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Education

Singapore Management University *2023–2028 (Expected)*
PhD Candidate in Finance

Xiamen University *2020–2023*
Master's Degree in Finance

Southwestern University of Finance and Economics *2016–2020*
Bachelor's Degree in Accounting

Research Interests

ESG and sustainability topics in corporate finance

Working Papers

Financing the Green Transition of "Brown" Sectors
with Hao Liang and Tianhao Yao

Abstract: We examine whether cheaper financing conditions facilitate firms' transition away from carbon-intensive activities and toward sustainable ones, measured by the share of revenue from green activities ("green revenue"). Using a novel revenue-decomposition dataset for Chinese listed firms, we find that lower costs of debt are associated with a higher green-revenue share, with effects concentrated in high-emission ("brown") sectors. The association is stronger for smaller firms and for firms with richer ex-ante green technologies. Exploiting policy-induced reductions in borrowing costs, we document a plausibly causal effect of cheaper debt on increases in green revenue. We corroborate these patterns in a global sample. Taken together, the results indicate that *financing the transition of brown sectors* — by lowering the marginal cost of capital for credible investments — can materially accelerate corporate decarbonization. We discuss implications for emerging transition-finance frameworks.

- **Conferences:** NBER Climate Finance PhD Workshop (*Scheduled*)

From Incidents to Actions: The Dynamics of ESG Engagement in Asset Management
with Hao Liang and Mandy Tham

Abstract: This paper examines when and why institutional investors engage with portfolio firms on ESG issues. Using proprietary engagement records from a European asset manager, we find that salient negative incidents are a key trigger of engagement, second only to firm size in economic importance. Investor responses are driven by both reputational concerns and new information about firms' hidden weaknesses, particularly in those previously regarded as strong ESG performers. We also find that investor monitoring extends beyond portfolio firms to their suppliers, as supplier incidents trigger engagement as well. Finally, we find that engagement is linked to higher firm value, stronger ESG performance, and increased cash flows. Together, these findings provide new evidence on the drivers and mechanisms of ESG engagement and underscore its role as an effective form of external corporate governance.

- **Conferences:** 2025 Australasian Finance and Banking Conference (*Scheduled*); 2025 FMA Asia/Pacific Conference (*Scheduled*); 2025 New Zealand Finance Meeting (*Scheduled*); 2025 Massey Sustainable Finance Conference (*Scheduled*)

Research Before PhD

Unwatched Corporate Social Responsibility: The Impact of Releasing Political Pressure
with Shusen Qi and Jieyu Zhou

Abstract: China's *Rule 18* in 2013 mandated political officials to resign as independent directors from listed companies. We exploit this quasi-natural experiment to examine the long-term effects of political pressures on CSR. Based on hand-collected data and difference-in-differences models, we find that firms' CSR performance decreases after they are released from political pressures. The results suggest that while political pressures can increase CSR engagement, politically induced CSR is generally not persistent. We further reveal that politically induced CSR could turn into firms' spontaneous behavior only when firms have stronger incentives to conduct CSR, when the strength of political pressures is moderate, and when firms have greater bargaining power against political pressure. Finally, we show that firms are more likely to discontinue CSR that is less lined up with their best self-interest and that CSR activities induced by political pressures are generally economically inefficient. Our research is among the first to provide evidence regarding the persistency of politically induced CSR activities.

- **Conferences:** Academy of Management Annual Meeting 2024

Industry Articles

Greening Brown Sectors through Transition Finance (Link) ***Asian Management Insights***
with Hao Liang and Tianhao Yao

Chapter 1 in "Navigating Climate Risks and Opportunities: How Institutional Investors Respond to the Transition of High-Carbon Sectors" [in Chinese] (Link) ***Caixin Insights***
with Hao Liang

Research Grants

ASEAN Business Research Initiative Grant *2024–2025*
Co-Principal Investigator

Referee Service

Journal of Business Ethics

Honors and Awards

SMU PhD Full Scholarship *2023–Present*
China National Scholarship *2019*

Language and Skills

Language: Chinese (native), English (fluent)
Programming: Stata, Python, LaTeX

Financing the Green Transition of "Brown" Sectors*

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Abstract

We examine whether cheaper financing conditions facilitate firms' transition away from carbon-intensive activities and toward sustainable ones, measured by the share of revenue from green activities ("green revenue"). Using a novel revenue-decomposition dataset for Chinese listed firms, we find that lower costs of debt are associated with a higher green-revenue share, with effects concentrated in high-emission ("brown") sectors. The association is stronger for smaller firms and for firms with richer ex-ante green technologies. Exploiting policy-induced reductions in borrowing costs, we document a plausibly causal effect of cheaper debt on increases in green revenue. We corroborate these patterns in a global sample. Taken together, the results indicate that *financing the transition of brown sectors* — by lowering the marginal cost of capital for credible investments — can materially accelerate corporate decarbonization. We discuss implications for emerging transition-finance frameworks.

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1 Introduction

Climate change is one of the most pressing challenges facing humanity. According to the Intergovernmental Panel on Climate Change (IPCC), global temperatures over the past 50 years have increased at the fastest rate in the past two millennia. In response, substantial capital has flowed into sustainable investment vehicles over the past decade. A central mechanism is the *cost of capital* approach: investor preferences and policies reprice securities so that greener firms enjoy a lower cost of capital while carbon-intensive ("brown") firms face a higher one. This *green premium* (or "greenium") can, in principle, shift investment and growth toward greener activities and away from brown ones, thereby creating market-based incentives for decarbonization (e.g., Pástor et al., 2021, 2022).

At the same time, relying purely on raising financing costs for brown firms may be counterproductive. When capital becomes expensive, high-emitting firms can rationally prioritize short-term cash flows over investments that would reorient their business models toward greener activities, potentially increasing emissions or other pollutants (e.g., Hartzmark and Shue, 2023; Xu and Kim, 2022). This observation motivates an alternative emphasis: rather than withdrawing capital from brown sectors, *financing the transition of brown sectors* — that is, improving financing conditions when firms undertake credible transition plans — may better accelerate real-economy decarbonization.

In this paper, we study whether cheaper financing conditions help firms — especially those in the brown sector — transition their businesses toward greener activities. We employ a direct, revenue-based measure of transition — the shares of firms' *green* and *brown* revenues — constructed for publicly listed Chinese firms. This taxonomy-mapped decomposition reflects the extent to which firms are fundamentally reweighting their product and service mix toward sustainable activities. Relative to flow measures such as annual emissions, revenue composition more directly captures shifts in business models and market exposure to green activities, and thus provides a complementary lens on transition progress.

We focus on China for three reasons. First, China is undergoing rapid and far-reaching industrial restructuring toward lower-carbon technologies, offering a fertile setting to study how financing conditions shape transition at scale. Second, China's green taxonomy and reporting systems provide us with granular measures on Chinese listed firms environment-related business models, including green and brown revenue shares and identified green projects, allowing us to examine multiple dimensions of transition within a consistent framework. Third, China's policy

environment features plausibly exogenous shocks to firms' borrowing costs — such as changes in depreciation allowances and related tax-policy levers — that we exploit to study the effect of cheaper debt on subsequent shifts in revenue mix and investment.

We begin by describing and validating our revenue-based measures of transition. In the time series, the *green-revenue share* rises and the *brown-revenue share* falls, consistent with China's ongoing shift toward lower-carbon activities. In the cross-section, a firm's *net green share* (green minus brown) is negatively associated with total and intensity-based GHG emissions and positively associated with standard environmental scores from ESG providers. These correlations also obtain within industries, indicating that green revenue meaningfully captures firm-level transition efforts beyond industry composition.

We then study how financing conditions relate to transition. Our baseline specification is a firm–time panel with firm and time fixed effects and standard controls (size, liquidity, leverage, investment, and growth). We interact firms' *ex ante* industry classification — "green," "brown," or "neutral," based on industry-level taxonomy shares — with the firm's cost of debt. We find that *lower debt costs are associated with a lower brown-revenue share*, and the magnitude is economically meaningful: a one-standard-deviation decline in borrowing costs reduces the brown share by 0.77 percentage points (about 11% of its unconditional mean). The effect is concentrated in brown industries, consistent with financing conditions being most consequential where abatement potential is greatest.

We next explore heterogeneity. The relationship between cheaper debt and greener revenue is strongest for *smaller firms*, consistent with greater organizational flexibility aiding reallocation, and for firms with richer *ex ante* green-technology portfolios, consistent with technological readiness easing transition.

To study the investment channel, we construct a novel firm-year measure of *green investment* by mapping taxonomy-based keywords to project titles in annual reports and aggregating the value of identified projects (scaled by firm size). Green investment is positively correlated with green revenue, and — within the same regression framework — *lower debt costs are associated with higher green investment*, reinforcing the view that relaxed financing constraints facilitate transition on both the revenue and investment margins.

To address endogeneity, we exploit staggered tax-policy changes (2014–2019) that allowed accelerated depreciation in selected industries. These policies increased internal cash flows and improved creditworthiness, lowering borrowing costs. We verify a first-stage decline in firms' cost of debt of 0.5 percentage points (8.3% of the unconditional mean). In a stacked difference-

in-differences design, treated firms — especially those in brown, hard-to-abate industries — *increase their green-revenue share* by 3.2 percentage points (about 64% of the sample mean), providing plausibly causal evidence that cheaper debt accelerates transition.

Finally, using the S&P Global EU Taxonomy dataset, we examine external validity in a global sample. We find that firms with lower market-implied costs of capital have higher taxonomy-eligible revenue shares, suggesting that the link between financing conditions and revenue-side transition is not unique to China but generalizes internationally.

Our results highlight a financing-based pathway for the economy's green transition. We provide novel evidence that improving financing conditions for high-emitting firms with credible plans can facilitate green investment and shift business models toward greater reliance on green revenues.

We contribute to several strands of research. First, we add to work on financing frictions and environmental outcomes. Hartzmark and Shue (2023) show that reallocating capital away from brown firms can be counterproductive, while Xu and Kim (2022) find that tighter financial constraints raise pollution. Cohen et al. (2024) document that brown sectors generate many highly cited green innovations. We complement these insights by showing that higher financing costs impede firms' transition toward greener business models — measured directly via green-revenue shares — and by leveraging a policy shock that provides plausibly exogenous variation in borrowing costs. Our study also relates to theoretical work on socially responsible investing and market equilibria (Heinkel et al., 2001; Edmans et al., 2022; Lanteri and Rampini, 2023; Landier and Lovo, 2025; Oehmke and Opp, 2025).

Second, we add to the emerging literature that measures firms' revenue-side transition. Klausmann et al. (2024) use EU Taxonomy definitions to show that firms' green revenues accelerated post–Paris Agreement, especially among firms with ex-ante green patents and support from ESG investors. We complement this evidence by focusing on the role of financing costs in shaping green revenue as a proxy for transition progress. Unlike the EU Taxonomy, our data distinguish *green*, *brown*, and *neutral* revenues, allowing us to document that transition also occurs by moving away from brown revenue. Related contributions include Bassen et al. (2025) and Sautner et al. (2025).

Third, we connect to work on sustainable investment, cost of capital, and environmental externalities (Chava, 2014; Gormsen et al., 2024; Van der Beck, 2021; Pástor et al., 2021, 2022; Bolton and Kacperczyk, 2021; Berk and Van Binsbergen, 2025). While some studies find that divestment by intermediaries can reduce emissions under specific conditions (e.g., Green and

Vallee, 2022), our evidence emphasizes a complementary channel: easing financing frictions can catalyze revenue-side transition within high-emitting firms.

The rest of the paper is organized as follows. Section 2 describes the data and sample. Section 3 presents descriptive evidence on green revenue and its correlation with other sustainability measures. Section 4 reports the baseline relation between cost of debt and green revenue. Section 5 studies heterogeneity. Section 6 examines green investments. Section 7 provides identification evidence. Section 8 presents international results. Section 9 concludes.

2 Data and Sample

Our main sample covers all nonfinancial Chinese A-share listed firms from 2010 to 2022. We exclude financial firms, firms under special treatment, and observations with missing key variables.[1] The final dataset comprises 29,265 firm–year observations.

2.1 Green and Brown Revenue

We construct revenue-based measures of transition from Chinese listed firms' mandatory disclosures of *main business segments* in annual reports. For each firm–year, we extract segment names and associated revenues and map each segment into one of three mutually exclusive categories: *green*, *brown*, or *neutral*.

The green classification follows the *Green Industry Guidance Catalog (2019)* issued by the National Development and Reform Commission (NDRC) and other authorities. The Catalog enumerates environmentally sustainable activities across six main categories, thirty subcategories, and 211 specific business types with detailed descriptions. We match segment names to taxonomy entries using keyword dictionaries aligned to the Catalog and validate ambiguous cases via human review.

To identify brown activities, we delineate a set of typically high-emission businesses within eight widely recognized sectors in China — power generation, steel, building materials, nonferrous metals, petrochemicals, chemicals, papermaking, and aviation — and refine these into eight categories and thirty-eight specific business types. A segment is classified as brown if it

[1] Firms under extreme financial distress or abnormal operations are designated as specially treated by the Shanghai and Shenzhen Stock Exchanges to signal high investment risk. The label **ST* indicates a high risk of forced delisting (e.g., two consecutive years of negative net profits or a disclaimer/adverse audit opinion). The label *ST* highlights significant risks in other areas (e.g., inability to operate normally for at least three months or serious misappropriation of funds by controlling shareholders or related parties). As these firms are often distressed or face major governance issues, we exclude them.

matches this system based on keyword search and manual checks.[2] The resulting Green Revenue dataset covers 5,242 listed firms from 2010 to 2022.

Aggregating segment-level tags to the firm–year level, we define

$$\text{Green Ratio}_{it} \equiv \frac{\text{Green Revenue}_{it}}{\text{Total Revenue}_{it}}$$
$$\text{Brown Ratio}_{it} \equiv \frac{\text{Brown Revenue}_{it}}{\text{Total Revenue}_{it}}$$
$$\text{Net Green Ratio}_{it} \equiv \text{Green Ratio}_{it} - \text{Brown Ratio}_{it}$$

These measures summarize the extent to which a firm's revenue mix tilts toward (or away from) green activities in a given year. An illustrative example is provided in Table IA.1 (Appendix) for Guangdong Shaoneng Group Co., Ltd. (000601.SZ) in 2010: the firm reported six main businesses — hydropower generation (green; taxonomy category 3.1.4: Hydropower & Pumped Storage Equipment Manufacturing), cement (brown; label 3011: Cement Manufacturing), paper & paper products (brown; label 2221: Machine-made Paper & Paperboard Manufacturing), thermal power generation (brown; label 4411: Thermal Power Generation), trade & services (neutral), and transmission & gear products (neutral).

2.2 EU-Taxonomy Revenue (Global Sample)

To examine external validity outside China, we use the S&P Global EU Taxonomy dataset, which decomposes firm revenues into economic activities and maps them to the EU Taxonomy. The dataset reports each firm's *EU-Taxonomy eligible revenue ratio*, i.e., the share of revenue from activities that could substantially contribute to at least one EU environmental objective. Importantly, *eligibility* differs from *alignment*: for alignment, an activity must (i) make a substantial contribution to an environmental objective, (ii) do no significant harm to other objectives, and (iii) meet minimum safeguards. Hence, the eligible share is a suggestive indicator of "greenness," not a definitive alignment measure. The S&P dataset covers 24,611 firms worldwide from 2005 to 2020.

[2] According to a report on the website of China's State Council, these eight sectors account for roughly 75% of China's total emissions and are slated for inclusion in the national emissions trading system. Source: https://www.gov.cn/zhengce/202402/content_6934526.htm

2.3 Financial Data

Firm-level financials for Chinese listed companies are from the China Stock Market & Accounting Research (CSMAR) database. Data on green patents are sourced from the Chinese Research Data Services (CNRDS). For the global sample, we obtain financial statement data and stock prices from Compustat North America and Compustat Global, and analyst earnings forecasts from I/B/E/S. When necessary, all monetary values are converted to USD using exchange rates provided in Compustat Global.

2.4 Variable Definitions

To characterize firm greenness, we aggregate the revenue shares of green and brown businesses to derive three key metrics: the Green Ratio (proportion of revenue from green businesses), the Brown Ratio (proportion from brown businesses), and the Net Ratio (the difference between green and brown ratios). Following the example in Table IA.1, the firm generated 42.94% of its revenue from brown businesses and 35.79% from green businesses. Thus, its brown ratio is 42.94%, its green ratio is 35.79%, and its net green ratio is -7.15%.

Our main variable of interest, *Debt Cost*, proxies for the average cost of raising debt. The numerator sums interest expenditure, other financial expenses, and capitalized interest expenditure; the denominator is total debt, comprising short-term loans, non-current liabilities due within one year, long-term loans, bond payables, and long-term accounts payable. While this proxy is noisier than security-level borrowing rates, it is the most comprehensive public-data measure available in China given the absence of loan-level pricing. Using corporate-bond credit spreads would be more precise but substantially reduces coverage: Geng and Pan (2024) report that only 1,444 nonfinancial firms issued corporate bonds during 2010–2020, whereas more than 4,000 firms were listed by end-2020. Accordingly, our *Debt Cost* measure offers the best trade-off between comparability and sample breadth.

2.5 Summary Statistics

Panel A of Table 1 reports summary statistics for the Chinese sample used in the regressions. On average, *green* businesses account for 5% of firm revenue, while *brown* businesses contribute 7%. By ex ante industry classification, 76% of firm–years are neutral, 19% are brown, and 5% are green. The average cost of debt is 6%. Panel B of Table 1 summarizes the global sample. Firms generate, on average, 36% of revenue from EU-Taxonomy–eligible activities, which can

be considered as green revenues similar to that of the Chinese sample. The average implied cost of capital is about 9%, whether computed using analyst earnings forecasts or a model-based earnings forecast.

3 Green and Brown Revenue by Chinese Firms

In this section, we examine how firms' green and brown revenues relate to their cost of debt in the Chinese sample, and whether these correlations differ between green and brown sectors.

3.1 Time Trends and Industry Decomposition

Figure 1 plots the time series of green, brown, and net green revenue ratios for all Chinese listed firms in our sample. Firms become progressively greener over the sample period: the net green ratio rises from -3.66% in 2010 to 1.01% in 2022, reflecting both a substantial increase in the green ratio (87.13%) and a significant decline in the brown ratio (-27.86%). Despite this progress, most revenue remains *neutral*: on average, each of the green and brown shares stays below 10% of total revenue. For external validation, Klausmann et al. (2024) report comparable magnitudes for green-revenue shares in the Chinese subsample of their FTSE Russell–based global dataset (2008–2023).

Figure 2 decomposes average revenue shares across industries. Subfigure (a) shows that *Ecological Protection & Environmental Governance* exhibits the highest green-revenue share (61%), followed by *Forestry* (42%) and *Water Production & Supply* (39%). Subfigure (b) indicates that the highest brown shares tend to occur in industries related to papermaking, ferrous metals, power generation, nonferrous metals, petroleum, chemicals, non-metallic mineral products, and aviation — closely aligning with the eight conventionally recognized high-emitting sectors in China. Subfigure (c) shows that industries with high green shares typically also rank high in net green shares. A notable exception is *Production & Supply of Electric Power & Heat*: because the industry encompasses both hydropower (green) and thermal power (brown), it ranks high in *both* green and brown shares, yielding a relatively modest net green share. These patterns underscore the importance of tracking both green and brown activities when assessing overall greenness.

3.2 Correlations with Common Greenness Measures

Table 2 reports correlations between revenue-based measures (green, brown, and net green shares) and commonly used indicators of firm greenness.

GHG emissions (Trucost). We consider both intensities and levels for Scope 1, Scope 2, and combined (Scopes 1+2) emissions. Rows (4)–(9) show that GHG measures are positively correlated with the brown share (36%–57%), weakly correlated with the green share (2%–8%), and negatively correlated with the net green share (33%–43%).

Climate-change exposure (Sautner et al., 2023). Rows (10)–(13) indicate that overall climate exposure is positively correlated with both green and brown shares. Decomposing exposure shows that the brown share loads more on regulatory and physical risks, whereas the green and net green shares are more strongly associated with climate-related opportunities.

ESG scores (Refinitiv, MSCI). From Refinitiv, we use the environmental pillar and emissions scores; from MSCI, we use the environmental pillar score, climate-change theme score, and environmental-opportunities theme score. Rows (14)–(15) suggest that revenue-based measures are only weakly correlated with Refinitiv scores and at times imply a different greenness ordering. By contrast, Rows (16)–(18) show stronger and more consistent correlations with MSCI scores, with both sets indicating similar assessments of firm-level greenness.

Event-based measures (RepRisk, Truvalue SASB). We use RepRisk counts of environment- and GHG-related incidents[3] and the FactSet Truvalue SASB GHG performance score,[4] which reflects performance signaled in external reports. Rows (19) – (21) show that environmental incidents are positively correlated with the brown share and negatively with the net green share. The revenue shares, however, do not exhibit statistically meaningful correlations with GHG-specific incidents or GHG performance scores.

Beyond simple correlations, we estimate panel regressions to relate our revenue-based measures to standard indicators of firm greenness. Specifically, we regress each greenness proxy (carbon emissions and intensities, ESG ratings, and event-based measures) on the *net green share*, controlling for firm characteristics and including industry and year fixed effects. Table 3 shows that, conditional on these controls, the net green share is *negatively* associated with carbon emissions, *positively* associated with Refinitiv and MSCI environmental ratings, and *negatively* associated with environmental incidents — patterns that align with the simple corre-

[3]RepRisk identifies ESG incidents daily from a broad set of public sources in 23 languages and classifies them as environmental, social, or governance.

[4]FactSet Truvalue SASB Scores apply machine learning and natural language processing to ESG-related documents to construct issue-level and overall performance metrics defined by SASB.

lations in Table 2. Table IA.5 further decomposes the net measure into its components. Firms with *higher green shares* exhibit *lower* emissions, *stronger* environmental ratings, and *fewer* environmental incidents, whereas firms with *higher brown shares* display the opposite. Taken together, these results validate that our revenue-based measures are systematically related to established indicators of firm-level environmental performance.

Two findings emerge from the preceding analysis. First, the green, brown, and net revenue shares track firm-level greenness in ways that broadly align with carbon emissions, climate-exposure measures, ESG ratings, and incident-based indicators, thereby validating our revenue-based constructs. Second, their correlations with most existing proxies are only moderate, indicating that revenue-based greenness is not a mere re-labeling of emissions, risk exposures, or perception-based scores. Instead, it captures complementary information about *business-model reweighting* — the extent to which firms derive revenue from green versus brown activities — making it a distinct and useful dimension for analyzing transition progress.

3.3 Variance Decomposition

We next assess whether firm-, industry-, or time-level factors account for most of the variation in green, brown, and net green revenue shares. Following Sautner et al. (2023), we decompose total variance using fixed effects at different aggregation levels. Panel A of Table 4 shows that the bulk of variation is *firm-specific* (62%–74%), with *industry-level* differences explaining 24%–37% and *common time* effects contributing only 0.2%–0.4%. Panel B further partitions the variation into firm fixed effects, industry-by-year fixed effects, and a residual within-firm component: time-invariant firm effects together with time-varying industry-by-year effects explain 85%–89% of total variance, leaving 11%–15% as time-varying, firm-level variation.

These results imply that revenue-based greenness evolves slowly at the firm level, in contrast to more volatile measures of climate exposure. Using climate-related keywords from earnings calls, Sautner et al. (2023) find that 44% - 55% of variation in firm climate exposure reflects *within-firm* time-series movements. By comparison, only 11% - 15% of the variance in our green, brown, and net green shares arises from time-varying firm effects. The contrast suggests that exposure to climate risks can fluctuate markedly year to year, whereas business-model reweighting — and hence revenue-side transition — tends to proceed more gradually, consistent with the long-horizon nature of corporate transition.

4 Baseline Results: Cost of Debt and Corporate Green Transition

Our baseline analysis examines whether and how financing conditions — proxied by the *cost of debt* — affect firms' green transition, measured using Taxonomy-based green-revenue share, and whether the effect varies between green and brown sectors. In contrast to abatement within existing operations (which often entails costs with limited direct revenue upside), shifting the business mix toward greener activities generates cash flows from environmentally beneficial products and services. Revenue-based transition thus embeds economic incentives into decarbonization by linking greener activity directly to top-line growth.

Our approach aligns with recent evidence that revenue-based transition measure accelerates when incentives shift. Klausmann et al. (2024) identify the Paris Agreement as a regime change under which firms with stronger green technology and higher ESG institutional ownership expand green revenues. Theory and empirics similarly indicate that lower financing costs facilitate investment in green technologies and projects: in equilibrium, financially constrained firms tilt toward brown projects with lower upfront financing needs, while unconstrained firms invest in greener, more back-loaded projects (Lanteri and Rampini, 2023). Consistent with this mechanism, limited credit access slows green technology adoption (De Haas et al., 2024) and tighter constraints are associated with higher toxic emissions (Xu and Kim, 2022). Building on these insights, we test whether cheaper debt supports firms' transition — especially those in the brown sector — by enabling green investment and, in turn, raising the green share of revenues.

Focusing on the cost of *debt* is especially relevant in China. Debt — particularly bank lending — is the dominant external financing channel: as of end-2020, loans accounted for roughly 60% of aggregate financing to the real economy, while equity issuance represented about 2.9%, consistent with Cong et al. (2019).[5] Moreover, debt instruments play a central role in financing transition activities (e.g., sustainability-linked loans and bonds, and, more recently, transition-labelled bonds). Although our data do not track labelled instruments per se, variation in borrowing costs is a first-order determinant of firms' ability to finance green projects in this setting.

Heterogeneity by sector is also key. Hartzmark and Shue (2023) show that changes in the cost of capital need not symmetrically affect green and brown firms: higher capital costs disproportionately discourage projects with back-loaded payoffs, which are more likely to be "green"

[5]Source: http://www.pbc.gov.cn/en/3688247/3688978/3709140/4162135/index.html.

for brown firms than for already-green firms. In our context, brown firms face meaningful technology and product-mix choices between green and brown activities, whereas green firms' marginal projects are predominantly green. We therefore expect the sensitivity of green-revenue shares to financing conditions to be stronger among brown firms. In the baseline regressions below, we implement this idea by interacting the cost of debt with firms' ex ante industry-based greenness classification.

4.1 Method

Industry-based greenness classification. We first assign each industry to one of three *ex ante* greenness groups — *Green*, *Brown*, or *Neutral* — anchored at the industry's first appearance in the green-revenue data. For that first year, we compute the industry's average green, brown, and neither-green-nor-brown revenue shares. Industries with a neither-green-nor-brown share exceeding 90% are classified as *Neutral*. Among the remainder, industries with a higher green than brown share are classified as *Green*, and the others as *Brown*. Table IA.2 in the Appendix reports the resulting industry profiles. Each firm inherits its industry's greenness group.

Baseline specification. To relate financing conditions to revenue-side transition, we estimate panel regressions of the form

$$\begin{aligned} Y_{it} = \beta_0 + \beta_1 \cdot \mathit{Green}_{i,t-1} \cdot \mathit{Debt\ Cost}_{i,t} + \beta_2 \cdot \mathit{Brown}_{i,t-1} \cdot \mathit{Debt\ Cost}_{i,t} \\ + \beta_3 \cdot \mathit{Neutral}_{i,t-1} \cdot \mathit{Debt\ Cost}_{i,t} + \boldsymbol{\beta}_4 \cdot \boldsymbol{X}_{i,t-1} + \lambda_i + \eta_t + \varepsilon_{it} \end{aligned} \tag{1}$$

where i indexes firms and t years. The dependent variable Y_{it} alternates across *GreenShare*, *BrownShare*, and *NetGreen*. The indicators *Green*, *Brown*, and *Neutral* reflect the firm's *ex ante* industry-based group (lagged one year), interacted with contemporaneous *Debt Cost*. The control vector $\boldsymbol{X}_{i,t-1}$ includes *Firm Size*, *Cash Ratio*, *Tangible Ratio*, *Leverage*, *CapEx*, and *Sales Growth*. We include firm fixed effects (λ_i) and year fixed effects (η_t).

In alternative specifications, we add sector×year fixed effects to absorb time-varying sectoral shocks (e.g., profitability improvements in green technologies that could simultaneously raise green revenues and lower borrowing costs) and greenness-group×year fixed effects to capture broader time-varying factors specific to green, brown, or neutral firms (e.g., regulatory or investor pressure coinciding with macro movements in debt costs). All continuous variables are

winsorized at the 1st and 99th percentiles, and standard errors are clustered at the firm level. The interaction coefficients β_1–β_3 are interpreted as group-specific sensitivities of Y_{it} to *Debt Cost*, net of controls and fixed effects.

4.2 Results

Table 5 reports the baseline estimates. Columns (1)–(3) show a *positive* association between *Debt Cost* and the *BrownShare* and a *negative* association with *NetGreen*, with effects concentrated among firms classified as brown. The magnitudes are economically meaningful: in column (2), a one-standard-deviation increase in *Debt Cost* (five percentage points) is associated with a 0.77 percentage point rise in the brown share — about 11% of its 7% unconditional mean.

Columns (4)–(6) replace year fixed effects with sector×year fixed effects, and columns (7)–(9) use greenness-group×year fixed effects to absorb sector- or group-specific time-varying shocks. Coefficient signs, significance, and magnitudes remain stable across these specifications. Taken together, the results indicate that *lower* borrowing costs are associated with *greener* business mixes, particularly for brown firms. Because the models include firm fixed effects (and time dummies or their stricter counterparts), identification relies on within-firm changes over time, consistent with a transition-based interpretation in which firms become greener when their cost of debt declines.

5 Heterogeneity

In this section, we conduct heterogeneity tests to examine the conditions under which green transition is more likely to occur. We begin by assessing how the main effects vary between large and small firms. Since the variance decomposition suggests that firms' green revenue remains largely static over time, we expect the green transition to be more pronounced among smaller firms, which tend to be more flexible. We divide the sample based on the median firm size and perform subsample analyses. Panel A of Table 6 shows that the main effects are concentrated among small firms, consistent with our expectation. This finding suggests that smaller firms, potentially due to greater operational flexibility, tend to adopt green transitions more rapidly than their larger counterparts.

Next, we analyze the role of green technology in facilitating green transition. We partition the sample based on the median value of the cumulative number of green patents applied for in previous years. Panel B of Table 6 shows that the main effects are concentrated among firms with

more existing green technology. The results suggest that for brown firms with a stronger green technology base, a lower cost of debt is associated not only with a lower brown revenue ratio, as shown in the main results, but also with a higher green revenue ratio. Together, these effects lead to a higher net green revenue ratio. The findings indicate that existing green technology plays a critical role in enabling firms to shift toward more sustainable business models.

6 Cost of Debt and Firm Green Investement

In this section, we investigate whether a lower cost of debt incentivizes firms to increase their investment in green projects, which we refer to as green investment. Chinese-listed firms are required to disclose a list of projects under construction at the end of each fiscal year in their annual reports, enabling us to track their green investment on an annual basis. The basic idea is to identify green projects within the project list and aggregate the investment allocated to these projects.

We identify green projects based on their names. To do so, we first compile a list of green keywords from two versions of green taxonomies published by the Chinese government in 2019 and 2024. [6] Each document provides a comprehensive list of green industries along with a detailed description of each industry. We tokenize the text from both documents to compile a list of contained words. Next, we use ChatGPT to determine whether each keyword is related to green or sustainable economic activities. We then manually review the tagged words and retain those that we agree are green. After this process, we identified 448 green keywords.

With this curated list, we identify green projects by searching for the presence of these green keywords in project names. Projects that contain any green keyword are classified as green projects, and a firm's green investment is calculated as the total investment in green projects within a given year. Table IA.4 in the Appendix lists the 279 green keywords that are associated with at least one project and the number of unique project names they are associated with. The keywords that identify most green project names include "Photovoltaic" (1,666), "Environmental Protection" (1,445), "Wind Power" (1,314), "Wastewater Treatment" (1,173), and "Energy Conservation" (1,080). On average, firms in the regression sample invest 28.90 million RMB in green projects. Green investment accounts for, on average, 0.22% of total assets, 0.59% of total revenue, and 10.1% of total project investment.

[6] Green Industry Guidance Catalog (2019 Edition) by the National Development and Reform Commission (NDRC) et al. and Guidance Catalog for Green and Low Carbon Transition Industries (2024 Edition) by NDRC et al.

In Table 7, we examine the effects of debt cost on green investment. Panel A presents the correlation between green investment and the net green revenue ratio. The results indicate a significant positive relationship, suggesting that green investment is closely tied to a firm's overall greenness. Panel B investigates the impact of debt cost on green investment. The results show that a lower cost of debt is significantly associated with increased green investment. A one-standard-deviation decrease in the cost of debt is associated with a 4.8% increase in the logarithm of green investment amount, a 13.6% increase in green investment as a share of total assets, and a 14.4% increase in ln green investment as a share of total revenue, relative to the sample mean of each respective outcome variable. The results suggest that increased investment in green projects may be one channel through which firms become greener.

7 Identification: Accelerated Depreciation Policy

7.1 Institutional Background

We try to strengthen the causal interpretation of the baseline findings with exogenous shock to the debt cost. The identification strategy leverages a series of policies introduced by China's Ministry of Finance that allow firms in specific industries to accelerate the depreciation of their assets. By adopting an accelerated depreciation accounting method, firms can recognize a larger portion of an asset's depreciation costs in its earlier years. Consequently, these policies reduce the tax base, enabling firms to pay less tax and preserve more cash. Since higher cash reserves typically signal a firm's ability to repay debt, we expect this policy to ultimately reduce firms' cost of debt.

Three such policies were issued in 2014, 2015, and 2019, each outlining several industries eligible to adopt an accelerated depreciation accounting method. [7] Table IA.3 in the Appendix lists the treatment year of each treated industry. [8] For example, the first document, issued on 20 October 2014, allowed firms in six specified industries to accelerate the recognition of depreciation costs for fixed assets purchased after 1 January 2014. This could be achieved by shortening the depreciation period, adopting the double-declining balance method, or using the

[7] Please see the following pages for the original files: a. 2014: https://www.gov.cn/zhengce/2014-10/20/content_5023495.htm; b. 2015: https://www.gov.cn/zhuanti/2015-12/14/content_5023664.htm; c. 2019: https://www.gov.cn/zhengce/zhengceku/2019-10/16/content_5440614.htm.

[8] The original documents define industries according to the "Industrial Classification for National Economic Activities". We map these industries to the classification system used by the China Securities Regulatory Commission (CSRC). The latter is based on the former, so we can easily establish the mapping. The original documents sometimes define industries at a broader or narrower level than the CSRC classification. Thus, there may be discrepancies in the number of treated industries between the original documents and Table IA.3.

sum-of-the-years' digits method. The second document, issued on 17 September 2015, extended this policy to four additional sectors for assets purchased after 1 January 2015. The final policy, issued on 23 April 2019, expanded eligibility to all manufacturing industries.

To verify the validity of this identification setting, we conducted a back-of-the-envelope calculation to assess its impact on firm cash flow, the mechanism through which we expect it to lower firms' cost of debt. The average treated firm in our final sample invested 355 million in fixed assets the year before the treatment. Assuming these assets are fully depreciated over the next ten years, under the normal straight-line depreciation method, the firm would recognize 35.5 million in expenses in the first year, reducing its tax payment by 8.9 million, given a 25% tax rate. By adopting the double-declining balance method, the firm could recognize 71 million in expenses, lowering its tax payment by 17.8 million. Therefore, by switching to an accelerated depreciation method, the average firm could save 8.9 million in cash flow, equaling up to 20.3% of its net cash flow in the year before the treatment. We continue to examine the policy's effect on firm debt cost and firm greenness in the next section by estimating a stacked DID model.

7.2 Identification Strategy

Given the staggered nature of the treatment, we estimate the stacked DID model below. The model specification below allows us to identify the policy's dynamic effects on green, brown, and neutral firms, respectively.

$$Y_{ict} = \sum_{h \in \{\text{green,brown,neutral}\}} \sum_{\substack{k=-2 \\ k \neq 0}}^{3} (\beta_{hk} \cdot D_{ic} \cdot 1[t = k] \cdot 1[g = h]) + \lambda_{ci} + \eta_{cjt} + \delta_{cgt} + \varepsilon_{ict} \quad (2)$$

The analysis is conducted at the firm-cohort-time level. In the model, i indicates the firm, c represents the cohort, t denotes the time, j refers to the sector to which firm i belongs, and g represents firm i's greenness category. Here, a cohort means all treated firms in a treatment event plus all clean control firms for that event, which consist of firms that are treated at least three periods after the focal event or never treated. Thus, this model has three cohorts in the current setting, corresponding to the three treatment years of 2014, 2015, and 2019. Time is defined relative to the policy issuance year, with value 0 representing the policy issuance year. To avoid compositional changes that could bias the dynamic effect estimates, as noted by Wing et al. (2024), the sample is restricted to observations within two periods before and three periods after each event. Consequently, time ranges from -2 to 3, with time 0 omitted as the

benchmark.

D_{ic} equals 1 if firm i is in the treatment group of cohort c and equals 0 otherwise. $1[t = \cdot]$ and $1[g = \cdot]$ are dummies for each time and greenness category. I include firm fixed effects (λ_{ci}), sector $\times$ time fixed effects (η_{cjt}), and greenness $\times$ time fixed effects (δ_{cgt}). Following Baker et al. (2022) and Cengiz et al. (2019), all fixed effects are in a cohort-specific form. Sector $\times$ time fixed effects control for time-varying factors specific to each sector that may confound the effects of the policy shock. For example, differences in firm greenness between the treatment and control groups after the policy may stem from other systematically correlated shocks that improve firm greenness in sectors with a high concentration of treated firms. Greenness $\times$ time fixed effects additionally account for similar yet broader confounding shocks that specifically affect green, brown, or neutral firms. Interacting the fixed effects with cohorts further allows them to vary across cohorts. Standard errors are clustered at the cohort $\times$ firm level.

Table 8 presents the static DID estimates. Essentially, we combine the post-treatment periods together (t = 1, 2, 3) and the pre-treatment periods together (t = -2, -1, 0) in Model 2. Then we compare the difference in firm greenness between the treatment and control groups after the policy with their difference before the policy. The first column shows that the policy significantly reduced the cost of debt, validating it as an exogenous shock to debt cost. After the policy, the debt cost for the treated firms decreased by 0.5 percentage points compared to control firms, which corresponds to 8.3% of the sample mean (6%) and 10% of the sample standard deviation (5%). The next three columns reveal that the treated brown firms became significantly greener after the policy. Their green ratio increased by 3.2 percentage points, equivalent to 64% of the sample mean (5%) and 17% of the sample standard deviation (18%). Additionally, their net green ratio increased by 5.2 percentage points, equivalent to 17.9% of the sample standard deviation (29%).

We proceed to examine the dynamic effects of the policy. Figure 3 illustrates the policy's impact on the cost of debt. The results show that the debt cost for treated firms remained stable before the policy but declined significantly afterward relative to control firms, further confirming the policy as an exogenous shock to firm debt cost. Figure 4 displays the dynamic effects on firm greenness. Prior to the policy intervention, the treatment and control groups exhibited comparable green, brown, and net revenue ratios. However, following the policy, brown firms experienced a significant increase in their green ratio and a decline in their brown ratio, leading to an overall rise in their net ratio, as shown in subfigures (b), (e), and (h). In contrast, neutral firms showed a modest increase in greenness, as illustrated in subfigures (c), (f), and (i), while

green firms exhibited no significant changes, as depicted in subfigures (a), (d), and (g).

Taken together, our findings suggest that firms become greener following an exogenous shock that reduces the cost of debt. This observation further reinforces the causal interpretation of our main result: a lower cost of debt leads to an increase in firm greenness.

8 International Sample: Implied Cost of Capital and EU Taxonomy Eligibility Ratio

While we have demonstrated that a lower cost of debt is associated with improved firm greenness among Chinese firms, it remains unclear whether this finding is unique to China or reflects a more general phenomenon that we could also observe in other countries. While we believe the role of debt cost is particularly relevant in the Chinese context, we shift our focus to equity cost when extending the analysis to a global setting. This is because, in global discussions on addressing climate risk, the role of institutional investors is especially emphasized. For example, the survey conducted by Stroebel and Wurgler (2021) reveals that finance academics, practitioners, and regulators consider pressure from institutional investors to be the most influential financial mechanism driving firms to reduce their climate risk exposure. Moreover, evidence indicates that institutional investors worldwide actively manage and engage with firms on climate risk (Krueger et al., 2020), thereby transforming firm behavior, such as enhancing climate disclosure (Ilhan et al., 2023). More importantly, Hartzmark and Shue (2023) suggests that in economies other than China, such as the United States, firm greenness is largely influenced by equity costs. Given that equity cost is closely tied to capital from institutional investors, it becomes especially relevant in the global context. To verify our main findings in the global sample, we estimate the following model.

$$\textit{Eligible Ratio}_{i,t} = \beta_0 + \beta_1 \cdot ICC_{i,t} + \boldsymbol{\beta}_2 \cdot \boldsymbol{X}_{i,t-1} + \lambda_i + \eta_t + \varepsilon_{it} \tag{3}$$

In this model, i denotes firms and t represents years. The dependent variable is the eligible ratio, defined as the proportion of a firm's revenue derived from activities specified in the EU Taxonomy. We obtain this data from the S&P Global EU Taxonomy dataset. The key explanatory variable is the firm's implied cost of capital (ICC), calculated following the model proposed by Gebhardt et al. (2001) and the approach of Eskildsen et al. (2024). This calculation

requires forecasts of future earnings. We use analysts' forecasts from I/B/E/S and complement them with earnings predictions from models proposed by previous literature: the HVZ Model (Hou et al., 2012), the Earnings Persistence Model (EP) by Li and Mohanram (2014), and the Residual Income Model (RI), also by Li and Mohanram (2014). [9] $\boldsymbol{X}_{i,t-1}$ represents a set of control variables, including firm size (*Size*), cash holdings (*Cash*), tangible assets (*Tangible*), leverage ratio (*Leverage*), sales growth (*Sales Growth*), and capital expenditure (*CAPX*). λ_i and η_t denote firm and year fixed effects, respectively. Firm fixed effects control for unobserved firm-specific factors that could lead to spurious relationships between ICC and the eligible ratio. For instance, some firms may systematically possess more profitable green technologies that are valued by the stock market and simultaneously contribute to a higher eligible ratio. Moreover, firm fixed effects allow for a transition interpretation of the results, as the estimation relies on within-firm time-series variation. We exclude firms in the financial sector (SIC code between 6000 to 6999), winsorize all continuous variables at the 1% and 99% levels, and cluster the standard error at the firm level.

Table 9 presents the regression results. Consistent with our findings in the Chinese sample, we observe that a lower cost of capital is associated with a higher proportion of revenue from green activities, indicating improved firm greenness. Given that firms may have put greater emphasis on green transition in recent years, we separately analyze the subsample after the Paris Agreement in the right panel. As expected, the relationship between ICC and firm greenness is even stronger during this period. Taking the first column as an example, in the whole sample period, a one-standard decrease in ICC (3 percentage points) corresponds to a 0.711 percentage point increase in the eligible ratio, equivalent to 1.9% of the sample mean (37%). In contrast, the fifth column suggests that after the Paris Agreement, the same decrease in ICC is associated with a 1.257 percentage point increase in the eligible ratio, equivalent to 3.4% of the sample mean. These results suggest that our previous findings are not unique to China but instead reflect a broader pattern that could be observed in the global setting.

9 Conclusion

In this study, we examine the impact of the cost of debt on firms' green transitions. Leveraging a unique dataset that identifies the proportion of revenue derived from green, brown, and neutral

[9] Although the original motivation for model-based forecasts is to increase the coverage of ICC data, we find that solving for ICC using these forecasts is more challenging in the global setting, ultimately leading to a smaller sample size compared to ICC estimates based on analyst forecasts.

activities for Chinese-listed companies, we find that firms with a lower cost of debt tend to become greener, particularly those classified as brown firms. The effect is especially pronounced among smaller firms, which tend to be more operationally flexible, and those with a greater stock of green technologies. We further show that a reduction in debt cost is associated with increased investment in green projects, suggesting that improved firm greenness may be partly driven by greater green capital expenditure. To address endogeneity concerns, we exploit a Chinese policy that introduces an exogenous shock to debt cost and find consistent results, supporting a causal interpretation. Finally, we find similar results in the global sample, suggesting that the relationship between lower financing costs and increased firm greenness is not unique to China.

Our findings have important implications for investors and policymakers who aim to promote a greener economy with finance. Despite the sharp growth of sustainable investing, some research suggests that it may not be as effective as anticipated. Hartzmark and Shue (2023) shows that high-emitting firms not only produce 1,700 times more emissions than low-emitting firms, but their emissions are also far more sensitive to changes in capital costs. As such, by directing funds from brown firms to green firms, the current sustainable investing may fail to exploit the substantial emissions reduction potential of high-emitting. Recognizing this issue, policymakers have introduced transition finance as a solution, which essentially involves providing funds to high-emitting firms to help them move toward greener operations. Although this new concept has triggered considerable discussion, leading to the development of various frameworks, guidelines, and policies worldwide, there is still no systematic evidence on its feasibility. [10] Our research findings shed light on this issue and suggest that at least the fundamental logic of transition finance works — lower financing costs can facilitate firms' green transitions. In this sense, our findings highlight the significant potential of transition finance as a crucial tool for accelerating corporate sustainability efforts.

[10] Examples include "Financing Credible Transitions" by Climate Bond Initiative in 2020; "Basic Guidelines on Climate Transition Finance" by Japan in 2021; "G20 Transition Finance Framework" by G20 Sustainable Finance Working Group in 2022; "Financial Institution Net-Zero Transition Plans" by Glasgow Financial Alliance for Net Zero in 2022; "Climate Transition Finance Handbook" by International Capital Market Association in 2023; and "Japan Climate Transition Bond Framework" also by Japan in 2023.

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10 Figures

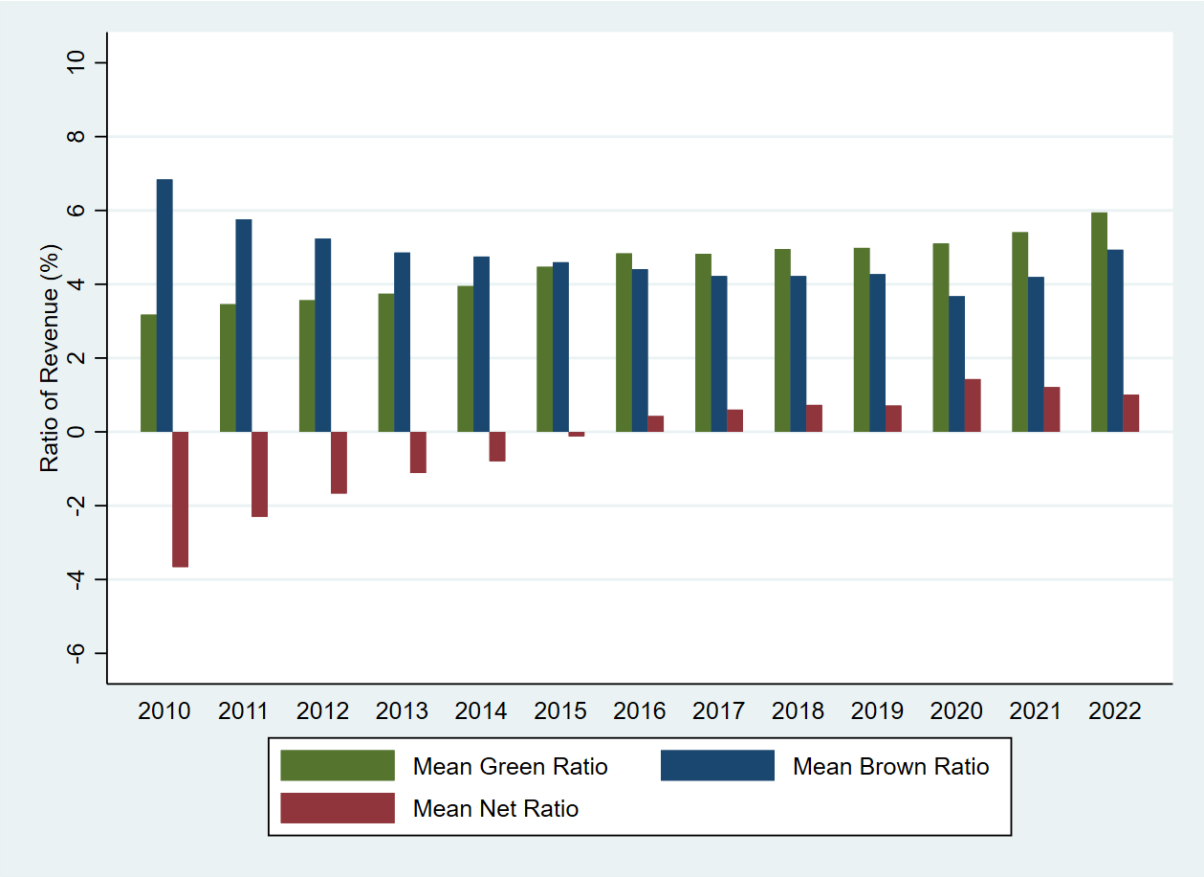
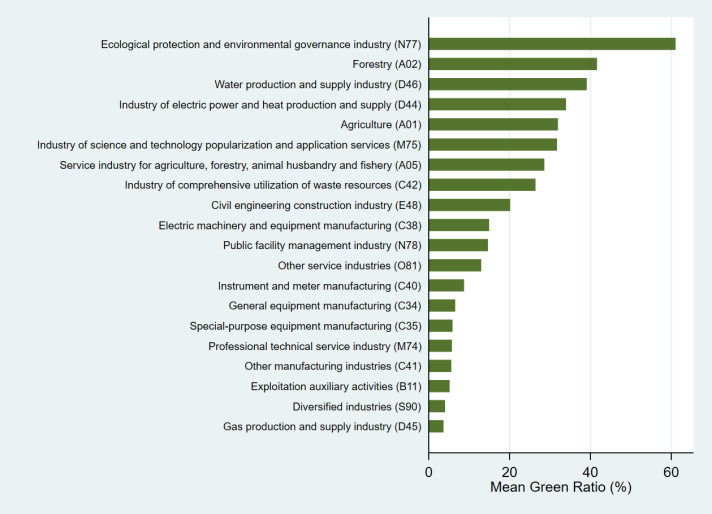
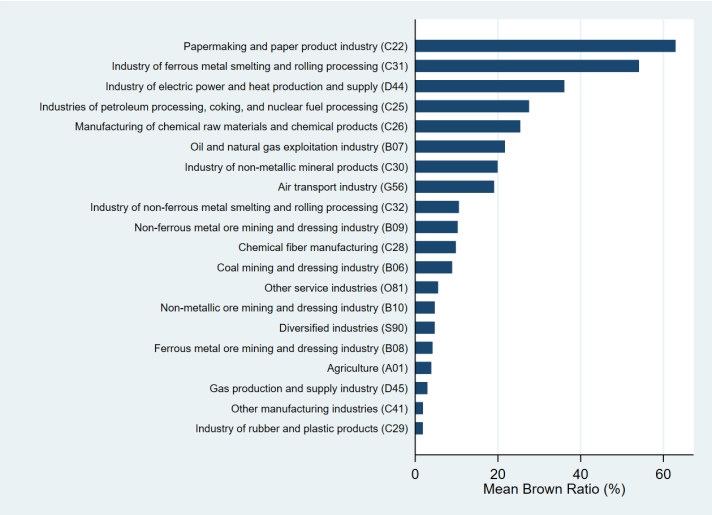


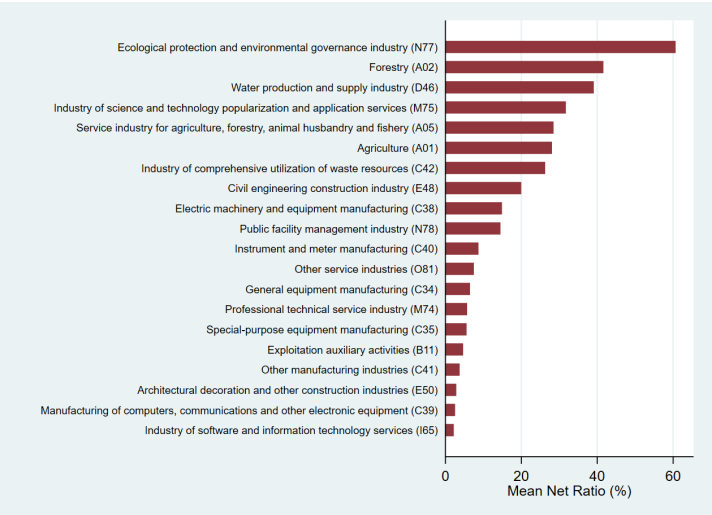
Figure 1: **Average Green, Brown, and Net Ratios of Revenue Over 2010–2022:** This figure plots the average green, brown, and net ratios from 2010 to 2022. *Green Ratio* is the proportion of firm revenue from green activities. *Brown Ratio* is the proportion of firm revenue from brown activities. *Net Ratio* is the difference between *Green Ratio* and *Brown Ratio*.



(a) Top 20 Industries by Green Ratio



(b) Top 20 Industries by Brown Ratio



(c) Top 20 Industries by Net Ratio

Figure 2: **Top Industries by Green, Brown, or Net Ratios:** This figure plots the top 20 industries ranked by their average green, brown, and net ratios. *Green Ratio* is the proportion of firm revenue from green activities. *Brown Ratio* is the proportion of firm revenue from brown activities. *Net Ratio* is the difference between *Green Ratio* and *Brown Ratio*.

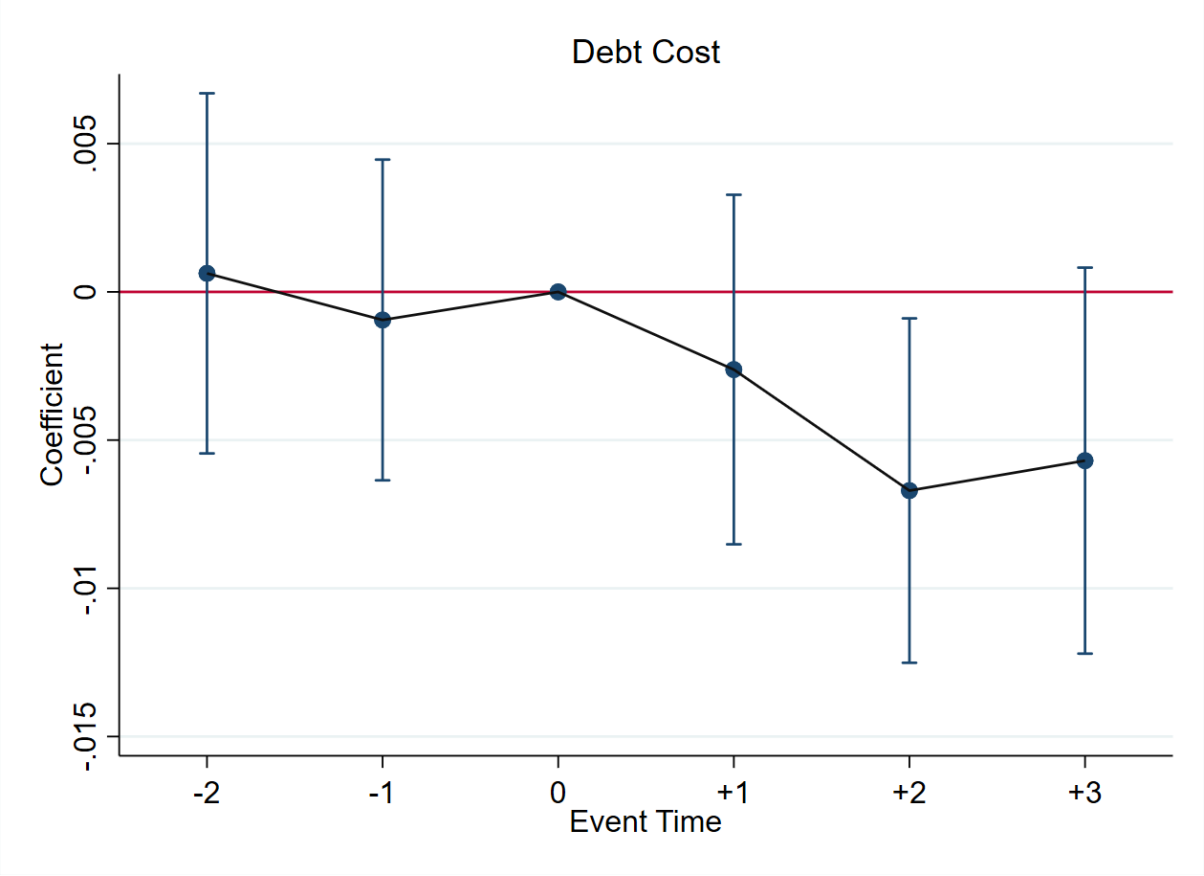
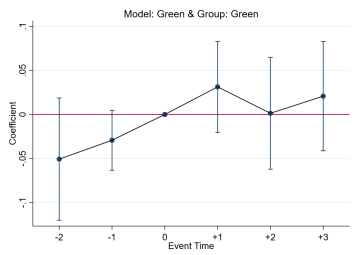
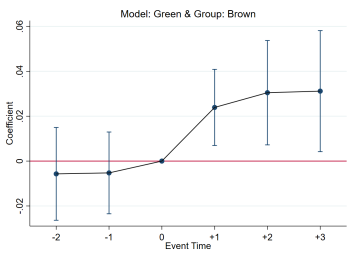


Figure 3: **Identification: Dynamic Effects of Accelerated Depreciation Policy on Debt Cost:** This figure plots the dynamic effects of the accelerated depreciation policy on debt cost. Specifically, it plots the estimates of β_k for k = -2, -1, 1, 2, 3 in the stacked DID model below: $Debt\ Cost_{iet} = \sum_{\substack{k=-2 \\ k\neq 0}}^{3} (\beta_k \cdot D_{ie} \cdot 1[t = k]) + \lambda_{ci} + \eta_{cjt} + \delta_{cgt} + \varepsilon_{ict}$.

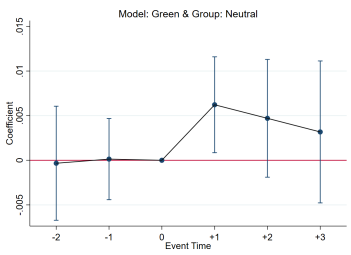
Panel A: Green Ratio



(a) Green Firms

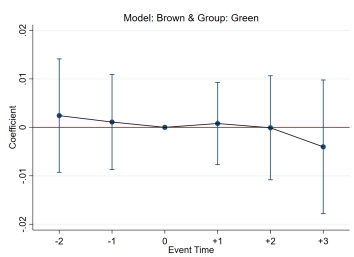


(b) Brown Firms

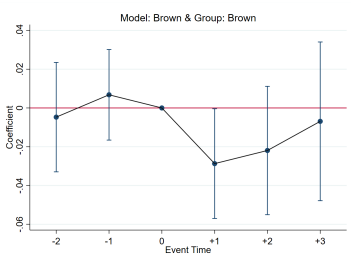


(c) Neutral Firms

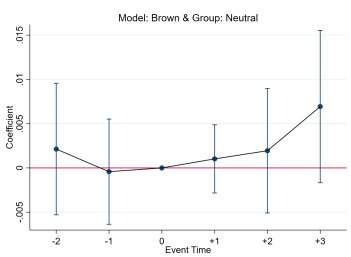
Panel B: Brown Ratio



(d) Green Firms

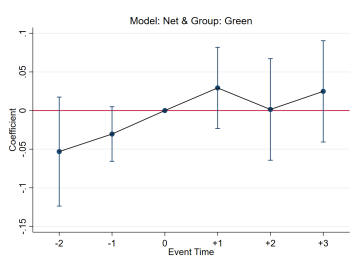


(e) Brown Firms

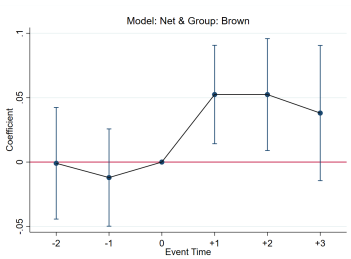


(f) Neutral Firms

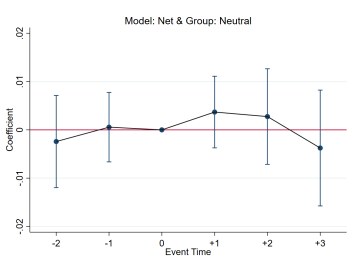
Panel C: Net Ratio



(g) Green Firms



(h) Brown Firms



(i) Neutral Firms

Figure 4: **Identification: Dynamic Effects of Accelerated Depreciation Policy on Corporate Green Transition:** This figure plots the dynamic effects of the accelerated depreciation policy on the green, brown, and net ratios of different types of firms. Specifically, subfigures (a), (b), (c) plot the estimates of $\beta_{\text{green},h}$, $\beta_{\text{brown},h}$, $\beta_{\text{neutral},h}$ for h = -2, -1, 1, 2, 3 when the dependent variable is *Green Ratio* in the model: $Y_{ict} = \sum_{h\in\{\text{green,brown,neutral}\}} \sum_{\substack{k=-2 \\ k\neq 0}}^{3} (\beta_{hk} \cdot D_{ie} \cdot 1[t=k] \cdot 1[g=h]) + \lambda_{ci} + \eta_{cjt} + \delta_{cgt} + \varepsilon_{ict}$. Subfigures (d), (e), (f) plot the estimates of $\beta_{\text{green},k}$, $\beta_{\text{brown},k}$, $\beta_{\text{neutral},k}$ for k = -2, -1, 1, 2, 3 when the dependent variable is *Brown Ratio* in the same stacked DID model. Subfigures (g), (h), (i) plot the estimates of $\beta_{\text{green},k}$, $\beta_{\text{brown},k}$, $\beta_{\text{neutral},k}$ for k = -2, -1, 1, 2, 3 when the dependent variable is *Net Ratio* in the same stacked DID model.

11 Tables

Panel A: Chinese Sample

	count	mean	sd	p25	p50	p75	min	max
Green Ratio	29,265	0.05	0.18	0.00	0.00	0.00	0.00	0.98
Brown Ratio	29,265	0.07	0.21	0.00	0.00	0.00	0.00	0.97
Net Ratio	29,265	-0.01	0.29	0.00	0.00	0.00	-0.97	0.98
Debt Cost	29,265	0.06	0.05	0.04	0.05	0.07	0.00	0.37
Green	29,265	0.05	0.22	0.00	0.00	0.00	0.00	1.00
Brown	29,265	0.19	0.39	0.00	0.00	0.00	0.00	1.00
Neutral	29,265	0.76	0.43	1.00	1.00	1.00	0.00	1.00
Size	29,265	22.43	1.29	21.53	22.26	23.17	19.94	26.31
Cash Ratio	29,265	0.14	0.10	0.06	0.11	0.18	0.01	0.58
Tangible Ratio	29,265	0.92	0.09	0.90	0.95	0.98	0.53	1.00
Leverage	29,265	0.47	0.19	0.33	0.47	0.61	0.08	0.92
CapEx	29,251	0.05	0.05	0.01	0.03	0.07	0.00	0.23
Sales Growth	29,265	0.17	0.43	-0.03	0.10	0.27	-0.58	2.61

Panel B: Global Sample

	count	mean	sd	p25	p50	p75	min	max
Eligible Ratio	48,969	0.37	0.44	0.00	0.02	0.96	0.00	1.00
ICC_Analyst	43,664	0.09	0.03	0.06	0.08	0.11	0.02	0.20
ICC_HVZ	31,544	0.09	0.06	0.05	0.07	0.10	0.02	0.41
ICC_EP	35,457	0.09	0.07	0.05	0.07	0.10	0.01	0.42
ICC_RI	35,463	0.08	0.07	0.04	0.07	0.10	0.01	0.41
Size	48,969	7.62	1.63	6.46	7.58	8.71	4.00	11.67
Cash	48,969	0.17	0.15	0.06	0.12	0.23	0.00	0.78
Tangible	48,969	0.30	0.22	0.12	0.25	0.43	0.01	0.87
Leverage	48,969	0.22	0.17	0.07	0.21	0.34	0.00	0.67
Sales Growth	48,969	0.10	0.25	-0.01	0.06	0.16	-0.45	1.55
CAPX	48,969	0.05	0.04	0.02	0.04	0.06	0.00	0.23

Table 1: **Summary Statistics:** This table reports the summary statistics for the key variables in our main regression. *Green Ratio* is the proportion of firm revenue from green activities. *Brown Ratio* is the proportion of firm revenue from brown activities. *Net Ratio* is the difference between *Green Ratio* and *Brown Ratio*. *Debt Cost* is a measure for a firm's overall debt cost, defined as *Interest Expenditure + Other (Including Commissions) + Capitalized Interest Expenditure) / (Short-Term Loan + Non-Current Liabilities Due Within One Year + Long-Term Loan + Bond Payable + Long-Term Accounts Payable*. *Green*, *Brown*, and *Neutral* are dummies for green, brown, and neutral firms, respectively, depending on our classification of each industry. Specifically, we calculated the mean value of *Green Ratio*, *Brown Ratio*, and *Neither-green-nor-brown Ratio* of all firms in each industry in the first year that any firms exist in the industry during our sample period. Industries with a mean *Neither-green-nor-brown Ratio* equal to or larger than 90% are classified as neutral industries. For the other industries, those with a mean *Green Ratio* larger than a mean *Brown Ratio* are classified as green industries, while those otherwise are classified as brown industries. See Appendix Table IA.2 for the classification of each industry. *Size* is the logarithm of 1 + total assets. *Cash Ratio* is cash and cash equivalents to total assets. *Tangible Ratio* is tangible assets to total assets. *Leverage* is total debt to total assets. *CapEx* is cash paid to acquire fixed assets, intangible assets, and other long-term assets scaled by total assets. *Sales Growth* is the growth rate of firm revenue.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
(1) Brown Ratio	1.0000																				
	[53,850]																				
(2) Green Ratio	-0.0477***	1.0000																			
	[53,850]	[53,850]																			
(3) Net Ratio	-0.7294***	0.7179***	1.0000																		
	[53,850]	[53,850]	[53,850]																		
(4) GHG Int. S1	0.5622***	0.0718***	-0.4220***	1.0000																	
	[5,805]	[5,805]	[5,805]	[5,805]																	
(5) GHG Int. S2	0.3917***	-0.0802***	-0.3661***	0.0907***	1.0000																
	[5,805]	[5,805]	[5,805]	[5,805]	[5,805]																
(6) GHG Int. S1+S2	0.5700***	0.0686***	-0.4302***	0.9972***	0.1304***	1.0000															
	[5,805]	[5,805]	[5,805]	[5,805]	[5,805]	[5,805]															
(7) GHG Abs. S1	0.4977***	0.0271*	-0.3939***	0.7630***	0.1308***	0.7662***	1.0000														
	[5,805]	[5,805]	[5,805]	[5,805]	[5,805]	[5,805]	[5,805]														
(8) GHG Abs. S2	0.3599***	-0.0645***	-0.3314***	0.0761***	0.4793***	0.1024***	0.3945***	1.0000													
	[5,805]	[5,805]	[5,805]	[5,805]	[5,805]	[5,805]	[5,805]	[5,805]													
(9) GHG Abs. S1+S2	0.4924***	0.0228	-0.3918***	0.7430***	0.1522***	0.7485***	0.9963***	0.4378***	1.0000												
	[5,805]	[5,805]	[5,805]	[5,805]	[5,805]	[5,805]	[5,805]	[5,805]	[5,805]												
(10) CCExposure	0.2125**	0.8044***	0.3292***	0.7278***	0.1607*	0.7294***	0.7371***	0.2422**	0.7389***	1.0000											
	[201]	[201]	[201]	[155]	[155]	[155]	[155]	[155]	[155]	[201]											
(11) CCExposure_Opp	0.0860	0.8940***	0.4824***	0.7259***	0.0817	0.7268***	0.6315***	0.0636	0.6248***	0.9610***	1.0000										
	[201]	[201]	[201]	[155]	[155]	[155]	[155]	[155]	[155]	[201]	[201]										
(12) CCExposure_Reg	0.3323***	0.2414***	-0.1096	0.2479**	0.1190	0.2491**	0.4138***	0.4184***	0.4347***	0.5200***	0.4243***	1.0000									
	[201]	[201]	[201]	[155]	[155]	[155]	[155]	[155]	[155]	[201]	[201]	[201]									
(13) CCExposure_Phy	0.1762*	0.2284**	0.0036	0.6308***	-0.0342	0.6307***	0.4585***	-0.0094	0.4552***	0.4283***	0.3398***	0.1901**	1.0000								
	[201]	[201]	[201]	[155]	[155]	[155]	[155]	[155]	[155]	[201]	[201]	[201]	[201]								
(14) Refinitive Env.	0.0353*	0.0534***	0.0087	-0.0358	0.0090	-0.0336	0.0691**	0.1946***	0.0783**	-0.0036	0.0502	-0.0299	-0.1563*	1.0000							
	[4,354]	[4,354]	[4,354]	[1,586]	[1,586]	[1,586]	[1,586]	[1,586]	[1,586]	[191]	[191]	[191]	[191]	[4,354]							
(15) Refinitive Emi.	0.1003***	0.0099	-0.0676***	-0.0082	0.1577***	-0.0003	0.1283***	0.3038***	0.1388***	0.1763*	0.1450*	0.1718*	-0.0516	0.7847***	1.0000						
	[4,354]	[4,354]	[4,354]	[1,586]	[1,586]	[1,586]	[1,586]	[1,586]	[1,586]	[191]	[191]	[191]	[191]	[4,354]	[4,354]						
(16) MSCI Env.	-0.2042***	0.1204***	0.2310***	-0.2065***	-0.2360***	-0.2141***	-0.2146***	-0.1787***	-0.2160***	-0.0176	0.0741	-0.1392	-0.2455***	0.1256***	0.0896***	1.0000					
	[3,071]	[3,071]	[3,071]	[1,315]	[1,315]	[1,315]	[1,315]	[1,315]	[1,315]	[182]	[182]	[182]	[182]	[2,659]	[2,659]	[3,071]					
(17) MSCI Climate Chg.	-0.2937***	0.0331	0.2415***	-0.3046***	-0.2223***	-0.3118***	-0.3043***	-0.1669***	-0.3009***	0.0984	0.1695*	-0.0226	-0.1660*	-0.0246	0.0025	0.4457***	1.0000				
	[2,933]	[2,933]	[2,933]	[1,199]	[1,199]	[1,199]	[1,199]	[1,199]	[1,199]	[143]	[143]	[143]	[143]	[2,532]	[2,532]	[2,933]	[2,933]				
(18) MSCI Env. Opp.	-0.0893***	0.3511***	0.3206***	-0.0468	-0.0898*	-0.0541	-0.0446	-0.0582	-0.0504	0.7623***	0.8304***	0.2510	0.0681	0.3014***	0.1850***	0.6110***	0.0441	1.0000			
	[1,355]	[1,355]	[1,355]	[505]	[505]	[505]	[505]	[505]	[505]	[20]	[20]	[20]	[20]	[1,133]	[1,133]	[1,355]	[1,323]	[1,355]			
(19) Env. Incident Num.	0.0879***	0.0107	-0.0578***	0.0163	0.0500**	0.0195	0.1318***	0.3006***	0.1456***	0.0547	-0.0009	0.1660	-0.0081	0.2887***	0.2069***	0.0067	-0.0580**	0.0566	1.0000		
	[21,703]	[21,703]	[21,703]	[3,608]	[3,608]	[3,608]	[3,608]	[3,608]	[3,608]	[97]	[97]	[97]	[97]	[2,807]	[2,807]	[2,074]	[1,992]	[855]	[21,703]		
(20) GHG Incident Num.	0.0117	0.0023	-0.0071	0.0436**	-0.0577***	0.0434**	0.1004***	0.1246***	0.1051***	-0.0667	-0.1029	0.0699	-0.1647	0.2738***	0.1275***	0.0324	-0.0352	0.0724*	0.5233***	1.0000	
	[21,703]	[21,703]	[21,703]	[3,608]	[3,608]	[3,608]	[3,608]	[3,608]	[3,608]	[97]	[97]	[97]	[97]	[2,807]	[2,807]	[2,074]	[1,992]	[855]	[21,703]	[21,703]	
(21) TV GHG Emission	0.0084	0.0052	-0.0024	0.0649	-0.0142	0.0678	0.0893*	-0.0260	0.0869*	0.1012	0.0773	0.1197	0.0069	0.1187***	0.1376***	0.0669*	0.0076	0.0167	0.1133***	0.0542*	1.0000
	[2,292]	[2,292]	[2,292]	[770]	[770]	[770]	[770]	[770]	[770]	[176]	[176]	[176]	[176]	[1,735]	[1,735]	[1,369]	[1,274]	[550]	[1,414]	[1,414]	[2,292]

Table 2: **Correlation with Other Environmental Measures:** This table reports the correlation between green, brown, net ratios and commonly used greenness measures. *Green Ratio* is the proportion of firm revenue from green activities. *Brown Ratio* is the proportion of firm revenue from brown activities. *Net Ratio* is the difference between *Green Ratio* and *Brown Ratio*. *GHG Int. S1*, *GHG Int. S2*, *GHG Int. S1+S2* are Scope 1, Scope 2, and both scopes combined GHG emission intensity from Trucost. *GHG Abs. S1*, *GHG Abs. S2*, *GHG Abs. S1+S2* are Scope 1, Scope 2, and both scopes combined absolute GHG emissions from Trucost. Note that our Trucost data ends in 2021 whereas the green revenue data ends in 2022. *CCExposure*, *CCExposure_Opp*, *CCExposure_Reg*, *CCExposure_Phy* are climate change exposure measures from Sautner et al. (2023), corresponding to the overall, opportunity, regulation, and physical risk aspect, respectively. *Refinitive Env.* and *Refinitive Emi.* are Refinitive environmental pillar score and emission category score, respectively. *MSCI Env.*, *MSCI Climate Chg.*, and *MSCI Env.Opp.* are MSCI environmental pillar score, climate change theme score, and environmental opportunity theme score, respectively. *Env.Incident Num.* and *GHG.Incident Num.* are the number of incidents related to the environment in general and the number of incidents related to climate change, GHG emissions, and global pollution, respectively, from Reprisk. *TV GHG Emission* is the insight score in the dimension of GHG emissions from Factset Truvalue Labs. * p<.10; ** p<.05; *** p<.01. Numbers in the brackets indicate the number of observations in each pair-wise correlation.

	Net Ratio									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Ln GHG Int. S1+S2	-0.082***									
	(0.015)									
Ln GHG Abs. S1+S2		-0.071***								
		(0.012)								
Refinitive Env.			0.001***							
			(0.000)							
Refinitive Emi.				0.000						
				(0.000)						
MSCI Env.					0.019***					
					(0.004)					
MSCI Climate Chg.						0.010***				
						(0.004)				
MSCI Env. Opp.							0.027***			
							(0.006)			
Env. Incident Num.								-0.029***		
								(0.011)		
GHG Incident Num.									-0.018	
									(0.025)	
TV GHG Emission										0.001
										(0.001)
Industry FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,021	5,021	3,370	3,370	2,421	2,342	1,212	18,118	18,118	1,744
R^2	0.51	0.51	0.39	0.39	0.41	0.39	0.36	0.37	0.37	0.43

Table 3: **Regression on Other Environmental Measures:** This table presents the regression-based correlations between the green, brown, and net revenue ratios and commonly used measures of firm greenness. *Net Ratio* is the difference between the proportion of firm revenue from green and brown activities. *Ln GHG Int. S1+S2* is the natural logarithm of one plus the firm's GHG emission intensity, combining Scope 1 and Scope 2 emissions from Trucost. *Ln GHG Abs. S1+S2* is the natural logarithm of one plus the firm's absolute GHG emissions, also combining Scope 1 and Scope 2 from Trucost. Note that our Trucost data ends in 2021 whereas the green revenue data ends in 2022. *Refinitive Env.* and *Refinitive Emi.* are Refinitive environmental pillar score and emission category score, respectively. *MSCI Env.*, *MSCI Climate Chg.*, and *MSCI Env.Opp.* are MSCI environmental pillar score, climate change theme score, and environmental opportunity theme score, respectively. *Env.Incident Num.* and *GHG.Incident Num.* are the number of incidents related to the environment in general and the number of incidents related to climate change, GHG emissions, and global pollution, respectively, from Reprisk. *TV GHG Emission* is the insight score in the dimension of GHG emissions from Factset Truvalue Labs. Control variables include *Size*, *Cash Ratio*, *Tangible Ratio*, *Leverage*, *CapEx*, *Sales Growth*, and *SOE*. Standard errors reported in parentheses are clustered at the firm level. * p<.10; ** p<.05; *** p<.01.

	Green Ratio	Brown Ratio	Net Ratio
Panel A: Incremental R^2			
Year Fixed Effect	0.2%	0.2%	0.4%
Industry Fixed Effect	24.4%	36.5%	27.5%
Industry × Year Fixed Effect	1.4%	1.0%	1.3%
Unexaplained	74.1%	62.2%	70.9%
Sum	100.0%	100.0%	100.0%
Panel B: Fraction of Variation			
Firm + Industry × Year Fixed Effect	84.8%	88.8%	86.7%
Unexaplained	15.2%	11.2%	13.3%
Sum	100.0%	100.0%	100.0%

Table 4: **Variance Decomposition:** This table provides a variance decomposition of the green, brown, and net ratios, following the approach of Sautner et al. (2023). Panel A reports the incremental R^2 from adding a specific fixed effect. Panel B decomposes the variation into one part that can be explained by firm and industry × year fixed effects and a residual part.

	(1) Green Ratio	(2) Brown Ratio	(3) Net Ratio	(4) Green Ratio	(5) Brown Ratio	(6) Net Ratio	(7) Green Ratio	(8) Brown Ratio	(9) Net Ratio
Debt Cost × Green	-0.044	-0.010	-0.030	0.012	-0.029	0.045	-0.077	-0.007	-0.067
	(0.058)	(0.052)	(0.088)	(0.056)	(0.050)	(0.087)	(0.061)	(0.055)	(0.093)
Debt Cost × Brown	-0.033	0.154**	-0.186**	-0.024	0.142**	-0.165**	-0.028	0.136**	-0.164**
	(0.026)	(0.068)	(0.077)	(0.024)	(0.068)	(0.075)	(0.025)	(0.067)	(0.075)
Debt Cost × Neutral	-0.022	-0.006	-0.016	-0.023*	-0.008	-0.015	-0.022	-0.008	-0.014
	(0.014)	(0.010)	(0.018)	(0.014)	(0.010)	(0.017)	(0.014)	(0.010)	(0.017)
Green	0.049**	-0.002	0.051**	0.010	-0.003	0.013			
	(0.020)	(0.009)	(0.025)	(0.031)	(0.020)	(0.047)			
Brown	0.006	0.084***	-0.078***	-0.006	0.085***	-0.091***			
	(0.010)	(0.017)	(0.023)	(0.010)	(0.018)	(0.023)			
Size	0.009***	0.003	0.006	0.008***	0.004	0.005	0.009***	0.002	0.007*
	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)
Cash Ratio	-0.007	-0.013	0.007	-0.011	-0.013	0.002	-0.006	-0.013	0.007
	(0.012)	(0.009)	(0.016)	(0.012)	(0.009)	(0.016)	(0.012)	(0.009)	(0.016)
Tangible Ratio	0.008	0.019	-0.012	0.009	0.016	-0.008	0.009	0.020	-0.012
	(0.020)	(0.016)	(0.026)	(0.019)	(0.017)	(0.026)	(0.020)	(0.016)	(0.026)
Leverage	0.010	-0.003	0.013	0.012	-0.006	0.017	0.010	-0.009	0.019
	(0.010)	(0.010)	(0.016)	(0.010)	(0.010)	(0.015)	(0.010)	(0.010)	(0.015)
CapEx	0.078***	0.008	0.070*	0.065**	0.011	0.054	0.079***	-0.004	0.084**
	(0.027)	(0.026)	(0.040)	(0.025)	(0.026)	(0.038)	(0.027)	(0.026)	(0.040)
Sales Growth	0.003*	-0.001	0.004*	0.003	-0.002	0.004**	0.003*	-0.001	0.004*
	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)
Firm FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓						
Sector × Year FE				✓	✓	✓			
Greenness × Year FE							✓	✓	✓
Observations	29,265	29,265	29,265	29,253	29,253	29,253	29,265	29,265	29,265
R^2	0.86	0.91	0.88	0.86	0.91	0.88	0.86	0.91	0.88

Table 5: **Main Results: Cost of Debt and Corporate Green Transition:** This table reports the results of our baseline regression. *Green Ratio* is the proportion of firm revenue from green activities. *Brown Ratio* is the proportion of firm revenue from brown activities. *Net Ratio* is the difference between *Green Ratio* and *Brown Ratio*. *Debt Cost* is a measure for a firm's overall debt cost, defined as *Interest Expenditure + Other (Including Commissions) + Capitalized Interest Expenditure) / (Short-Term Loan + Non-Current Liabilities Due Within One Year + Long-Term Loan + Bond Payable + Long-Term Accounts Payable*. *Green*, *Brown*, and *Neutral* are dummies for green, brown, and neutral firms, respectively, depending on our classification of each industry. Specifically, we calculated the mean value of *Green Ratio*, *Brown Ratio*, and *Neither-green-nor-brown Ratio* of all firms in each industry in the first year that any firms exist in the industry during our sample period. Industries with a mean *Neither-green-nor-brown Ratio* equal to or larger than 90% are classified as a neutral industries. For the other industries, those with a mean *Green Ratio* larger than a mean *Brown Ratio* are classified as green industries, while those otherwise are classified as brown industries. See Appendix Table IA.2 for the classification of each industry. *Size* is the logarithm of 1 + total assets. *Cash Ratio* is cash and cash equivalents to total assets. *Tangible Ratio* is tangible assets to total assets. *Leverage* is total debt to total assets. *CapEx* is cash paid to acquire fixed assets, intangible assets, and other long-term assets scaled by total assets. *Sales Growth* is the growth rate of firm revenue. Standard errors reported in parentheses are clustered at the firm level. * p<.10; ** p<.05; *** p<.01.

Panel A: Firm Size

	1[Size > Med.] == 1			1[Size > Med.] == 0		
	(1) Green Ratio	(2) Brown Ratio	(3) Net Ratio	(4) Green Ratio	(5) Brown Ratio	(6) Net Ratio
Debt Cost × Green	-0.057	0.008	-0.065	0.011	-0.027	0.042
	(0.079)	(0.036)	(0.087)	(0.057)	(0.072)	(0.103)
Debt Cost × Brown	-0.022	0.047	-0.069	-0.034	0.158**	-0.193**
	(0.042)	(0.122)	(0.135)	(0.035)	(0.076)	(0.088)
Debt Cost × Neutral	-0.013	0.010	-0.023	-0.034**	-0.014	-0.020
	(0.011)	(0.016)	(0.019)	(0.017)	(0.011)	(0.021)
Green	0.007	-0.009	0.017	0.018	0.001	0.018
	(0.017)	(0.010)	(0.022)	(0.019)	(0.009)	(0.024)
Brown	-0.016	0.076***	-0.092***	-0.006	0.048**	-0.053**
	(0.011)	(0.026)	(0.032)	(0.009)	(0.020)	(0.024)
Size	0.005	0.002	0.003	0.003	-0.002	0.005
	(0.003)	(0.006)	(0.006)	(0.005)	(0.003)	(0.006)
Cash Ratio	-0.027*	-0.034*	0.006	-0.005	-0.015	0.010
	(0.014)	(0.019)	(0.025)	(0.015)	(0.010)	(0.018)
Tangible Ratio	-0.022	0.034	-0.057	0.016	0.012	0.004
	(0.028)	(0.034)	(0.047)	(0.022)	(0.016)	(0.029)
Leverage	0.006	-0.021	0.026	0.011	0.004	0.007
	(0.010)	(0.020)	(0.024)	(0.014)	(0.011)	(0.020)
CapEx	0.034	-0.008	0.042	0.013	-0.005	0.018
	(0.030)	(0.055)	(0.068)	(0.024)	(0.026)	(0.037)
Sales Growth	-0.001	-0.004**	0.003	0.004*	0.000	0.004
	(0.001)	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)
Firm FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Observations	14,432	14,432	14,432	14,387	14,387	14,387
R^2	0.92	0.93	0.92	0.86	0.90	0.87

Panel B: Cummulative Number of Green Patents in Previous Years

	1[Cum. Green Patent Num. > Med.] == 1			1[Cum. Green Patent Num. > Med.] == 0		
	(1) Green Ratio	(2) Brown Ratio	(3) Net Ratio	(4) Green Ratio	(5) Brown Ratio	(6) Net Ratio
Debt Cost × Green	0.030	-0.097	0.139	-0.068	-0.007	-0.061
	(0.092)	(0.084)	(0.120)	(0.058)	(0.014)	(0.060)
Debt Cost × Brown	-0.058**	0.303***	-0.361***	-0.048	0.067	-0.115
	(0.028)	(0.098)	(0.106)	(0.040)	(0.108)	(0.125)
Debt Cost × Neutral	-0.054**	-0.024	-0.030	-0.013	0.010	-0.022
	(0.023)	(0.016)	(0.028)	(0.009)	(0.010)	(0.014)
Green	0.051	-0.006	0.056	0.010	0.005	0.005
	(0.035)	(0.010)	(0.038)	(0.010)	(0.004)	(0.011)
Brown	0.018	0.052**	-0.035	-0.005	0.076***	-0.081***
	(0.019)	(0.025)	(0.032)	(0.005)	(0.021)	(0.023)
Size	0.009	-0.005	0.014*	0.002	0.007*	-0.005
	(0.006)	(0.005)	(0.008)	(0.003)	(0.004)	(0.005)
Cash Ratio	-0.033	-0.004	-0.029	0.011	-0.017	0.027*
	(0.023)	(0.014)	(0.028)	(0.009)	(0.010)	(0.014)
Tangible Ratio	-0.001	0.029	-0.033	0.021	0.027	-0.007
	(0.041)	(0.024)	(0.048)	(0.014)	(0.023)	(0.028)
Leverage	0.034*	0.014	0.019	-0.002	-0.008	0.006
	(0.019)	(0.014)	(0.024)	(0.008)	(0.015)	(0.018)
CapEx	0.060	-0.004	0.066	0.047**	0.006	0.042
	(0.048)	(0.042)	(0.065)	(0.020)	(0.033)	(0.041)
Sales Growth	-0.002	-0.002	0.000	0.004***	-0.000	0.004*
	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)
Firm FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Observations	14,149	14,149	14,149	14,404	14,404	14,404
R^2	0.89	0.92	0.91	0.85	0.92	0.89

Table 6: **Heterogeneity Test:** This table reports the results of heterogeneity tests. *Green Ratio* is the proportion of firm revenue from green activities. *Brown Ratio* is the proportion of firm revenue from brown activities. *Net Ratio* is the difference between *Green Ratio* and *Brown Ratio*. *Debt Cost* is a measure for a firm's overall debt cost, defined as *Interest Expenditure + Other (Including Commissions) + Capitalized Interest Expenditure) / (Short-Term Loan + Non-Current Liabilities Due Within One Year + Long-Term Loan + Bond Payable + Long-Term Accounts Payable*. *Green*, *Brown*, and *Neutral* are dummies for green, brown, and neutral firms, respectively, depending on our classification of each industry. Specifically, we calculated the mean value of *Green Ratio*, *Brown Ratio*, and *Neither-green-nor-brown Ratio* of all firms in each industry in the first year that any firms exist in the industry during our sample period. Industries with a mean *Neither-green-nor-brown Ratio* equal to or larger than 90% are classified as a neutral industries. For the other industries, those with a mean *Green Ratio* larger than a mean *Brown Ratio* are classified as green industries, while those otherwise are classified as brown industries. See Appendix Table IA.2 for the classification of each industry. *Size* is the logarithm of 1 + total assets. *Cash Ratio* is cash and cash equivalents to total assets. *Tangible Ratio* is tangible assets to total assets. *Leverage* is total debt to total assets. *CapEx* is cash paid to acquire fixed assets, intangible assets, and other long-term assets scaled by total assets. *Sales Growth* is the growth rate of firm revenue. Standard errors reported in parentheses are clustered at the firm level. * p<.10; ** p<.05; *** p<.01.

	Panel A: Green Inv. and Firm Greenness			Panel B: Debt Cost and Green Inv.		
	(1) Net Ratio	(2) Net Ratio	(3) Net Ratio	(4) Ln Green Inv Amt	(5) Green Inv / Assets	(6) Green Inv / Rev
Ln Green Inv Amt	0.004***					
	(0.001)					
Green Inv / Assets		0.602***				
		(0.232)				
Green Inv / Rev			0.302***			
			(0.098)			
Debt Cost				-0.872***	-0.006***	-0.017***
				(0.148)	(0.001)	(0.003)
Size	0.007	0.008*	0.008*	0.282***	0.000*	0.001**
	(0.005)	(0.005)	(0.005)	(0.036)	(0.000)	(0.001)
Cash Ratio	0.003	0.003	0.003	0.422***	0.002***	0.007***
	(0.018)	(0.018)	(0.018)	(0.129)	(0.001)	(0.003)
Tangible Ratio	-0.008	-0.006	-0.007	0.584***	0.001	0.004
	(0.030)	(0.030)	(0.030)	(0.179)	(0.001)	(0.003)
Leverage	0.013	0.012	0.012	-0.386***	-0.002***	-0.006**
	(0.017)	(0.017)	(0.017)	(0.125)	(0.001)	(0.002)
CapEx	0.055	0.048	0.037	1.479***	0.012***	0.046***
	(0.040)	(0.040)	(0.038)	(0.322)	(0.002)	(0.007)
Sales Growth	0.004*	0.004*	0.004*	0.016	0.000	-0.001
	(0.002)	(0.002)	(0.002)	(0.018)	(0.000)	(0.000)
Firm FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Observations	25,803	25,803	25,803	27,252	27,252	27,252
R^2	0.89	0.89	0.89	0.54	0.39	0.42

Table 7: **Cost of Debt and Green Investment:** This table reports the effects of debt cost on firm green investment. Panel A shows the correlation between green investment and firm greenness. Panel B reports the effects of debt cost on green investment. *Net Ratio* is the proportion of firm revenue from green activities minus that from brown activities. *Ln GEXP Amt* is the logarithm of 1 + the amount of green investment. *GEXP / Assets* is the green investment amount scaled by total assets. *GEXP / Rev* is the green investment amount scaled by total revenue. *Debt Cost* is a measure for a firm's overall debt cost, defined as *Interest Expenditure + Other (Including Commissions) + Capitalized Interest Expenditure) / (Short-Term Loan + Non-Current Liabilities Due Within One Year + Long-Term Loan + Bond Payable + Long-Term Accounts Payable*. *Green*, *Brown*, and *Neutral* are dummies for green, brown, and neutral firms, respectively, depending on our classification of each industry. Specifically, we calculated the mean value of *Green Ratio*, *Brown Ratio*, and *Neither-green-nor-brown Ratio* of all firms in each industry in the first year that any firms exist in the industry during our sample period. Industries with a mean *Neither-green-nor-brown Ratio* equal to or larger than 90% are classified as neutral industries. For the other industries, those with a mean *Green Ratio* larger than a mean *Brown Ratio* are classified as green industries, while those otherwise are classified as brown industries. See Appendix Table IA.2 for the classification of each industry. *Size* is the logarithm of 1 + total assets. *Cash Ratio* is cash and cash equivalents to total assets. *Tangible Ratio* is tangible assets to total assets. *Leverage* is total debt to total assets. *CapEx* is cash paid to acquire fixed assets, intangible assets, and other long-term assets scaled by total assets. *Sales Growth* is the growth rate of firm revenue. Standard errors reported in parentheses are clustered at firm level. * p<.10; ** p<.05; *** p<.01.

	(1) Debt Cost	(2) Green Ratio	(3) Brown Ratio	(4) Net Ratio
Treat × Post	-0.005**			
	(0.002)			
Treat × Post × Green		0.042	-0.002	0.044
		(0.035)	(0.006)	(0.036)
Treat × Post × Brown		0.032**	-0.020	0.052*
		(0.015)	(0.018)	(0.029)
Treat × Post × Neutral		0.005	0.003	0.001
		(0.003)	(0.003)	(0.005)
Event × Firm FE	✓	✓	✓	✓
Event × Greenness × Event-time FE	✓	✓	✓	✓
Event × Sector × Event-time FE	✓	✓	✓	✓
Observations	29,539	29,539	29,539	29,539
R^2	0.49	0.91	0.95	0.93

Table 8: **Identification: Static Effects of Accelerated Depreciation Policy:** This table reports the stacked DID estimates for the static effects of the accelerated depreciation policy. *Treat* equals 1 for treated firms (i.e., firms in industries that were allowed to adopt an accelerated depreciation accounting method) and equals 0 for control firms. *Post* equals 1 for post-treatment periods (i.e., Event-time = 1, 2, or 3) and equals 0 periods otherwise. *Green Ratio* is the proportion of firm revenue from green activities. *Brown Ratio* is the proportion of firm revenue from brown activities. *Net Ratio* is the difference between *Green Ratio* and *Brown Ratio*. *Debt Cost* is a measure for a firm's overall debt cost, defined as *Interest Expenditure + Other (Including Commissions) + Capitalized Interest Expenditure) / (Short-Term Loan + Non-Current Liabilities Due Within One Year + Long-Term Loan + Bond Payable + Long-Term Accounts Payable*. *Green*, *Brown*, and *Neutral* are dummies for green, brown, and neutral firms, respectively, depending on our classification of each industry. Specifically, we calculated the mean value of *Green Ratio*, *Brown Ratio*, and *Neither-green-nor-brown Ratio* of all firms in each industry in the first year that any firms exist in the industry during our sample period. Industries with a mean *Neither-green-nor-brown Ratio* equal to or larger than 90% are classified as a neutral industries. For the other industries, those with a mean *Green Ratio* larger than a mean *Brown Ratio* are classified as green industries, while those otherwise are classified as brown industries. See Appendix Table IA.2 for the classification of each industry. Standard errors reported in parentheses are clustered at the event × firm level. * p<.10; ** p<.05; *** p<.01.

	Whole Period: [2010, 2020]				After 2015: [2015, 2020]			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ICC_Analyst	-0.237***				-0.419***			
	(0.055)				(0.072)			
ICC_HVZ		-0.026				-0.083*		
		(0.035)				(0.045)		
ICC_EP			-0.071**				-0.153***	
			(0.030)				(0.048)	
ICC_RI				-0.065**				-0.170***
				(0.032)				(0.054)
Size	0.003	0.003	0.006	0.005	0.009	0.006	0.009	0.011
	(0.005)	(0.006)	(0.005)	(0.005)	(0.007)	(0.008)	(0.008)	(0.008)
Cash	-0.011	0.008	0.003	-0.004	0.013	0.031	0.023	0.016
	(0.019)	(0.022)	(0.021)	(0.021)	(0.024)	(0.027)	(0.026)	(0.026)
Tangible	0.009	0.004	0.015	0.013	0.014	-0.008	0.008	0.010
	(0.022)	(0.024)	(0.023)	(0.024)	(0.027)	(0.032)	(0.031)	(0.031)
Leverage	-0.054***	-0.047**	-0.038**	-0.047***	-0.079***	-0.069***	-0.050**	-0.067***
	(0.016)	(0.019)	(0.017)	(0.017)	(0.022)	(0.026)	(0.024)	(0.024)
Sales Growth	-0.009**	-0.009*	-0.012**	-0.012***	-0.015***	-0.010*	-0.014**	-0.015***
	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)
CAPX	0.109***	0.073*	0.066*	0.066*	0.129***	0.072	0.076	0.067
	(0.032)	(0.038)	(0.038)	(0.038)	(0.040)	(0.048)	(0.048)	(0.048)
Firm FE	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Observations	43,383	30,811	34,942	34,923	31,667	23,213	26,127	26,095
R^2	0.91	0.91	0.91	0.91	0.90	0.90	0.89	0.89

Table 9: **International Sample: Implied Cost of Capital and EU Taxonomy Eligibility Ratio:** This table reports the results for the effects of ICC on the EU Taxonomy eligibility ratio in the international sample. The dependent variable is the proportion of firm revenue from eligible activities defined by the EU Taxonomy. *ICC_Analyst* is the ICC solved from Gebhardt et al. (2001) model using analyst earnings forecasts. *ICC_Analyst* is the ICC solved from Gebhardt et al. (2001) model using analyst earnings forecasts. *ICC_HVZ* is the ICC solved from Gebhardt et al. (2001) model using earnings forecasts generated by HVZ model proposed by Hou et al. (2012). *ICC_EP* is the ICC solved from Gebhardt et al. (2001) model using earnings forecasts generated by EP model proposed by Li and Mohanram (2014). *ICC_RI* is the ICC solved from Gebhardt et al. (2001) model using earnings forecasts generated by RI model proposed by Li and Mohanram (2014). *Size* is the logarithm of 1 + total assets. *Cash* is cash and short-term investments scaled by total assets. *Tangible* is property, plant, and equipment scaled by total assets. *Leverage* is long-term debt and debt in current liabilities scaled by total assets. *CAPX* capital expenditure scaled by total assets. *Sales Growth* is the growth rate of firm sales. Standard errors reported in parentheses are clustered at the firm level. * p<.10; ** p<.05; *** p<.01.

A Green Revenue Data Example

Business (Chinese)	Business (English)	Amount (CNY)	Ratio	Brown Tag	Green Tag	Category
水力发电	Hydropower Generation	759,202,283.18	0.3579		3.1.4	G
水泥	Cement	286,517,137.34	0.1351	3011		B
纸及纸制品	Paper and Paper Products	216,715,745.25	0.1022	2221		B
火力发电	Thermal Power Generation	407,558,707.47	0.1921	4411		B
贸易及服务	Trade and Services	242,700,648.32	0.1144			GB N/A
变速箱、齿轮系列产品	Transmission and Gear Products	182,409,479.31	0.0860			GB N/A
其他业务	Other Businesses	26,269,672.06	0.0124			GB N/A

Table IA.1: **Green Revenue Data Example:** This table shows the revenue breakdown of Guangdong Shaoneng Group Co.,Ltd. (Ticker: 000601.SZ) in 2010 by business and the greenness classification of each business in the green revenue dataset.

B Greenness Definition

Code	Name	Brown	Green	Other	Net	Category
B07	Oil and natural gas exploitation industry	0.3189	0.0000	0.6811	-0.3189	brown
B08	Ferrous metal ore mining and dressing industry	0.1036	0.0000	0.8964	-0.1036	brown
B09	Non-ferrous metal ore mining and dressing industry	0.1477	0.0000	0.8523	-0.1477	brown
C22	Papermaking and paper product industry	0.7320	0.0001	0.2680	-0.7319	brown
C25	Industries of petroleum processing, coking, and nuclear fuel processing	0.3153	0.0000	0.6754	-0.3153	brown
C26	Manufacturing of chemical raw materials and chemical products	0.3164	0.0050	0.6770	-0.3114	brown
C30	Industry of non-metallic mineral products	0.3168	0.0281	0.6453	-0.2887	brown
C31	Industry of ferrous metal smelting and rolling processing	0.5486	0.0000	0.4494	-0.5486	brown
C32	Industry of non-ferrous metal smelting and rolling processing	0.1428	0.0000	0.8524	-0.1428	brown
D44	Industry of electric power and heat production and supply	0.4406	0.1954	0.3503	-0.2452	brown
G56	Air transport industry	0.2748	0.0000	0.7252	-0.2748	brown
A01	Agriculture	0.0712	0.3213	0.6074	0.2501	green
A02	Forestry	0.0000	0.1915	0.8085	0.1915	green
A05	Service industry for agriculture, forestry, animal husbandry and fishery	0.0013	0.2448	0.7504	0.2435	green
C40	Instrument and meter manufacturing	0.0000	0.1000	0.8743	0.1000	green
C42	Industry of comprehensive utilization of waste resources	0.0000	0.1333	0.8667	0.1333	green
D46	Water production and supply industry	0.0000	0.1936	0.8064	0.1936	green
E50	Architectural decoration and other construction industries	0.0399	0.1445	0.7774	0.1046	green
M74	Professional technical service industry	0.0000	0.1017	0.8984	0.1017	green
N77	Ecological protection and environmental governance industry	0.0000	0.9979	0.0021	0.9979	green
N78	Public facility management industry	0.0089	0.5596	0.4315	0.5508	green
O81	Other service industries	0.0454	0.1118	0.8427	0.0664	green
A03	Animal husbandry	0.0021	0.0000	0.9979	-0.0021	neutral
A04	Fishery	0.0000	0.0000	1.0000	0.0000	neutral
B06	Coal mining and dressing industry	0.0469	0.0000	0.9532	-0.0469	neutral
B10	Non-metallic ore mining and dressing industry	0.0000	0.0000	1.0001	0.0000	neutral
B11	Exploitation auxiliary activities	0.0000	0.0352	0.9648	0.0352	neutral
C13	Agricultural and sideline food processing industry	0.0214	0.0001	0.9667	-0.0213	neutral
C14	Food manufacturing	0.0085	0.0000	0.9915	-0.0085	neutral
C15	Alcohol, beverage and refined tea manufacturing	0.0000	0.0000	1.0000	0.0000	neutral
C17	Textile industry	0.0116	0.0002	0.9882	-0.0114	neutral
C18	Textile garment and apparel industry	0.0026	0.0185	0.9836	0.0159	neutral
C19	Leathers, furs, feathers and related products and footwear industry	0.0000	0.0000	1.0000	0.0000	neutral
C20	Wood processing and wood, bamboo, rattan, Palm fiber, and straw product industry	0.0000	0.0000	1.0000	0.0000	neutral
C21	Furniture manufacturing	0.0000	0.0000	1.0000	0.0000	neutral
C23	Printing and recording media reproduction industry	0.0000	0.0000	1.0000	0.0000	neutral
C24	Manufacturing of stationery, industrial arts, sports and entertainment supplies	0.0032	0.0000	0.9968	-0.0032	neutral
C27	Pharmaceutical industry	0.0101	0.0000	0.9843	-0.0101	neutral
C28	Chemical fiber manufacturing	0.0667	0.0000	0.9333	-0.0667	neutral
C29	Industry of rubber and plastic products	0.0294	0.0000	0.9706	-0.0294	neutral
C33	Metal product industry	0.0278	0.0185	0.9538	-0.0093	neutral
C34	General equipment manufacturing	0.0000	0.0421	0.9579	0.0421	neutral
C35	Special-purpose equipment manufacturing	0.0036	0.0667	0.9313	0.0631	neutral
C36	Automobile manufacturing	0.0024	0.0151	0.9817	0.0127	neutral
C37	Manufacturing of railways, ships, aircrafts, spacecrafts and other transportation equipment	0.0021	0.0246	0.9719	0.0225	neutral
C38	Electric machinery and equipment manufacturing	0.0004	0.0682	0.9318	0.0678	neutral
C39	Manufacturing of computers, communications and other electronic equipment	0.0003	0.0292	0.9746	0.0289	neutral
C41	Other manufacturing industries	0.0258	0.0398	0.9324	0.0140	neutral
C43	Industry of metal product, machinery and equipment repair	0.0000	0.0000	1.0001	0.0000	neutral
D45	Gas production and supply industry	0.0000	0.0000	1.0000	0.0000	neutral
E47	Building construction industry	0.0000	0.0030	0.9970	0.0030	neutral
E48	Civil engineering construction industry	0.0045	0.0593	0.9362	0.0548	neutral
E49	Construction installation industry	0.0000	0.0000	1.0000	0.0000	neutral
F51	Wholesale industry	0.0000	0.0006	0.9993	0.0006	neutral
F52	Retail industry	0.0010	0.0004	0.9847	-0.0006	neutral
G53	Railway transportation industry	0.0000	0.0000	0.9999	0.0000	neutral
G54	Road transport industry	0.0000	0.0000	1.0000	0.0000	neutral
G55	Waterway transport industry	0.0000	0.0000	0.9999	0.0000	neutral
G58	Industry of loading/unloading handling and transport agency	0.0034	0.0000	0.9966	-0.0034	neutral
G59	Storage industry	0.0000	0.0000	1.0000	0.0000	neutral
G60	Postal service industry	0.0000	0.0000	0.9999	0.0000	neutral
H61	Accommodation industry	0.0000	0.0000	1.0000	0.0000	neutral
H62	Catering industry	0.0000	0.0000	1.0000	0.0000	neutral
I63	Telecommunications, radio and television and satellite transmission services	0.0000	0.0000	1.0000	0.0000	neutral
I64	Internet and related services	0.0000	0.0656	0.9344	0.0656	neutral
I65	Industry of software and information technology services	0.0000	0.0275	0.9736	0.0275	neutral
J66	Monetary and financial services	0.0000	0.0000	0.9815	0.0000	neutral
J67	Capital market services	0.0000	0.0000	0.9903	0.0000	neutral
J68	Insurance industry	0.0000	0.0000	1.0187	0.0000	neutral
J69	Other financial industries	0.0000	0.0000	0.9551	0.0000	neutral
K70	Real estate industry	0.0044	0.0005	0.9951	-0.0038	neutral
L71	Leasing industry	0.0000	0.0000	1.0001	0.0000	neutral
L72	Commercial service industry	0.0001	0.0156	0.9840	0.0155	neutral
M73	Research and experimental development	0.0000	0.0000	1.0000	0.0000	neutral
M75	Industry of science and technology popularization and application services	0.0000	0.0000	1.0001	0.0000	neutral
O79	Resident service industry	0.0000	0.0000	1.0000	0.0000	neutral
O80	Industry of repair of motor vehicles, electronic products and household products	0.0000	0.0000	1.0000	0.0000	neutral
P82	Education	0.0000	0.0000	1.0000	0.0000	neutral
Q83	Health	0.0000	0.0000	1.0000	0.0000	neutral
R85	Press and publishing industry	0.0000	0.0000	1.0000	0.0000	neutral
R86	Radio, television, film, and film and television sound recording production industry	0.0000	0.0000	1.0000	0.0000	neutral
R87	Industry of culture and arts	0.0000	0.0000	1.0000	0.0000	neutral
R88	Sports	0.0000	0.0000	0.9999	0.0000	neutral
S90	Diversified industries	0.0493	0.0234	0.9274	-0.0259	neutral

Table IA.2: **Greenness Definition**

C Treatment Years for the Accelerated Depreciation Policy

Code	Name	Treatment Year
C27	Pharmaceutical industry	2014
C35	Special-purpose equipment manufacturing	2014
C37	Manufacturing of railways, ships, aircrafts, spacecrafts and other transportation equipment	2014
C39	Manufacturing of computers, communications and other electronic equipment	2014
C40	Instrument and meter manufacturing	2014
I63	Telecommunications, radio and television and satellite transmission services	2014
I64	Internet and related services	2014
I65	Industry of software and information technology services	2014
C13	Agricultural and sideline food processing industry	2015
C14	Food manufacturing	2015
C17	Textile industry	2015
C18	Textile garment and apparel industry	2015
C19	Leathers, furs, feathers and related products and footwear industry	2015
C20	Wood processing and wood, bamboo, rattan, Palm fiber, and straw product industry	2015
C21	Furniture manufacturing	2015
C22	Papermaking and paper product industry	2015
C23	Printing and recording media reproduction industry	2015
C24	Manufacturing of stationery, industrial arts, sports and entertainment supplies	2015
C28	Chemical fiber manufacturing	2015
C33	Metal product industry	2015
C34	General equipment manufacturing	2015
C36	Automobile manufacturing	2015
C38	Electric machinery and equipment manufacturing	2015
C15	Alcohol, beverage and refined tea manufacturing	2019
C25	Industries of petroleum processing, coking, and nuclear fuel processing	2019
C26	Manufacturing of chemical raw materials and chemical products	2019
C29	Industry of rubber and plastic products	2019
C30	Industry of non-metallic mineral products	2019
C31	Industry of ferrous metal smelting and rolling processing	2019
C32	Industry of non-ferrous metal smelting and rolling processing	2019
C41	Other manufacturing industries	2019
C42	Industry of comprehensive utilization of waste resources	2019
C43	Industry of metal product, machinery and equipment repair	2019

Table IA.3: **Treatment Years for the Accelerated Depreciation Policy**

D Keywords to Identify Green Projects

Keyword	Meaning	Number	Keyword	Meaning	Number	Keyword	Meaning	Number
光伏	Photovoltaic	1666	储能	Energy Storage	171	水性	Water-Based	54
环保	Environmental Protection	1445	减排	Emission Reduction	169	能降	Energy Reduction	50
风电	Wind Power	1314	清洁	Clean	161	制氢	Hydrogen Production	49
污水处理	Wastewater Treatment	1173	核电	Nuclear Power	149	乙醇	Ethanol	49
节能	Energy Conservation	1080	资源化	Resource Utilization	146	环境治理	Environmental Management	49
新能源	New Energy	858	绿化	Greening	139	地铁	Subway	47
回收	Recycling	632	生物质	Biomass	133	特高压	Ultra-High Voltage	46
综合利用	Comprehensive Utilization	587	回用	Reuse	131	园林	Landscape	46
风电场	Wind Farm	567	循环水	Circulating Water	111	电解槽	Electrolyzer	45
脱硫	Desulfurization	557	多晶	Polycrystalline	107	粮食	Grain	44
除尘	Dust Removal	497	变频	Variable Frequency	103	热泵	Heat Pump	44
循环	Circular	496	甲醇	Methanol	98	绿地	Greenfield	44
绿色	Green	479	能源管理	Energy Management	97	雨水	Rainwater	43
高效	Efficient	447	植物	Plant	97	净水	Water Purification	43
信息化	Informatization	437	增效	Efficiency Enhancement	97	氢能	Hydrogen Energy	43
净化	Purification	431	多晶硅	Polysilicon	93	再生资源	Recycled Resources	41
生态	Ecological	428	除尘器	Dust Collector	93	食用菌	Edible Fungi	41
锂电	Lithium Battery	417	节水	Water-Saving	87	无害	Harmless	41
太阳能	Solar Energy	401	风力	Wind Power	83	节能型	Energy-Saving	40
余热	Waste Heat	375	单晶硅	Monocrystalline Silicon	81	无害化	Harmless	39
环境	Environment	357	污染	Pollution	81	水利	Water Conservancy	38
LED	Led	320	用水	Water Use	79	氢气	Hydrogen	37
脱硝	Denitrification	319	水源	Water Source	71	调峰	Peaking Adjustment	37
排放	Emission	318	加氢	Hydrogenation	67	热能	Thermal Energy	36
水电	Hydropower	305	充电站	Charging Station	61	超临界	Supercritical	35
再生	Recycling	276	装配式	Prefabricated	60	蓄热	Thermal Energy Storage	34
废水处理	Wastewater Treatment	210	降解	Degradation	59	水质	Water Quality	33
锂离子	Lithium-Ion	207	集中供热	District Heating	58	可降解	Degradable	33
水电站	Hydropower Station	192	垃圾处理	Waste Treatment	57	有机肥	Organic Fertilizer	33
风机	Wind Turbine	190	电除尘	Electrostatic Precipitation	56	零排放	Zero Emissions	32
电动	Electric	190	水产	Aquaculture	55	燃料电池	Fuel Cell	31
光热	Solar Thermal	30	电动汽车	Electric Vehicle	15	生态环境	Ecological Environment	9
水资源	Water Resources	28	地下水	Groundwater	15	作物	Crop	9
生态农业	Eco-Agriculture	26	防洪	Flood Control	15	育苗	Nursery	9
温度	Temperature	25	水循环	Water Recycling	15	原生态	Primitive Ecology	9
地热	Geothermal	25	生态旅游	Ecotourism	14	农田水利	Farmland Water Conservancy	8
资源管理	Resource Management	25	智慧水务	Smart Water Management	14	种苗	Seedlings	8
变频器	Inverter	24	二手	Second-Hand	14	纸包	Paper Packaging	8
良种	Improved Seeds	22	农林	Agriculture And Forestry	14	热解	Pyrolysis	8
微生物	Microorganism	22	森林	Forest	14	地表水	Surface Water	8
蓄水	Water Storage	22	水轮	Water Turbine	14	冷凝水回收	Condensate Recovery	8
再生能源	Renewable Energy	21	风能	Wind Energy	14	自然	Nature	8
电能	Electrical Energy	20	降解塑料	Degradable Plastics	13	环境监测	Environmental Monitoring	8
电车	Electric Vehicle	20	水净化	Water Purification	13	聚乳酸	Polylactic Acid	7
页岩	Shale	20	清淤	Dredging	12	高效化	Efficiency Enhancement	7
回水	Return Water	19	淡水	Freshwater	12	充电机	Charger	7
电气化	Electrification	19	水产品	Aquatic Products	12	长寿命	Long Lifespan	7
可再生	Renewable	19	热交换器	Heat Exchanger	11	海绵城市	Sponge City	6
循环流化床	Circulating Fluidized Bed	18	降噪	Noise Reduction	11	堆肥	Composting	6
再造	Reconstruction	18	能效	Energy Efficiency	11	水能	Hydropower	6
脱盐	Desalination	18	植保	Plant Protection	11	林业	Forestry	6
溶剂回收	Solvent Recovery	18	核电站	Nuclear Power Plant	11	林区	Forest Area	6
现代农业	Modern Agriculture	17	绿色建材	Green Building Materials	11	水力	Hydropower	6
草种	Grass Seed	17	保育	Conservation	10	玻璃包装	Glass Packaging	6
湿地	Wetland	17	环境友好	Environmentally Friendly	10	水电工程	Hydropower Engineering	6
生物质能	Biomass Energy	17	水性涂料	Water-Based Coatings	10	城市轨道	Urban Rail	6
抽水蓄能	Pumped Storage	16	减振	Vibration Reduction	10	树林	Forest	6
土壤	Soil	16	超导	Superconducting	10	空气净化	Air Purification	6
燃气轮机	Gas Turbine	16	水源地	Water Source	10	低能	Low Energy	5
环境保护	Environmental Protection	16	水轮发电	Hydropower Generation	10	林地	Forest Land	5
苗圃	Nursery	16	防渗	Seepage Control	9	水土保持	Soil And Water Conservation	5
电除尘器	Electrostatic Precipitator	16	电动机	Electric Motor	9	复垦	Reclamation	5
水网	Water Network	5	建筑节能	Building Energy Efficiency	3	植物种	Plant Species	2
治沙	Sand Control	5	林场	Forest Farm	3	林带	Shelterbelt	2
风车	Wind Turbine	5	电动船	Electric Boat	3	节煤	Coal Saving	2
低毒	Low Toxicity	5	纸包装	Paper Packaging	3	海流	Ocean Current	2
调蓄	Regulation And Storage	5	微特电机	Micro-Specialized Motor	3	物耗	Resource Consumption	2
储氢	Hydrogen Storage	5	治污	Pollution Control	3	核能	Nuclear Energy	2
膜法	Membrane Method	5	磁悬浮	Maglev	3	精量	Precision	2
竹林	Bamboo Forest	5	污水集中	Sewage Centralization	3	碲化镉	Cadmium Telluride	2
钠离子	Sodium-Ion	5	养鱼	Fish Farming	3	动植物	Flora And Fauna	1
PEM	Proton Exchange Membrane	5	低能耗	Low Energy Consumption	3	竹子	Bamboo	1
聚光	Concentration	4	环境质量	Environmental Quality	3	苗木	Nursery Stock	1
红树林	Mangrove	4	潮汐	Tidal	2	异步电动	Asynchronous Electric	1
红树	Mangrove	4	生态农场	Eco-Farm	2	保土	Soil Conservation	1
林木	Timber	4	皂素	Saponin	2	CIGS	Cigs	1
光化	Photochemical	4	护林	Forest Protection	2	有轨电车	Tram	1
水轮机	Hydraulic Turbine	4	植被	Vegetation	2	持续性	Sustainability	1
生物肥	Biofertilizer	4	海藻	Algae	2	低噪声	Low Noise	1
气候	Climate	4	绿色食品	Green Food	2	海流能	Ocean Current Energy	1
保水	Water Retention	4	净水机	Water Purifier	2	电化学储能	Electrochemical Energy Storage	1
石漠化	Rock Desertification	4	园林绿化	Landscaping And Greening	2	电子客票	E-Ticket	1
集约化	Intensive	4	风轮	Wind Turbine	2	节水型	Water-Saving	1
净化器	Purifier	4	防护林	Protective Forest	2	江河源	River Source	1
育林	Afforestation	3	节约	Conservation	2	透水	Permeable	1
高效能	High-Efficiency	3	江源	River Source	2	农作物	Crops	1
洗舱	Tank Cleaning	3	有轨	Light Rail	2	鱼礁	Fish Reef	1
速生	Fast-Growing	3	污水净化	Wastewater Purification	2	大气环境	Atmospheric Environment	1
森林公园	Forest Park	3	回收站	Recycling Station	2	稀土永磁电机	Rare Earth Permanent Magnet Motor	1
造林	Afforestation	3	基因库	Gene Bank	2	保护区	Protected Area	1
海洋能	Ocean Energy	3	液氢	Liquid Hydrogen	2	保温材料	Insulation Materials	1
土壤改良	Soil Improvement	3	生态系	Ecosystem	2	国家森林公园	National Forest Park	1
PEMS	Pems (Predictive Emissions Monitoring System)	3	生态系统	Ecosystem	2	贯流式	Through-Flow Type	1

Table IA.4: **Keywords to Identify Green Projects**

E Validation Tests

Panel A: Green Ratio

	Green Ratio									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Ln GHG Int. S1+S2	-0.024**									
	(0.010)									
Ln GHG Abs. S1+S2		-0.026***								
		(0.007)								
Refinitive Env.			0.001**							
			(0.000)							
Refinitive Emi.				0.000						
				(0.000)						
MSCI Env.					0.011***					
					(0.003)					
MSCI Climate Chg.						0.003				
						(0.002)				
MSCI Env. Opp.							0.022***			
							(0.005)			
Env. Incident Num.								-0.004		
								(0.005)		
GHG Incident Num.									0.006	
									(0.014)	
TV GHG Emission										-0.000
										(0.000)
Industry FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,021	5,021	3,370	3,370	2,421	2,342	1,212	18,118	18,118	1,744
R^2	0.36	0.38	0.34	0.34	0.37	0.36	0.41	0.31	0.31	0.43

Panel B: Brown Ratio

	Brown Ratio									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Ln GHG Int. S1+S2	0.058***									
	(0.007)									
Ln GHG Abs. S1+S2		0.046***								
		(0.006)								
Refinitive Env.			-0.001***							
			(0.000)							
Refinitive Emi.				-0.000						
				(0.000)						
MSCI Env.					-0.008***					
					(0.003)					
MSCI Climate Chg.						-0.007**				
						(0.003)				
MSCI Env. Opp.							-0.005*			
							(0.003)			
Env. Incident Num.								0.024***		
								(0.009)		
GHG Incident Num.									0.024	
									(0.018)	
TV GHG Emission										-0.001
										(0.001)
Industry FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,021	5,021	3,370	3,370	2,421	2,342	1,212	18,118	18,118	1,744
R^2	0.64	0.63	0.53	0.53	0.52	0.51	0.48	0.47	0.47	0.52

Table IA.5: **Regression on Green and Brown Ratios on Other Environmental Variables**