient estimate of 1.330 ($p$-value $< 0.001$) translates into a 21.34% increase in profitability. This finding holds consistent in a separate analysis of recession periods in the next column, where the magnitude of the economic effect increases to 60.98%, further supporting the notion that sustainable revenues enhance firm resilience under adverse economic conditions (3.801, $p$-value $< 0.001$). These results indicate a substantial portion of the increase in profitability in column (1) of Table 4 occurs during economic downturns, which may serve as a stabilizing force during such times. These results echo Lins et al. (2017) and Albuquerque et al. (2020), who find that firms with higher ESG ratings fare better during economic downturns but are inconsistent with other studies such as Bae, El Ghoul, Gong, and Guedhami (2021), who do not find such effects around the COVID-19 pandemic.

[Table 5 here]

Next, I examine whether societal climate change beliefs influence the profitability impact of sustainable revenues, as Servaes and Tamayo (2013) show that customer awareness affects the value effects of ESG activities. The next two columns show that sustainable revenues increase profits predominantly in countries with strong climate beliefs. I use two proxies for cultural attitudes toward climate obtained from *International Public Opinion on Climate Change* survey conducted by Yale School of the Environment: personal belief that climate change is extremely or very important (or cause a great deal of harm). Results in columns (3) and (4) suggest that sustainable revenues are more effective at driving profits in these cultural contexts, likely due to greater consumer and investor demand for eco-friendly products in countries where climate awareness is high. For example, the coefficient estimates of -13.915 and 26.161 on *TreatPost* and its interaction term with personal harm in column (4) imply a 33.63% increase in profitability on average.[9] This result also suggests that weaker consumer demand for eco-friendly products in low-climate-awareness countries may be a key factor in why some regions lag in the development of green products.

In the next column, I examine the impact of vulnerability to climate change risks. I use the Notre Dame

[9]This is calculated as $(-13.915 + 26.161 \times 0.612)/6.232$, where 0.612 is the average value for *personal harm* and 6.232 is the average profitability ratio as reported in Table 2.

Global Adaptation Initiative (nd-gain) dataset that ranks countries based on their vulnerability and readiness to climate change risks on an annual basis. Column (5) shows that firms in more climate-vulnerable countries exhibit higher profitability from eco-friendly revenues, potentially driven by heightened demand for sustainable solutions that address local environmental challenges, resource constraints, or regulatory pressures. Similarly, the final column shows that the readiness measure, which reflects a country's ability to implement adaptation strategies and attract investments, is positively associated with higher profitability of eco-friendly revenues. In countries with greater readiness, firms can better leverage eco-friendly products through supportive infrastructure, enhancing operational efficiency and market opportunities for sustainable solutions.

## 4.5 Results from the Matched Sample

In this section, I test the robustness of the results on revenues from eco-friendly products and environmental and financial outcomes against potential endogeneity, omitted variables, and subsample variation. Ideally, I would compare changes in eco-friendly revenues and firm valuation around the adoption of GPP laws between firms with similar pre-law characteristics, except for the treatment of being subject to these laws (Angrist and Pischke, 2009). To account for unobserved firm heterogeneity, I include firm fixed effects throughout the analysis. However, if pre-law characteristics differ between firms affected by GPP laws and those not affected, the estimates might capture these differences rather than changes directly attributable to the laws. To address this, I construct a matched sample of firms exposed to GPP laws and those not exposed, aligning on similar observable characteristics in the pre-law period. I apply a nearest neighbor matching approach using the Mahalanobis distance metric as the weighting criterion (Abadie, Herr, Imbens, and Drukker, 2004).

To this end, I build a matched sample where each firm in the treatment group (those subject to GPP laws) is matched with a firm in the control group (those not subject to the laws) using replacement, based on the following characteristics from the year before the law's adoption and within the same industry: the natural logarithm of total assets, ROA, total institutional ownership, ESG ratings, and leverage. Panel A of 6 shows the results from this comparison, which reveals that the means of the main matching variables except for leverage are not significantly different between treated and control groups in the year preceding the passage of GPP laws. In a

multivariate regression, none of these matching variables is statistically significant at a conventional level.[10] I use this set of firms to estimate the main specifications in previous tables and report the results in Panel B.

[Table 6 here]

Results are very similar to those reported using the entire sample of firms. Specifically, Panel B shows that sustainable revenues are higher, carbon emissions are lower, and profitability and cash flows improve following the adoption of GPP laws. For example, column (2) confirms that sustainable revenues increase significantly following the adoption of GPP laws as observed in Table 3 (0.060, $p$-value $< 0.018$). This panel further reveals that profitability becomes more sensitive to economic cycles and to variations in environmental beliefs and regulations in the aftermath of GPP laws. This indicates that while firms gain resilience during economic downturns, as previously shown, their performance is also influenced by the broader cultural and regulatory environment.

## 4.6 Results from the Instrumental Variable Estimation

A key concern with the previous estimations is that sustainable revenues may be endogenous due to unobserved factors influencing both the adoption of eco-friendly practices and financial or environmental outcomes. While the DiD framework uses GPP laws as a policy shock to estimate their impact, country-specific factors such as policy stringency or public demand for ESG activities may influence both the adoption of GPP laws and green revenue growth, potentially confounding the DiD estimates—even if GPP laws themselves are unrelated to eco-friendly revenues. To address these concerns further and validate the findings, I adopt an instrumental variable approach, which ensures robustness to different sources of endogeneity.[11]

To instrument sustainable revenues, I rely on three sources of exogenous variation. First, GPP laws serve as regulatory shocks that create direct incentives for firms to adopt eco-friendly practices, offering quasi-random variation in sustainable revenues. While these laws are central to the DiD analysis, they serve as an instrument in this context to isolate the impact of green revenues rather than directly modeling the treatment effect. Second,

[10] Results are robust to additional matching variables such as lagged revenues from eco-friendly products and $CO_2$ emissions as of the year prior to the adoption of GPP laws, though the matched sample becomes much smaller.

[11] While the DiD analysis identifies localized policy-driven effects, the instrumental variable method allows for broader insights into the determinants of green revenues and their strategic value, offering complementary evidence for the causal link between sustainable revenues and firm performance.

the number of natural climate disasters in a given country and year, obtained from the EM-DAT database, serves as a proxy for heightened societal and corporate attention to climate change. Prior research shows that such shocks increase demand for sustainability and drive firm-level responses (e.g., Kruttli et al., 2024).

Third, the political orientation of a country's second largest governing party, specifically whether it is left-leaning, sourced from the World Bank's Database on Political Institutions, serves as a proxy for societal support for environmental regulation and the governing parties' stance on climate-related issues.[12] Previous studies have shown the relevance of political factors for regulatory adoption and financial market structures (e.g., Kroszner and Strahan, 1999; Pagano and Volpin, 2005). Further, research in the U.S. context frequently uses political affiliations, such as Democrat versus Republican membership, to proxy support for ESG issues (e.g., Di Giuli and Kostovetsky, 2014; Gormley et al., 2024). These instruments ensure that the variation in sustainable revenues used for estimation is exogenous, mitigating concerns about confounding variables or reverse causality. Further, using multiple instruments achieves two purposes: (1) to instrument the interaction term between sustainable revenues and economic, cultural, and regulatory variables, and (2) to improve identification by strengthening relevance, mitigating measurement error, and enhancing estimation efficiency.

Panel A of Table 7 presents the first-stage regressions, showing the impact of these variables on sustainable revenues across countries using the linear probability model. The first column uses the ratio of sustainable revenues to total revenues and the second column uses the level of sustainable revenues. Both columns show that firms have higher sustainable revenues if they are subject to more climate-related natural disasters and GPP laws, and if largest party in power is not left-leaning. Diagnostic tests indicate that these variables serve as valid instruments, as shown by the F-test statistic ($p$-value $< 0.010$) for both regression specifications.

[Table 7 here]

In the second-stage IV estimation reported in Panel B, I observe that sustainable revenues are associated with a decline in $CO_2$ emissions intensity, which supports the effectiveness of sustainable revenues in encouraging lower-carbon outputs. The coefficient estimate of -0.035 is both statistically and economically significant ($p$-value = 0.043), corresponding to an average decline of 9.43%. Firms also demonstrate improved financial

[12] I use the second largest government party's left-orientation as an IV, as the second largest party's political orientation is less likely to have direct effects on firm outcomes compared to the largest party, increasing its validity as an instrument. The orientation of the second-largest party still provides insight into the overall societal support for green policies.

performance when they increase their sustainable revenues as reported in the next three column, suggesting that sustainable revenues may enhance both the environmental sustainability and financial performance of these firms. Furthermore, the last three columns show that the profit-sustainable revenue relationship is more pronounced during economic downturns and in countries with greater sensitivity to climate change concerns. Overall, these findings are consistent with the argument that the instruments provide an exogenous shift in demand, allowing me to capture the causal impact of sustainable revenues on corporate financial and environmental performance. .

## 4.7 Alternative Shocks to Revenues from Eco-Friendly Products

In this subsection, I examine changes in corporate financial and environmental policies in response to alternative shocks to revenues from eco-friendly products as a robustness check. Specifically, Table 8 examines the effects of two distinct environmental policy shocks—green funding initiatives and the Paris Climate Agreement—on sustainable revenue outcomes and key financial indicators like profitability and $CO_2$ emissions in a DiD setting similar to that used for GPP laws.

[Table 8 here]

Green funding initiatives represent a strong exogenous shock to green revenues, as they provide firms with targeted financial resources, incentives, or subsidies specifically aimed at promoting eco-friendly products and sustainable practices. By making capital available for green projects without requiring prior sustainability commitments, these initiatives reduce firms' cost of adopting eco-friendly practices, leading to an increase in green revenues that is likely exogenous. In the regression sample, 33 of the 47 countries implement such initiatives. Results in Panel A indicate that following the introduction of green funding initiatives, sustainable revenues and profitability rise significantly, while carbon emissions decline, aligning with the initiatives' environmental objectives. The interaction terms further show that profitability effects are more pronounced during economic downturns, in countries with high environmental awareness, and in settings with less stringent environmental regulations, suggesting that financial incentives can strongly catalyze green revenue growth.

Panel B focuses on the Paris Climate Agreement as an alternative shock to eco-friendly revenues, which has led many countries to adopt or strengthen national laws and policies aimed at advancing sustainable practices

(e.g., Averchenkova, Fankhauser, and Nachmany, 2017). The findings mirror those in Panel A, with firms subject to the Paris Agreement showing significant increases in sustainable revenue percentage and profitability, with profitability effects influenced by economic conditions and environmental awareness.

Together, these panels provide evidence that environmental policy shocks—whether through financial incentives or regulatory pressures—are pivotal in guiding firms toward sustainability. They further show that the initial results related to GPP laws are robust when tested against alternative policies affecting revenues from eco-friendly products.

# 5 Drivers of Revenues from Eco-Friendly Products

Building on these results, I turn my focus to the core factors driving sustainable revenue growth. Understanding these drivers is crucial, as previous results suggest that sustainable revenues contribute both to financial performance and the broader green transition. In this analysis, I add country×year fixed effects to the baseline specification used in the previous analysis that includes firm fixed effects and industry×year fixed effects to control for unobserved time-varying country-level trends such as natural disasters, regulations, and economic activity.[13] Results from this analysis are represented in Panel A of Table 9 where the dependent variable is sustainable revenue percentage.

Column (1) shows that total institutional ownership is positively and significantly associated with sustainable revenues (0.036, $p$-value = 0.001). This effect is also economically significant, with a shift from the bottom to the top quartile corresponding to a 28.64% increase in sustainable revenue percentage, consistent with previous studies on ESG ratings and $CO_2$ emissions (e.g., Dimson et al., 2015; Dyck et al., 2019). Additionally, I find that ESG controversies score is associated with a 6.57% increase in sustainable revenues on average, suggesting that firms use sustainable revenues to offset reputational risks and align with stakeholder expectations.

[Table 9 here]

In column (2), I add sustainable corporate investments as a key variable, as they support the development and improvement of eco-friendly products. The dataset, sourced from Corporate Knights Inc., defines sustainable

[13] In the previous tables, I omit country×year fixed effects to be able to identify the impact of regulations like GPP laws, which vary by country and year, on the variable of interest.

CAPEX and R&D as investments aligned with the Corporate Knights Taxonomy, scaled by total assets. Due to data limitations, the sample size is reduced to 5,191 observations. This column shows a significant link between sustainable revenue generation and lagged sustainable CAPEX (0.096, $p$-value = 0.024), suggesting that firms directing resources into sustainable projects benefit in sustainable revenue growth in the future. On the other hand, there is no impact of sustainable R&D expenditures on the extent of sustainable revenue generation, underscoring the impact of targeted capital expenditures on eco-friendly revenue growth.

In the next column, I analyze peer effects, where firms respond to their rivals' eco-friendly products by expanding their own offerings. To capture this, I use *Peer Intensity*, defined as the one-year lagged median value of sustainable revenues within the firm's industry and country, as a proxy for peer effects. The positive and highly significant coefficient (0.590, $p$-value $< 0.001$) on this variable suggests that firms in industries with higher median sustainable revenue percentage in the previous year are more likely to increase their own sustainable revenue percentage. In terms of economic significance, this coefficient translates to a 13.93% increase in sustainable revenue generation for an average firm. These effects are statistically significant regardless of whether the firm operates in a carbon-intensive industry (unreported), suggesting that the results are not driven solely by less carbon-intensive sectors though the effects are much more pronounced in these sectors.

Column (4) examines regional differences, finding that European firms have a higher sustainable revenue percentage (3.069, $p$-value $< 0.001$), underscoring the role of national ESG policies and investor preferences (e.g., Cai, Pan, and Statman, 2016; Kim and Yoon, 2023; Lafarre, 2024). A caveat is that this specification requires omitting firm and country-year fixed effects, leaving the results susceptible to noise from unobserved heterogeneity and time-varying country-level factors.

## 5.1 The Role of Institutional Investors

Given that institutional ownership is the most economically important driver of sustainable revenues in Panel A, I examine which types of institutional investors drive this effect. Institutional investors can promote the development of green products by engaging privately with portfolio firms (Dimson et al., 2015), voting on environmental and social proposals (Dikolli et al., 2022), and subtly fostering governance structures that enhance corporate responsiveness to investor interests. Prior studies on corporate ESG activities suggest that socially responsible

investors (SRIs), Big 3 investors, long-term (LT) investors, and European investors can influence firms to improve ESG activities (e.g., Dikolli et al., 2022, Azar et al., 2021, Starks, Venkat, and Zhu, 2024, and Kim and Yoon, 2023, respectively). Thus, I decompose total institutional ownership along these dimensions.

To identify SRI status, I use whether the investor pledges with UN PRI, a commitment to responsible investment principles. Column (1) of Panel B shows that ownership by SRI coefficient has a positive and statistically significant impact on sustainable revenues, with a coefficient of 0.067 ($p$-value $< 0.001$). This effect is economically significant, with a shift from the bottom to the top quartile of SRI ownership corresponding to a 20.63% increase in sustainable revenue percentage. Meanwhile, the coefficient on non-SRI ownership is not statistically significant. Further, a Chow test confirms that these two coefficients are statistically different from each other ($p$-value $= 0.018$), indicating that firms with higher ownership by UN PRI signatories tend to exhibit significantly higher sustainable revenues.

In column (2), both Big 3 (BlackRock, Vanguard, and State Street) and non-Big 3 institutional ownership are positively associated with sustainable revenue percentage, though the difference between them is statistically significant (Chow test $p$-value $= 0.035$). Column (3) similarly shows no significant difference between long-term and short-term institutional ownership. In the final column, I find that European ownership has a strong positive effect on sustainable revenue percentage (0.075, $p$-value $< 0.001$), corresponding to a 11.74% increase, while U.S. ownership shows a smaller, statistically insignificant effect. A Chow test confirms the stronger impact of European investors, likely reflecting cultural and regulatory differences, consistent with the greater sustainable revenue percentage for European firms in Panel A ($p$-value $= 0.007$).

## 5.2 Instrumental Variable Estimation

An important consideration is whether the impact of SRI ownership arises from positive screening where investors selectively choose firms with high sustainable revenue percentage, or from active engagement where investors encourage firms to take environmentally friendly actions such as increasing the share of sustainable products in their revenue streams. To address this question, I use the MSCI ESG index additions as an exogenous shift in

SRI ownership.[14] Inclusion in the index is not related to firms' valuations and they often increase visibility among ESG-focused investors (Starks et al., 2024).

Using data on additions to this index from FactSet, I find a substantial increase in SRI ownership following the inclusion. Column (1) in Panel C shows a positive and highly significant coefficient estimate on the ESG index inclusion (0.389, $p$-value = 0.021), indicating that on average, SRI ownership increases by 2.20%. As a placebo test, column (2) shows that index inclusion does not increase non-SRI ownership; the coefficient on which is negative and statistically insignificant. I then use index inclusion as an instrument for SRI ownership to examine changes in sustainable revenue generation. Column (3) shows a positive and statistically significant coefficient estimate on the instrumental variable (0.511, $p$-value $< 0.001$). Given the passive nature of funds tracking the index, this finding suggests that institutional influence occurs through engagement rather than a preference among institutional investors for firms already high in green income, aligning with studies on institutional influence over ESG issues (e.g., Pastor et al., 2021; Broccardo et al., 2022). Overall, these results support the notion that SRI engagement is related to increases in sustainable revenues, consistent with studies showing institutional investors impact ESG issues through engagement (e.g., Kim, Wan, Wang, and Yang, 2019; Azar et al., 2021; Dikolli et al., 2022).

## 5.3 The Role of Managerial Incentives

CEOs may pursue environmentally friendly policies for private benefits, potentially at shareholders' expense, including increased compensation, enhanced reputation as environmental leaders, and concealing weak firm performance (e.g., Hubbard, Christensen, and Graffin, 2017; Bebchuk and Tallarita, 2022; Dai, Gao, Lisic, and Zhang, 2021b; Masulis and Reza, 2015). By adopting an ESG-oriented image, CEOs might also gain opportunities for board positions elsewhere. In the context of this study, CEOs may strategically increase green product offerings for personal gain, which predicts a positive relationship between sustainable revenue percentage and CEO career outcomes.

Panel A of Table 10 tests this hypothesis by examining CEO dismissal, pay, and board seats— common proxies

[14]This is a global equity index that screens for ESG criteria. It is derived from the broader MSCI ACWI and excludes companies involved in certain controversial activities (like fossil fuels, tobacco, and weapons) and those that perform poorly on key ESG metrics. It has 2,319 constituents with $4.88 billion in assets under management. The sample period for this analysis is from 2012 to 2023 because data on the ETF additions are available from 2014 on.

for managerial career outcomes (e.g., Lel and Miller, 2008, Murphy, 2013, and Fahlenbrach, Low, and Stulz, 2010, respectively). Data for these career-related variables are sourced from BoardEX. Additionally, I include poison pills, which are often linked to greater managerial agency problems (e.g., Karpoff and Wittry, 2019). Results show minimal career impacts from changes in eco-friendly revenues around the adoption of GPP laws in terms of dismissal and compensation decisions. However, board seats increase for the CEOs of affected firms (1.457, $p = 0.068$), which translates into a 56.11% increase in the number of external board memberships of the affected CEOs. This can reflect their increased reputation as leaders in sustainability, enhancing their demand as directors across other firms.

[Table 10 here]

Panel B explores the link between sustainable revenue percentage and managerial incentives as an alterative way to test for the potential role of managerial incentives, finding no significant relationship with CEO pay duration (e.g., Edmans, Fang, and Lewellen, 2017), board membership and chairperson status (e.g., Brickley, Coles, and Jarrell, 1997), and classified boards (e.g., Faleye, 2007).Overall, these findings suggest that managerial incentives have a limited role in driving sustainable revenue generation with the exception of higher number of board seats held by the CEOs of affected firms.

# 6 Conclusion

This study demonstrates the transformative impact of eco-friendly revenues on both financial and environmental performance, emphasizing that firms embracing eco-friendly products can strengthen profitability while advancing environmental goals. Drawing on a comprehensive firm-level dataset from 2008 to 2023 across 46 countries, I find that sustainable revenues are associated with substantial improvements in profit margins, cash flows, and market valuations, with these effects more pronounced during economic downturns and in countries where societal norms favor environmental responsibility. These results suggest that sustainable products not only create a resilient revenue stream that stabilizes firms amid market volatility but also enhance competitive positioning and build corporate reputation.

Institutional investors, especially those with a focus on ESG principles, emerge as key drivers of sustainable revenue strategies, indicating the vital role of shareholder engagement in the green transition. However, managerial incentives appear to have a limited influence, suggesting that environmental strategy is more driven by external stakeholders such as consumers and shareholders than by managerial self-interest. These findings highlight the growing importance of sustainable revenues in shaping both corporate strategy and environmental policy.

As global market conditions evolve and the demand for sustainability grows, sustainable revenue generation will likely become an integral component of corporate strategy, further intertwining financial performance with environmental responsibility. Customers and investors play pivotal roles in fostering the adoption of eco-friendly practices, driving businesses to transition toward greener production processes. As consumer preferences increasingly favor sustainability, firms face growing incentives to innovate and align their strategies with these shifting demands. Similarly, institutional investors, particularly those with ESG-focused mandates, actively influence corporate environmental strategies through engagement and advocacy, accelerating the shift toward sustainability. This dynamic is especially crucial as businesses navigate the dual challenges of satisfying evolving customer expectations and maintaining competitiveness in increasingly eco-conscious markets.

Future research could explore the within-industry dynamics of eco-friendly revenues and their impact on competitiveness, the influence of regulatory frameworks, and assess the long-term valuation implications of sustainable revenue streams across diverse economic contexts. Additionally, examining how firms integrate sustainable product strategies into their innovation processes or adapt to emerging climate policies can provide valuable insights into the broader economic impact of green transition.

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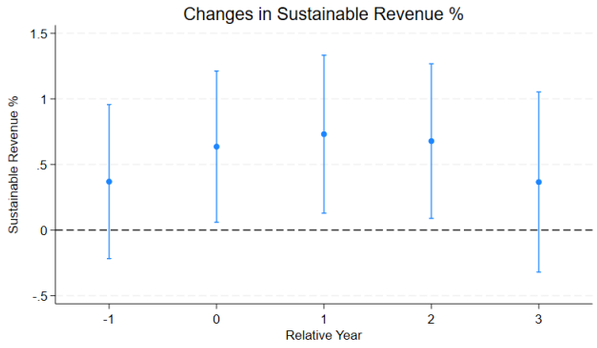
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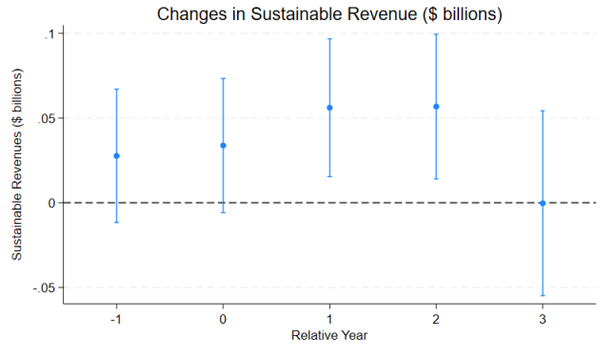
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Figure 1: Changes Around the Passage of Green Public Procurement Laws

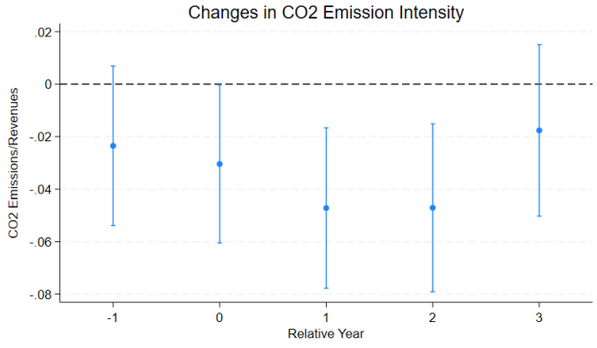
This figure presents the dynamic effects of the regression estimates of changes in sustainable revenue percentage and key environmental outcomes within three years around the enactment of Green Procurement Laws. Coefficient estimates reported in Table 3 and Table 4 are used in plotting the figures. The 95% confidence intervals are based on standard errors clustered by country and year.



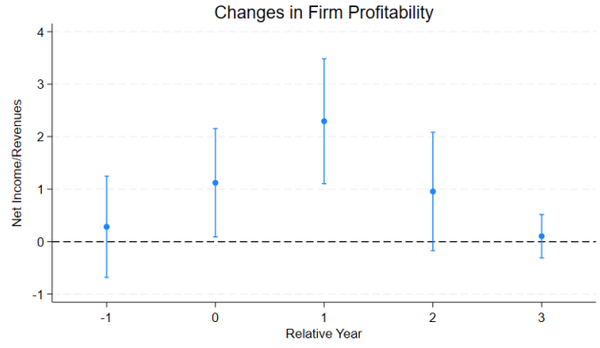

(a) Changes in Sustainable Revenue (%)



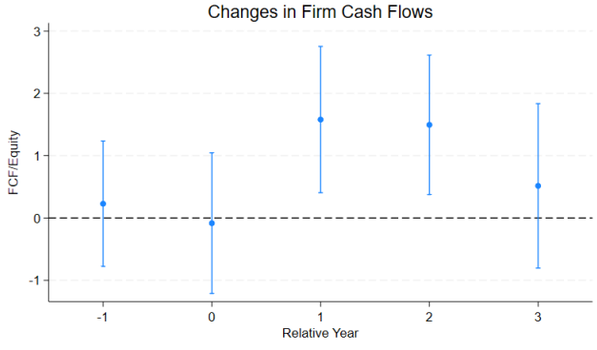

(b) Changes in Sustainable Revenue ($ Billions)




(c) Changes in Total $CO_2$ Emission Intensity




(d) Changes in Profitability




(e) Changes in Cash Flows




(f) Changes in Market-to-Book Ratio

Table 1: Sample Distribution

This table reports the average values for sustainable revenues across countries. Variable definitions are described in appendix 1. All continuous variables are winsorized at the one percent level.

| Country | # Obs. | # Firms | Sustainable Revenue (%) | Sustainable Revenues ($ Billions) | Country | # Obs. | # Firms | Sustainable Revenue (%) | Sustainable Revenues ($ Billions) |
|---|---|---|---|---|---|---|---|---|---|
| Argentina | 61 | 10 | 2.053 | 0.040 | Malaysia | 493 | 63 | 5.120 | 0.129 |
| Australia | 1,532 | 125 | 3.766 | 0.113 | Mexico | 294 | 27 | 5.075 | 0.400 |
| Austria | 212 | 23 | 9.546 | 0.394 | Netherlands | 479 | 43 | 7.372 | 0.452 |
| Belgium | 300 | 29 | 7.090 | 0.350 | New Zealand | 217 | 22 | 3.523 | 0.056 |
| Brazil | 579 | 60 | 14.044 | 0.449 | Norway | 265 | 29 | 16.115 | 0.422 |
| Canada | 1,616 | 132 | 6.763 | 0.227 | Philippines | 262 | 24 | 9.063 | 0.117 |
| Chile | 188 | 18 | 7.300 | 0.372 | Poland | 91 | 10 | 0.000 | 0.000 |
| China | 1,809 | 216 | 7.142 | 0.407 | Portugal | 145 | 14 | 5.857 | 0.423 |
| Colombia | 84 | 8 | 2.547 | 0.060 | Qatar | 51 | 7 | 0.000 | 0.000 |
| Denmark | 310 | 29 | 12.668 | 0.434 | Russia | 153 | 16 | 2.258 | 0.185 |
| Finland | 332 | 31 | 12.028 | 0.574 | Saudi Arabia | 74 | 10 | 2.305 | 0.132 |
| France | 1,224 | 105 | 10.157 | 0.490 | Singapore | 411 | 41 | 2.223 | 0.159 |
| Germany | 925 | 97 | 11.416 | 0.666 | South Africa | 762 | 69 | 2.145 | 0.058 |
| Greece | 170 | 16 | 3.587 | 0.069 | South Korea | 819 | 77 | 5.282 | 0.464 |
| Hong Kong | 658 | 60 | 8.198 | 0.281 | Spain | 458 | 40 | 7.850 | 0.551 |
| India | 751 | 85 | 3.944 | 0.260 | Sweden | 659 | 74 | 8.763 | 0.343 |
| Indonesia | 213 | 20 | 3.417 | 0.113 | Switzerland | 788 | 77 | 5.405 | 0.235 |
| Ireland | 355 | 27 | 4.048 | 0.324 | Taiwan | 1,395 | 130 | 7.392 | 0.193 |
| Israel | 137 | 10 | 0.436 | 0.026 | Thailand | 366 | 45 | 4.699 | 0.246 |
| Italy | 492 | 53 | 7.511 | 0.404 | Turkey | 317 | 45 | 1.732 | 0.029 |
| Japan | 4,290 | 374 | 6.489 | 0.522 | UAE | 73 | 15 | 2.831 | 0.017 |
| Kuwait | 50 | 6 | 1.203 | 0.035 | United Kingdom | 3,099 | 300 | 7.127 | 0.231 |
| Luxembourg | 90 | 9 | 6.235 | 0.515 | United States | 8,597 | 759 | 7.197 | 0.341 |

Table 2: Summary Statistics

This table reports descriptive statistics for key variables used in the analysis. The sample includes all firm-year observations with non-missing values of sustainable revenue percentage and financial characteristics from LSEG and non-missing investor characteristics from FactSet. Variable definitions are described in appendix 1. All continuous variables are winsorized at the one percent level.

| Variable Name | Average | Median | Standard Deviation |
|---|---|---|---|
| Sustainable Revenue (%) | 6.862 | 0.000 | 18.528 |
| Sustainable Revenue ($) | 0.333 | 0.000 | 0.854 |
| Sustainable CAPEX | 0.743 | 0.000 | 2.614 |
| Sustainable R&D | 0.110 | 0.000 | 0.765 |
| $CO_2$ Emission Intensity | 0.371 | 0.041 | 1.028 |
| Profit Margin | 6.195 | 0.180 | 31.843 |
| Cash Flows | 9.093 | 2.165 | 19.779 |
| Market-to-Book Ratio | 2.821 | 1.656 | 4.268 |
| Market Share | 0.551 | 0.203 | 0.875 |
| Sales Per Employee | 0.692 | 0.357 | 1.179 |
| ESG Controversies Score | 90.243 | 100.000 | 23.063 |
| Log (Assets) | 22.706 | 22.605 | 1.613 |
| Log (Revenues) | 21.969 | 21.991 | 1.498 |
| Green Procurement Laws | 0.307 | 0.000 | 0.461 |
| Green Funding Initiatives | 0.573 | 1.000 | 0.495 |
| Total Institutional Ownership | 44.201 | 35.191 | 30.918 |
| SRI Ownership | 17.684 | 12.293 | 15.188 |
| Big 3 Ownership | 7.476 | 4.084 | 7.692 |
| Crisis | 0.064 | 0.000 | 0.245 |
| Recession | 0.270 | 0.000 | 0.444 |
| Climate Importance | 0.810 | 0.791 | 0.080 |
| Personal Harm of Climate Change | 0.612 | 0.577 | 0.123 |
| Vulnerability | 0.334 | 0.314 | 0.049 |
| Readiness | 0.643 | 0.685 | 0.112 |
| # Natural Disasters | 4.236 | 1.000 | 6.106 |
| Left-Leaning Party Orientation | 0.080 | 0.000 | 0.272 |
| Competitive | 0.494 | 0.000 | 0.500 |
| Peer Intensity | 1.620 | 0.000 | 5.391 |
| ESG-based Compensation | 0.322 | 0.000 | 0.467 |
| Executive Gender Diversity | 12.999 | 10.344 | 13.856 |

Table 3: Green Public Procurement Laws: Sustainable Revenue and Carbon Emission Effects

This table presents DiD estimates of changes in sustainable revenues and $CO_2$ emissions within (-2, +3) years around the adoption of Green Public Procurement laws where 0 denotes the adoption year. Results are reported for each year except for the base year of T – 2. The dependent variables are sustainable revenue percentage in column (1), the dollar value of sustainable revenues in column (2), and $CO_2$ emission intensity in column (3). Variable definitions are described in appendix 1. All continuous variables are winsorized at the one percent level and use one-year lagged values of time-varying independent variables. The t-statistics appear in brackets below parameter estimates. Robust standard errors are estimated by clustering at the firm level. Asterisks ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

| | Sustainable Revenue % | Sustainable Revenue ($) | $CO_2$ Emission Intensity |
|---|---|---|---|
| | (1) | (2) | (3) |
| T - 1 | 0.372 | 0.028 | -0.024 |
| | [1.243] | [1.393] | [-1.538] |
| T | 0.636** | 0.034* | -0.031** |
| | [2.163] | [1.684] | [-2.048] |
| T + 1 | 0.732** | 0.056*** | -0.048*** |
| | [2.382] | [2.712] | [-3.102] |
| T + 2 | 0.679** | 0.057*** | -0.048*** |
| | [2.260] | [2.615] | [-2.927] |
| T + 3 | 0.366 | -0.000 | -0.018 |
| | [1.047] | [-0.008] | [-1.076] |
| N | 180,428 | 179,374 | 145,431 |
| $R^2$ | 0.873 | 0.769 | 0.893 |
| Firm FEs | Yes | Yes | Yes |
| Year FEs | Yes | Yes | Yes |
| Firm x Stack FEs | Yes | Yes | Yes |
| Year x Stack FEs | Yes | Yes | Yes |
| Firm controls | Yes | Yes | Yes |

Table 4: Green Public Procurement Laws: Profitability, Cash Flows, and Valuation Effects

This table presents DiD regression estimates of firm profitability, valuation, cash flows, sales efficiency, and market share within (-2, +3) years around the adoption of Green Public Procurement laws where 0 denotes the adoption year. Results are reported for each year except for the base year of T – 2. The dependent variables are the ratio of net income to revenues in column (1), the ratio of free cash flows to equity in column (2), the market-to-book ratio in column (3), the ratio of sales to the number of employees in column (4), and the market share of the firm in column (5). Variable definitions are described in appendix 1. All continuous variables are winsorized at the one percent level, using one-year lagged values of time-varying independent variables. The t-statistics appear in brackets below parameter estimates. Robust standard errors are estimated by clustering at the firm level. Asterisks ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

| | Profitability | Cash Flows | Market-to Book Ratio | Log (Total Revenue) | Sales Per Employee | Market Share |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| T - 1 | -0.043 | 0.231 | 0.144 | 0.012 | 0.006 | 0.013 |
| | [-0.103] | [0.449] | [1.290] | [1.315] | [0.354] | [1.486] |
| T | 0.811* | -0.090 | 0.508*** | -0.006 | -0.011 | 0.005 |
| | [1.755] | [-0.156] | [3.741] | [-0.560] | [-0.654] | [0.552] |
| T + 1 | 2.069*** | 1.578*** | 0.594*** | 0.049*** | 0.102*** | 0.022** |
| | [3.721] | [2.634] | [4.503] | [4.413] | [4.855] | [2.195] |
| T + 2 | 0.924 | 1.483*** | 0.510*** | 0.034*** | 0.127*** | 0.022** |
| | [1.605] | [2.597] | [3.962] | [3.140] | [5.202] | [2.223] |
| T + 3 | 0.042 | 0.514 | 0.339*** | 0.020 | 0.025 | 0.017 |
| | [0.206] | [0.764] | [2.636] | [1.600] | [1.522] | [1.607] |
| N | 137,794 | 140,176 | 179,325 | 179,017 | 124,261 | 179,374 |
| $R^2$ | 0.926 | 0.574 | 0.696 | 0.968 | 0.847 | 0.933 |
| Firm FEs | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FEs | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm x Stack FEs | Yes | Yes | Yes | Yes | Yes | Yes |
| Year x Stack FEs | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm controls | Yes | Yes | Yes | Yes | Yes | Yes |

Table 5: Profitability Effects: Economic Downturns, Beliefs, and Environmental Regulations

This table reports DiD regression estimates on the sensitivity of firm profitability around the adoption of Green Public Procurement laws to economic conditions and cultural and environmental regulatory differences. The post-adoption years are combined into a single variable, TreatPost. Crisis equals one for years when the country is subject to a banking, currency, or fiscal crisis, zero otherwise. Recession equals one for years when GDP growth is less than half of the average growth rate in the 1980-2023 period for a given a country, zero otherwise. Climate Importance (Personal Harm) is the portion of respondents worldwide that believe climate change is extremely or very important (cause a great deal of harm) to them personally. Vulnerability measures a country's exposure, sensitivity, and ability to adapt to climate change. Readiness assesses a country's ability to leverage investments and implement adaptation actions. Variable definitions are described in appendix 1. All continuous variables are winsorized at the one percent level, using one-year lagged values of time-varying independent variables. The t-statistics appear in brackets below parameter estimates. Robust standard errors are estimated by clustering at the firm level. Asterisks ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

| | Interaction Variable | | | | | |
|---|---|---|---|---|---|---|
| | Crisis | Recession | Climate Importance | Personal Harm | Vulnerability | Readiness |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| TreatPost | 0.867** | 0.174 | -24.768*** | -12.535*** | -14.585*** | -7.266*** |
| | [2.086] | [0.547] | [-3.273] | [-3.403] | [-3.164] | [-2.889] |
| TreatPost * Interaction | 1.340*** | 3.708*** | 33.103*** | 23.526*** | 49.068*** | 12.247*** |
| | [6.489] | [3.979] | [3.256] | [3.362] | [3.173] | [2.956] |
| N | 137,794 | 136,904 | 135,314 | 135,314 | 108,784 | 108,784 |
| $R^2$ | 0.926 | 0.926 | 0.926 | 0.926 | 0.935 | 0.935 |
| Firm FEs | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FEs | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm x Stack FEs | Yes | Yes | Yes | Yes | Yes | Yes |
| Year x Stack FEs | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm controls | Yes | Yes | Yes | Yes | Yes | Yes |

Table 6: Matched Sample Analysis

This table presents DiD regression estimates of the key variables in the previous tables replicated in a matched sample. The matching is achieved using the Mahalanobis distance metric as the weighting criterion and with replacement, based on characteristics from the year before the law's adoption and within the same industry including the natural logarithm of total assets, ROA, total institutional ownership, ESG ratings, and leverage. The matching diagnostics are reported in Panel A for the year prior to the adoption of Green Public Procurement laws. The regression estimates for the key variables are reported in Panel B. Variable definitions are described in appendix 1. All continuous variables are winsorized at the one percent level, using one-year lagged values of time-varying independent variables. The t-statistics appear in brackets below parameter estimates. Robust standard errors are estimated by clustering at the firm level. Asterisks ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Panel A. Matching Diagnostics

| | Differences in Means | OLS Estimates |
|---|---|---|
| | (1) | (2) |
| Log (Assets) | 0.071 | 0.013 |
| | | [0.624] |
| Institutional ownership % | 2.489 | 0.001 |
| | | [1.269] |
| ESG Controversies score | -0.519 | -0.001 |
| | | [-0.232] |
| Return on Assets | -0.001 | 0.089 |
| | | [0.202] |
| Leverage | 0.015** | 0.268 |
| | | [1.547] |
| N | | 1,596 |
| $R^2$ | | 0.008 |
| Industry x Year FEs | | Yes |

Panel B. Effects on Revenues, Carbon Emissions, and Cash Flows

| | Sustainable Revenue % | Sustainable Revenue $ | $CO_2$ Emission | Profit-ability | Market-to-Book Ratio | Crisis | Climate Importance | Vulnerability |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| TreatPost | 0.789** | 0.060** | -0.044** | 0.784** | 0.558*** | 0.781** | -29.536*** | -15.024*** |
| | [2.100] | [2.368] | [-2.539] | [2.153] | [4.558] | [2.142] | [-3.391] | [-3.095] |
| TreatPost * Interaction | | | | | | 0.747*** | 38.829*** | 49.614*** |
| | | | | | | [4.974] | [3.372] | [3.081] |
| N | 75,527 | 75,128 | 61,822 | 56,071 | 75,097 | 56,071 | 55,369 | 47,900 |
| $R^2$ | 0.850 | 0.754 | 0.834 | 0.910 | 0.635 | 0.910 | 0.911 | 0.922 |
| Firm FEs | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FEs | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Table 7: Instrumenting Sustainable Revenues

This table presents estimates from an instrumental variable specification where eco-friendly revenues are instrumented with the number of climate disasters, Green Public Procurement laws, and whether the party orientation with respect to economic policy is left leaning. The first stage regression results are reported in Panel A using the linear probability model. The p-value for the joint test of all instrumental variables being equal to zero is reported in the last row. Panel B reports results from the second stage instrumental variable estimation. Variable definitions are described in appendix 1. All continuous variables are winsorized at the one percent level, using one-year lagged values of time-varying independent variables. The t-statistics appear in brackets below parameter estimates. Robust standard errors are estimated by clustering at the firm level. Asterisks ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Panel A. First stage results

| | Sustainable Revenue % | Sustainable Revenue $ |
|---|---|---|
| | (1) | (2) |
| # Climate Disasters | 0.064** | 0.004** |
| | [2.187] | [2.073] |
| Green Public Procurement Laws | 0.704** | 0.057*** |
| | [2.137] | [2.655] |
| Left-leaning Party Orientation | -0.493* | -0.042* |
| | [-1.698] | [-1.845] |
| N | 31,316 | 31,178 |
| $R^2$ | 0.903 | 0.792 |
| Joint F-test statistics (p-value) | <0.010 | <0.010 |
| Firm FEs | Yes | Yes |
| Year FEs | Yes | Yes |
| Industry x Year FEs | Yes | Yes |
| Firm controls | Yes | Yes |

Panel B. Second stage results

| | $CO_2$ Emission | Profitability | Cash Flows | Market-to-Book Ratio | Crisis | Climate Importance | Vulnerability |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| TreatPost | -0.035** | 0.835*** | 1.312** | 0.575*** | 0.968** | -2.909 | -2.001 |
| | [-2.053] | [2.800] | [2.462] | [3.129] | [2.211] | [-1.433] | [-1.131] |
| TreatPost * Interaction | | | | | 3.520*** | 6.205* | 10.477* |
| | | | | | [2.673] | [1.875] | [1.755] |
| N | 24,173 | 24,243 | 23,564 | 31,126 | 24,243 | 22,664 | 20,670 |
| Pseudo $R^2$ | -0.408 | -0.277 | -0.417 | -1.712 | -1.384 | -1.851 | -1.016 |
| Firm FEs | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FEs | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Table 8: Alternative Shocks to Sustainable Revenues

This table presents DiD regression estimates of selected outcomes using two alternative shocks: green funding initiatives in Panel A and the Paris climate agreement in Panel B within (-2, +3) years around the shock where 0 denotes the starting year. Variable definitions are described in appendix 1. I winsorize all continuous variables at the one percent level and use one-year lagged values of time-varying independent variables. The t-statistics appear in brackets below parameter estimates. Robust standard errors are estimated by clustering at the firm level. Asterisks ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Panel A. Green Funding Initiatives

| | Sustainable Revenue % | Sustainable Revenue $ | $CO_2$ Emission | Profit-ability | Market-to-Book Ratio | Crisis | Climate Importance | Vulnerability |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| TreatPost | 0.021*** | 0.175*** | -0.050*** | 1.214*** | 0.288*** | 1.085*** | -19.082*** | -0.280 |
| | [2.584] | [9.850] | [-3.101] | [3.043] | [4.178] | [3.189] | [-5.133] | [-0.109] |
| TreatPost * Interaction | | | | | | -2.489* | 24.330*** | 4.644 |
| | | | | | | [-1.960] | [5.164] | [0.566] |
| N | 69,790 | 69,845 | 53,204 | 52,804 | 69,668 | 52,810 | 50,651 | 29,856 |
| $R^2$ | 0.555 | 0.797 | 0.916 | 0.925 | 0.660 | 0.922 | 0.923 | 0.944 |
| Firm FEs | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FEs | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Panel B. Paris Climate Agreement

| | Sustainable Revenue % | Sustainable Revenue $ | $CO_2$ Emission | Profit-ability | Market-to-Book Ratio | Crisis | Climate Importance | Vulnerability |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| TreatPost | 1.538** | 0.192*** | -0.053* | 1.734*** | 0.714*** | 1.411*** | -9.094*** | — |
| | [2.201] | [5.105] | [-1.785] | [3.218] | [5.283] | [3.051] | [-3.032] | |
| TreatPost * Interaction | | | | | | — | 12.638*** | 12.720*** |
| | | | | | | | [3.337] | [2.905] |
| N | 45,142 | 44,960 | 34,575 | 34,608 | 44,911 | 34,614 | 32,872 | 23,817 |
| $R^2$ | 0.897 | 0.792 | 0.909 | 0.909 | 0.645 | 0.907 | 0.907 | 0.921 |
| Firm FEs | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FEs | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Table 9: Drivers of Sustainable Revenues and Institutional Investors

This table presents regression estimates of the determinants of sustainable revenue percentage. Panel A reports results for the main drivers of sustainable revenues and Panel B reports results for various institutional ownership types where the dependent variable is sustainable revenue percentage. Panel C reports instrumental variable estimates of the impact of SRI ownership on sustainable revenue percentage where the SRI ownership is instrumented with the inclusion of firms' shares in the MSCI ACWI Select ESG index. The dependent variables are related to institutional ownership % in the first two columns and sustainable revenue percentage in column (3). Variable definitions are described in appendix 1. I winsorize all continuous variables at the one percent level and use one-year lagged values of time-varying independent variables. The t-statistics appear in brackets below parameter estimates. Robust standard errors are estimated by clustering at the firm level. Asterisks ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Panel A. Baseline Specification

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Total Institutional Ownership | 0.036*** | 0.035*** | 0.032*** | 0.029** |
| | [3.325] | [3.440] | [3.141] | [2.063] |
| Sustainable CAPEX | | 0.096** | | |
| | | [2.257] | | |
| Sustainable R&D | | 0.134 | | |
| | | [0.968] | | |
| Peer Intensity | | | 0.589*** | |
| | | | [7.310] | |
| Competitive | | | 0.121 | |
| | | | [0.520] | |
| United States | | | | -0.095 |
| | | | | [-0.094] |
| Europe | | | | 3.066*** |
| | | | | [3.698] |
| ESG Controversies Score | 0.005* | -0.002 | 0.005** | 0.014** |
| | [1.774] | [-1.250] | [2.069] | [2.374] |
| ESG-based Compensation | 0.013 | 0.007 | 0.013 | 0.002 |
| | [1.529] | [0.689] | [1.503] | [0.128] |
| Executive Gender Diversity | -0.059 | -0.244 | -0.218 | 0.201 |
| | [-0.232] | [-0.954] | [-0.840] | [0.360] |
| Log (Assets) | 0.102 | 0.086 | -0.258 | -0.103 |
| | [0.340] | [0.174] | [-0.894] | [-0.511] |
| Capex Ratio | 5.533*** | -2.017 | 3.040 | -4.739 |
| | [2.810] | [-0.948] | [1.557] | [-0.722] |
| Board Independence | 0.003 | 0.013 | -0.000 | -0.008 |
| | [0.388] | [1.164] | [-0.014] | [-0.728] |
| Return on Assets | 1.618 | -1.943* | 2.158* | -2.814 |
| | [1.395] | [-1.929] | [1.828] | [-1.052] |
| N | 36,634 | 5,191 | 35,794 | 36,662 |
| $R^2$ | 0.899 | 0.994 | 0.896 | 0.160 |
| Firm FEs | Yes | Yes | Yes | No |
| Year FEs | Yes | Yes | Yes | Yes |
| Industry x Year FEs | Yes | Yes | Yes | Yes |
| Country x Year FEs | Yes | Yes | Yes | No |

Panel B. Institutional Investor Type

| | (a) SRI (b) non-SRI | (a) Big3 (b) Non-Big3 | (a) Long-term (b) Short-term | (a) Europe (b) US |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| (a) Institutional Ownership % | 0.067*** | 0.135*** | 0.013 | 0.075*** |
| | [3.653] | [2.835] | [0.354] | [3.595] |
| (b) Institutional Ownership % | 0.018 | 0.028** | 0.012 | 0.005 |
| | [1.496] | [2.303] | [1.464] | [0.296] |
| Chow Test p-value | 0.018 | 0.035 | 0.982 | 0.007 |
| N | 36,516 | 36,022 | 36,715 | 36,634 |
| $R^2$ | 0.899 | 0.897 | 0.897 | 0.899 |
| Firm FEs | Yes | Yes | Yes | Yes |
| Year FEs | Yes | Yes | Yes | Yes |
| Industry x Year FEs | Yes | Yes | Yes | Yes |
| Country x Year FEs | Yes | Yes | Yes | Yes |
| Firm controls | Yes | Yes | Yes | Yes |

Panel C. Instrumenting SRI Ownership %

| | First Stage | | Second Stage |
|---|---|---|---|
| | SRI Ownership % | Non-SRI Ownership % | Sustainable Revenue % |
| | (1) | (2) | (3) |
| ESG Index Addition | 0.389** | -0.257 | |
| | [2.308] | [-1.217] | |
| SRI Ownership % | | | 0.511*** |
| | | | [3.749] |
| F-test statistics (p-value) | | | 0.021 |
| N | 28,483 | 28,517 | 28,498 |
| (Pseudo) $R^2$ | 0.942 | 0.928 | -0.065 |
| Firm FEs | Yes | Yes | Yes |
| Year FEs | Yes | Yes | Yes |
| Industry x Year FEs | Yes | Yes | Yes |
| Country x Year FEs | Yes | Yes | Yes |
| Firm controls | Yes | Yes | Yes |

Table 10: The Role of Managerial Incentives

This table presents regression estimates of the impact of managerial incentives on sustainable revenues. Panel A examines changes in variables related to managerial incentives around the adoption of Green Public Procurement laws. Panel B examines the impact of managerial incentives on sustainable revenues where the dependent variable is sustainable revenue percentage. Turnover probability equals one if the CEO is replaced in a given year. Total compensation is the logarithm of CEO's total annual compensation. Board Seats is the number of external board seats of the CEO. Poison pill adoption equals one if the firm has a poison pill. Pay duration represents the average pay duration of the top manager in a given year. CEO on Board equals one if the CEO is a board member, and dual CEO equals one if the CEO is the chairperson of the board. Variable definitions are described in appendix 1. I winsorize all continuous variables at the one percent level and use one-year lagged values of time-varying independent variables. The t-statistics appear in brackets below parameter estimates. Robust standard errors are estimated by clustering at the firm level. Asterisks ***, **, and * indicate significance at the 1 %, 5 %, and 10 % level, respectively.

Panel A. Managerial Private Benefits from Sustainable Revenues

| | Turnover Probability | Total Compensation | # Board Seats | Poison Pill Adoption |
|---|---|---|---|---|
| TreatPost | -0.074 | 0.010 | 1.457* | 0.002 |
| | [-0.514] | [0.106] | [1.827] | [0.161] |
| N | 5,046 | 4,863 | 4,973 | 76,461 |
| $R^2$ | 0.098 | 0.725 | 0.715 | 0.576 |
| Firm FEs | Yes | Yes | Yes | Yes |
| Year FEs | Yes | Yes | Yes | Yes |
| Firm x Stack FEs | Yes | Yes | Yes | Yes |
| Year x Stack FEs | Yes | Yes | Yes | Yes |
| Firm controls | Yes | Yes | Yes | Yes |

Panel B. Managerial Incentives and Sustainable Revenues

| | Pay Duration | CEO on Board | Dual CEO | Classified Boards |
|---|---|---|---|---|
| Pay Duration | -0.481 | | | |
| | [-1.531] | | | |
| CEO on Board | | -0.143 | | |
| | | [-0.261] | | |
| Dual CEO | | | 0.501 | |
| | | | [1.453] | |
| Classified Boards | | | | -3.252 |
| | | | | [-1.432] |
| N | 8,679 | 33,216 | 36,606 | 35,636 |
| $R^2$ | 0.871 | 0.896 | 0.899 | 0.899 |
| Firm controls | Yes | Yes | Yes | Yes |
| Firm FEs | Yes | Yes | Yes | Yes |
| Year FEs | Yes | Yes | Yes | Yes |
| Industry x Year FEs | Yes | Yes | Yes | Yes |
| Country x Year FEs | Yes | Yes | Yes | Yes |

# Appendix 1. Variable Definitions

| Variable Name | Definition |
|---|---|
| Firm Characteristics | |
| Sustainable Revenue % | Ratio of sustainable revenues to total revenues. Sustainable revenues are defined as total revenue derived from products and services that are categorized as green based on Green Revenues Classification System. Source: FTSE Russell. |
| Sustainable Revenue $ | Dollar value of sustainable revenues measured in billion USD. Sustainable revenues are defined as total revenue derived from products and services that are categorized as green based on Green Revenues Classification System. Source: FTSE Russell. |
| Sustainable CAPEX % | Ratio of sustainable CAPEX to assets. Source: Capital Knights Inc. |
| Sustainable R&D % | Ratio of sustainable R&D to assets. Source: Capital Knights Inc. |
| $CO_2$ Emission Intensity | Total $CO_2$ and $CO_2$ equivalent emissions of GHG emissions measured in metric tons divided by sales (multiplied by 100). Source: LSEG. |
| Total Institutional Ownership | Percentage of shares owned by institutional investors. Source: FactSet. |
| SRI Institutional Ownership | Percentage of shares owned by institutional investors that pledge with the United Nations Principles for Responsible Investment (UN PRI), starting from the year of the pledge. Source: FactSet. |
| Big 3 Institutional Ownership | Percentage of shares owned by the Big 3 institutional investors (BlackRock, Vanguard, and State Street). Source: FactSet. |
| Profitability | Ratio of net income to revenues. Source: LSEG. |
| Cash Flows | Ratio of free cash flows to equity (divided by 100). Source: LSEG. |
| Market-to-Book Ratio | Ratio of the market value of equity to book value of equity. Source: LSEG. |
| Market Share | Ratio of a firm's revenues to the total revenues within its industry-year group. Source: LSEG. |
| Sales Per Employee | Ratio of revenues to the number of employees, measured in ten thousands. Source: LSEG. |
| Turnover Probability | Equals one if the CEO is replaced in a given year, zero otherwise. Source: BoardEX. |
| Total Compensation | Total annual compensation of the CEO. Source: BoardEX. |
| # Board Seats | Number of external board seats of the CEO. Source: BoardEX. |
| Poison Pill Adoption | Equals one if the firm has a poison pill, zero otherwise. Source: LSEG. |
| Pay Duration | The average pay duration of the CEO. Source: ISS. |
| CEO on Board | Equals one if the CEO is a board member, zero otherwise. Source: LSEG. |
| Dual CEO | Equals one if the CEO is the chairperson of the board, zero otherwise. Source: LSEG. |
| Classified Boards | Equals one if the firm has a classified board structure, zero otherwise. Source: LSEG. |
| Executive Gender Diversity | Percentage of female executive members. Source: LSEG. |
| ESG-based Compensation | Indicator that equals one for firms with a compensation policy tied to ESG or sustainability factors, zero otherwise. Source: LSEG. |
| ESG Controversies Score | An index that measures a company's exposure to ESG controversies and negative events reflected in global media. Source: LSEG. |
| Board Independence | Percentage of independent board members. Source: LSEG. |

| Variable Name | Definition |
|---|---|
| Assets | The book value of total assets in $US millions. Source: LSEG. |
| Revenues | Total revenues in $US millions. Source: LSEG. |
| Capex Ratio | Ratio of total capital expenditures to total assets. Source: LSEG. |
| Return on Assets | Ratio of EBIT to total assets. Source: LSEG. |
| Leverage | Ratio of long-term debt to total assets. Source: LSEG. |
| | |
| Country and Industry-Specific Characteristics | |
| Green Procurement Laws | Indicator that equals one starting from the first year in which a country introduced green procurement laws, and zero otherwise. Source: Various legal publications. |
| Green Funding Initiatives | Indicator that equals one starting from the first year in which a country introduced green funding initiatives, and zero otherwise. Source: Various legal publications. |
| Paris Climate Agreement | Indicator that equals one starting from the first year in which a country signed the Paris climate agreement, and zero otherwise. Source: Various legal publications. |
| Crisis | Indicator that equals one for years when the country is subject to a banking, currency, or fiscal crisis, zero otherwise. Source: Nguyen et al. (2022). |
| Recession | Indicator that equals one for years when GDP growth is less than half of the average growth rate in the 1980-2023 period for a given country, zero otherwise. Source: World Economic Outlook database. |
| Vulnerability | An index that measures a country's exposure, sensitivity, and ability to adapt to climate change. It includes indicators across six sectors: food, water, health, ecosystem services, human habitat, and infrastructure. Source: ND-GAIN. |
| Readiness | An index that assesses a country's ability to leverage investments and implement adaptation actions. It covers three components: economic readiness, governance readiness, and social readiness. Source: ND-GAIN. |
| Climate Importance | The portion of respondents that believe climate change is extremely or very important to them personally. Source: International Public Opinion on Climate Change survey conducted by Yale School of the Environment. |
| Personal Harm | The portion of respondents that state climate change will cause a great deal of harm to them personally. Source: International Public Opinion on Climate Change survey conducted by Yale School of the Environment. |
| # Climate Disasters | The moving average of the number of major climate-related natural disasters a country experiences over the preceding two years, excluding disasters with damage less than $1 million. Source: EM-DAT database (https://www.emdat.be). |
| Left-Leaning Party Orientation | Indicator that equals one if the orientation of a country's second largest governing party with respect to economic policy is left leaning, zero otherwise. Source: World Bank's Political Institutions database. |
| Peer Intensity | The median value of sustainable revenue intensity in a given industry, country, and year. Source: LSEG. |
| Competitive | Equals one if the firm is in the bottom tercile of its industry in a given year and country based on the Herfindahl Index. Source: LSEG. |

# Internet Appendix

## A1.Corporate Statements on Sustainable Products and Services

Below, I provide a comprehensive list of statements made by Unilever, a leading consumer goods company, regarding their sustainable products and services. I also present several examples of corporate statements regarding their sustainable products and services, as found in their recent annual reports and news articles.

### Statements made by Unilever regarding sustainable products

- **Sustainable Living Brands**: "In 2022, our Sustainable Living Brands grew 46% faster than the rest of the business and delivered 75% of the company's growth."
- **Clean Future**: "We are reinventing our Home Care products to make them biodegradable and water-efficient, while reducing the use of fossil fuels in their production."
- **Plant-Based Foods**: "Our plant-based foods portfolio grew double digits in 2022, driven by strong consumer demand for more sustainable options. We have set an ambitious target to achieve €1 billion in annual sales from plant-based meat and dairy alternatives by 2025–2027."
- **Sustainable Ice Cream**: "We are working to reduce the environmental impact of our ice cream brands, such as Magnum and Ben & Jerry's, through initiatives like sourcing sustainable cocoa and using more recyclable packaging."
- **Sustainable Tea**: "We have achieved our goal of sourcing 100% of our Lipton and PG tips tea sustainably, supporting the livelihoods of over 1 million tea farmers and workers."
- **Green Cleaning Products**: "Our brands like Seventh Generation and Love Beauty and Planet offer plant-based and biodegradable cleaning products that are better for the planet."
- **Sustainable Personal Care**: "We have committed to making all our Dove bottles from 100% recycled plastic by the end of 2022."
- **Climate Transition Action Plan**: "We have committed to net-zero emissions across our value chain by 2039. This includes halving the greenhouse gas impact of our products by 2030."
- **Regenerative Agriculture Principles**: "We are working with farmers to adopt regenerative agriculture practices, which improve soil health, enhance biodiversity, and sequester carbon."
- **Sustainable Packaging**: "We have committed to halving our use of virgin plastic by 2025 and ensuring that 100% of our plastic packaging is fully reusable, recyclable, or compostable by 2025."
- **Partnerships for Sustainable Palm Oil**: "We are working with partners to transform the palm oil industry and ensure that all the palm oil we use is deforestation-free and traceable."

### Select statements from other corporations

- **Nike**: "Our 'Move to Zero' initiative, which aims to reduce our carbon footprint and waste, led to a 20% increase in sales of our sustainable footwear and apparel in 2022."
- **Danone**: "Our plant-based product portfolio, which includes brands like Alpro and Silk, grew by 15% in 2022, driven by increasing consumer demand for sustainable food options."
- **Honeywell**: "In 2022, we introduced over 100 new Sustainability Solutions – products and services that help customers meet their environmental and social goals – and they generated over $10 billion in revenue."
- **Schneider Electric**: "Our Green Premium offer, which includes products and solutions with superior environmental performance, accounts for 72% of our total revenue in 2022."

- **IKEA**: “We are committed to becoming people and planet positive by 2030, meaning we will produce more renewable energy than we consume, convert to circular business models, and contribute to a fair and inclusive society. Our sustainable product range continues to grow, accounting for 18% of total sales in 2020.”
- **Philips**: “Our Green Products portfolio, which offers superior energy efficiency and/or lower environmental impact throughout their lifecycle, generated 78% of our sales in 2022.”
- **Siemens**: “In fiscal year 2023, Siemens generated €43.5 billion in revenue from its green portfolio, representing 52% of its total revenue. This growth is driven by the increasing demand for sustainable technologies in areas like energy efficiency, renewable energy, and e-mobility.”
- **Neste**: “We are the world’s leading producer of renewable diesel and sustainable aviation fuel. In 2022, our renewable products segment generated €17.1 billion in revenue.”
- **Saint-Gobain**: “Our sustainable solutions, which include high-performance insulation, low-carbon glass, and circular economy products, represented 38% of our total sales in 2022.”
- **Hitachi**: “Our Green Energy and Mobility business segment, focusing on renewable energy solutions and electric vehicle infrastructure, grew 15% in revenue in 2022.”
- **DS Smith**: “We are a leading provider of sustainable packaging solutions, using 100% recycled or chain-of-custody certified papers. In 2022, our sustainable packaging solutions contributed to a 14% increase in revenue.”
- **BMW Group**: “We are focused on sustainability and have set a goal to have one million electrified vehicles on the road by the end of 2021. Our investments in electric and hybrid vehicles are driving growth and helping us reduce our carbon footprint.”
- **BASF**: “Our portfolio of ’Accelerator’ products, which contribute significantly to sustainability in the value
- **Symrise**: "Our sustainable fragrance and flavor ingredients, which are derived from renewable and responsibly sourced raw materials, contributed to a 10
- **Xylem**: “Our advanced water technologies, which help customers reduce water consumption and improve water quality, drove a 7
- **Saint-Gobain**: “Our sustainable solutions, which include high-performance insulation, low-carbon glass, and
- **ABB**: “Our sustainable technologies, including energy-efficient motors, drives, and robotics, generated $17 billion in revenue in 2022.”
- **Johnson & Johnson**: “Our sustainable product portfolio, which includes energy-efficient medical devices and recyclable packaging, grew by 10% in 2022.”
- **Roche**: “Our Diagnostics division’s sustainability-focused solutions, including energy-efficient instruments and eco-friendly reagents, contributed to CHF 14.9 billion in sales in 2022.”
- **Tesla**: “Tesla’s mission is to accelerate the world’s transition to sustainable energy. We produce electric vehicles, solar energy generation systems, and energy storage products.”

Table IA1: Systematic Differences: Missing Data versus Zero Sustainable Revenues

This table presents regression estimates of the systematic differences between firms with missing data on sustainable revenues versus firms with zero sustainable revenues. Variable definitions are described in appendix 1. I winsorize all continuous variables at the one percent level and use one-year lagged values of time-varying independent variables. The t-statistics appear in brackets below parameter estimates. Robust standard errors are estimated by firm level. Asterisks ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

| | Firms with "Missing" Sustainable Revenue Data | Firms with "Zero" Sustainable Revenue Data |
|---|---|---|
| | (1) | (2) |
| Log (Assets) | -0.010 | 0.002 |
| | [-1.453] | [0.181] |
| Capex Ratio | 0.050 | -0.161*** |
| | [0.876] | [-2.613] |
| Institutional Ownership % | 0.000 | -0.001*** |
| | [0.165] | [-2.685] |
| Peer Intensity | 0.001 | -0.009*** |
| | [0.820] | [-3.503] |
| ESG-based Compensation | -0.012** | 0.008 |
| | [-1.997] | [0.921] |
| Executive Gender Diversity | -0.000 | 0.000 |
| | [-0.574] | [0.137] |
| Controversies Score | 0.000 | -0.000 |
| | [0.126] | [-0.185] |
| Board Independence | -0.000 | 0.000 |
| | [-0.717] | [0.624] |
| Return on Assets | -0.012 | -0.005 |
| | [-0.427] | [-0.134] |
| N | 38,759 | 38,759 |
| $R^2$ | 0.573 | 0.795 |
| Firm FEs | Yes | Yes |
| Year FEs | Yes | Yes |
| Industry × Year FEs | Yes | Yes |
| Country × Year FEs | Yes | Yes |

Table IA2: Correlation among Sustainable Revenues, ESG Scores, and $CO_2$ Emissions

This table displays the correlations between sustainable revenues and two key variables frequently used in prior research: ESG scores and CO2 emissions. Definitions of these variables and details about the data sources are provided in appendix 1. The pillar scores, which assess corporate involvement in environmental, social, and governance issues, are derived from LSEG. All continuous variables are winsorized at the 1% level.

| | Sustainable Revenue % | Sustainable Revenue $ | ESG Score | Environmental Pillar | Social Pillar | Governance Pillar | Total $CO_2$ Emissions |
|---|---|---|---|---|---|---|---|
| Sustainable Revenue % | 1.0000 | | | | | | |
| Sustainable Revenue $ | 0.6293 | 1.0000 | | | | | |
| ESG Score | 0.0885 | 0.1746 | 1.0000 | | | | |
| Environmental Pillar | 0.1017 | 0.2391 | 0.7792 | 1.0000 | | | |
| Social Pillar | 0.0668 | 0.1773 | 0.8346 | 0.7102 | 1.0000 | | |
| Governance Pillar | 0.0092 | 0.0802 | 0.6066 | 0.3288 | 0.3872 | 1.0000 | |
| Total $CO_2$ Emissions | 0.0458 | 0.0614 | -0.0733 | -0.0656 | -0.1074 | -0.0086 | 1.0000 |

Table IA3: Green Public Procurement Laws and Green Funding Initiatives

This table reports the enactment dates for green public procurement laws and green funding initiatives by country, collected from various legal publications.

| Country | Green Public Procurement Laws | Green Funding Initiatives |
|---|---|---|
| Argentina | 2012 | – |
| Australia | – | 2014 |
| Austria | 2010 | 2021 |
| Belgium | 2021 | 2018 |
| Brazil | – | 2015 |
| Canada | 2006 | 2014 |
| Chile | – | 2019 |
| China | 2004 | 2018 |
| Colombia | 2010 | – |
| Denmark | 2015 | 2022 |
| Finland | 2020 | 2018 |
| France | 2015 | 2017 |
| Germany | 2010 | 2020 |
| Greece | – | 2024 |
| Hong Kong | – | – |
| India | – | 2015 |
| Indonesia | – | 2018 |
| Ireland | 2012 | 2018 |
| Israel | 2011 | 2022 |
| Italy | 2008 | 2021 |
| Japan | – | 2019 |
| Kuwait | – | – |
| Luxembourg | – | – |
| Malaysia | – | 2017 |
| Mexico | 2019 | 2016 |
| Netherlands | 2012 | 2019 |
| New Zealand | – | 2018 |
| Norway | 2017 | 2015 |
| Philippines | 2003 | – |
| Poland | 2010 | 2016 |
| Portugal | 2007 | 2022 |
| Qatar | – | – |
| Russia | – | 2019 |
| Saudi Arabia | – | – |
| Singapore | 2019 | 2022 |
| South Africa | – | 2012 |
| South Korea | 2021 | 2022 |
| Spain | – | 2021 |
| Sweden | – | 2015 |
| Switzerland | – | 2014 |
| Taiwan | – | – |
| Thailand | 2018 | 2018 |
| Turkey | – | 2021 |
| UAE | – | – |
| United Kingdom | – | 2016 |
| United States | 2021 | 2013 |

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