Green Public Procurement: International Evidence

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Abstract

Markets often fail to provide adequate incentives for corporations to invest in environmentally responsible practices at socially optimal levels. Green public procurement has emerged as a key policy tool for encouraging government suppliers to adopt green innovations and environmental abatement measures. This study presents the first large-scale, multi-country analysis of supplier firms engaged in green procurement contracts, examining their characteristics and the impact on their environmental performance. First, we show that firms with political connections, higher negative environmental externalities (i.e., higher levels of CO_2 emissions), and prior procurement contracts are more likely to secure green contracts and obtain contracts of higher value. Second, we find that the adoption of green procurement contracts is associated with subsequent reduction in CO_2 emissions, some evidence of improvements in product sustainability and customer consciousness, and a greater tendency for supplier firms to disengage from suppliers in their supply chain that fail to meet environmental compliance standards. The results of a difference-in-differences analysis conducted around an exogenous shock for a subset of European firms further corroborate these findings. These findings underscore the effectiveness of green public procurement as a distinct environmental policy tool for promoting sustainable development, offering insights of socio-economic relevance and policy implications.

Keywords: Government Procurement Contracts; Green Procurement; Sustainability; Environmental Policy; Pollution Abatement Investment; Political Connections; International

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1. Introduction

Markets often fail to incentivize corporations to invest in environmentally responsible practices due to a range of factors, including demand uncertainties, information asymmetry, and dual externalities. Negative externalities such as pollution are borne by society, while positive externalities such as knowledge spillovers from green innovations offer limited returns to the investing firms. In the absence of government regulation, financial incentives, or reputational risks, companies tend to prioritize short-term profits over long-term sustainability, resulting in inadequate investment in environmental practices.

Green public procurement (**GPP**) has gained increasing attention from policymakers as a strategic policy instrument to influence market practices by encouraging government suppliers to invest in environmental abatement and green innovation. Defined by the European Commission as the process of procuring goods, services, and works with reduced environmental impact, GPP is widely adopted across OECD countries and beyond (OECD 2020). International initiatives such as the United Nations' One Planet Network and Sustainable Development Goals (SDGs) further emphasize its importance as a tool in promoting sustainable development. Governments are among the largest consumers, with public procurement accounting for 10–15% of global GDP—equivalent to approximately USD 13 trillion annually (World Bank, 2021).GPP contracts often subject supplier firms to stringent government monitoring and entail higher upfront costs, with potential benefits taking longer to materialize.

Despite GPP's substantial economic scale and its critical role in driving sustainable development, there is limited large-sample empirical analysis of supplier firms' characteristics that commit to GPP projects and the impact on their environmental performance. This study provides the first large-sample empirical analysis using an international setting, leveraging the impact of institutional and country-level factors on the determinants and environmental consequences of green procurement contracts on supplier firms. Specifically, the objectives of this paper are threefold. First, as this study represents the first comprehensive examination of global green procurement contracts, we start by presenting stylized facts derived from our sample. Second, we analyze the factors influencing the likelihood of firms being awarded green contracts. Finally, we assess the impact of green contracting on supplier firms' environmental performance and outcomes.

Public procurement plays a critical role in shaping economic activity, influencing market behavior, and ensuring the efficient delivery of public goods and services. However, procurement strategies can vary significantly in their objectives, evaluation criteria, and socio-economic impacts. The distinction between traditional public procurement and GPP is particularly pronounced. Traditional public procurement is primarily concerned with the efficient acquisition of goods, services, and infrastructure essential for the functioning of public institutions. It emphasizes cost-effectiveness, transparency, competition, and adherence to legal and regulatory frameworks to ensure accountability and maximize value for taxpayer money (OECD 2015a). The principal goal is to achieve the best possible balance between quality and price while maintaining standardized procurement practices that promote fairness and efficiency.

In contrast, GPP represents a paradigm shift, integrating sustainability considerations into procurement decisions to advance environmental policy objectives. Rather than prioritizing cost alone, GPP emphasizes life-cycle costing, energy efficiency, resource conservation, carbon footprint reduction, and the minimization of environmental externalities (Testa, Iraldo, Daddi, and Frey 2016). As a strategic policy instrument, GPP seeks to harness government purchasing power to drive the transition toward a greener economy by incentivizing supplier firms to adopt environmentally responsible production methods, invest in pollution reduction initiatives, and develop innovative sustainable technologies (European Commission 2020). By embedding environmental considerations into procurement processes, GPP not only shapes market demand for eco-friendly products and services but also accelerates the diffusion of sustainability-oriented innovations across industries. While extensive research on traditional public procurement examines its determinants and impact on supplier firms, GPP warrants distinct analysis due to its broader strategic objectives, unique socio-economic implications, and increasing influence in driving sustainable market practices.

We obtain GPP data from TenderAlpha, a leading provider of global procurement information, which tracks both general and green procurement activities. The dataset contains over 85 million public procurement contracts, including 4.5 million green contracts awarded across 50 countries. Our sample covers 27,173 firm-year observations from 2010 to 2023. We begin our analysis by documenting several key stylized facts. First, the data reveal a clear upward trend in the adoption of GPP, both in terms of contract volume and monetary value, particularly from 2016 onward with the number of firms awarded GPP contracts steadily increasing from 150 in 2010 to 449 in 2021, before experiencing a slight decline in 2022. This trend highlights the increasing significance of GPP as a strategic instrument for advancing environmental sustainability in government policies and practices. Second, the geographic variation in both the value and number of GPP contracts underscores significant disparities in the global adoption of green procurement practices. The United States leads in representation, followed by the United Kingdom and Japan. These variations are influenced by differences in national policies, institutional frameworks, and environmental objectives across regions. Third, in terms of GPP contract types, the most commonly adopted categories include Eco-Regulation and Energy and Resource Efficiency (refer to Appendix A for variable definitions). In contrast, biodiversity preservation and eco-label-based procurement are less frequently adopted. Last, the sectors with the highest representation in GPP contracts include Communication, Healthcare, Medical Equipment, Pharmaceutical Products, and Personal and Business Services.

Next, for our determinant analyses, we explore three key factors that may influence the likelihood of firms being awarded GPP contracts (as well as their magnitude). First, we investigate the role of political connections in securing GPP contracts (e.g., Goldman, Rocholl, and So 2013; Cumming, Javakhadze, and

Suleymanov 2024). While political connections are known to influence traditional procurement outcomes, the unique features of GPP—such as strict oversight, complexity, and sustainability objectives—suggest that these connections may have a limited impact. The emphasis on fairness, ethics, and environmental goals in GPP could reduce the relevance of political ties, creating a tension between political influence and the normative expectations of green procurement.

Second, we consider whether firms with negative environmental externalities measured using carbon dioxide (CO_2) emissions are more likely to secure GPP contracts. If the goal of the rewarding government is to incentivize firms with weaker environmental records to enhance their performance, we expect a positive association between the supplier firms' level of CO_2 emissions and the likelihood of obtaining such contracts.

Third, we investigate whether firms with existing government contracts are more likely to secure GPP contracts. While prior procurement contracts can offer supplier firms competitive advantages through established networks, procedural expertise, and enhanced access to information, this raises concerns regarding fairness. Such advantages may limit opportunities for smaller or newer firms, potentially undermining the principles of equity and transparency in GPP processes.

Our findings suggest that firms with political connections, higher levels of CO2 emissions, and existing procurement contracts are more likely to secure green contracts (and obtain contracts of larger value). Cross-sectional analyses corroborate our main results and suggest heterogeneity in the relation between our determinant factors and the likelihood of securing green contracts: (1) the influence of political connections weakens in environments with lower information frictions; (2) CO_2 emissions have a more pronounced impact on firms headquartered in countries with mandatory environmental disclosure;

and (3) existing government contracts play a more significant role for foreign firms than domestic firms, as foreign firms face higher information asymmetry.

Our empirical analyses include a vector of control variables motivated by extant research (e.g., Samuels 2021; Cumming et al. 2024). Importantly, we also control for industry, country, and year fixed effects. Similar to broader government contract research, our sample does not include firms that bid unsuccessfully or do not apply for green procurement contracts. To address this limitation, we employ entropy balancing with matching up to the third moment, ensuring balanced firm-level covariates. This method strengthens the robustness of our inferences by controlling for observable confounders. Last, we regress our dependent variable, GPP, in year t+1 on the test and control variables from year t. This temporal separation helps mitigate the risk of reverse causality and enhances the validity of our inferences.[1]

Regarding our third objective, we evaluate the environmental consequences of GPP contracts on supplier firms. Specifically, we examine whether supplier firms with green contracts exhibit subsequent reduction in their CO_2 emissions as well as exhibit greater environmental responsibility by adopting more sustainable product choices and revising supply chains by terminating relationships with partners that fail to meet environmental criteria. We document that the adoption of green procurement contracts is associated with subsequent reduction in CO_2 emissions. We also find some evidence for improvements in product sustainability and customer consciousness, and higher likelihood of contracting firms terminating relationships with suppliers that do not meet environmental compliance standards. Overall, these findings indicate that GPP is effective in reducing environmentally harmful behaviors among supplier firms. By incentivizing firms to adopt more sustainable practices, these contracts promote alignment with environmental standards, resulting in enhanced environmental performance. This underscores the role of

[1] Section 4.5 includes several additional robustness tests.

GPP as a powerful mechanism for driving sustainable change, encouraging corporate responsibility, and improving environmental outcomes within supply chains.

To address potential residual endogeneity, we conduct difference-in-differences analyses around the enactment of the 2018 EU Renewable Energy Directive (RED II). RED II represents an exogenous regulatory shift across EU Member States (i.e., a subset of our full sample). This policy change provides a natural experiment to assess the plausibly causal impact of green contract awards on the environmental performance of supplier firms. Our results indicate that firms subject to the policy intervention reduce their emissions significantly more than control firms in the post-RED II period, further reinforcing the validity of our primary findings.

Our empirical analyses further indicate that awarding green procurement contracts is not positively correlated with future financial performance. Specifically, there is some evidence of a decrease in subsequent ROA. A possible interpretation is that firms awarded green procurement contracts face heightened environmental monitoring, leading them to prioritize sustainability efforts at the expense of profitability.

Our paper contributes to the literature investigating the impact of corporate customers on supplier firms' outcomes (e.g., Patatoukas 2012; Dhaliwal, Judd, Serfling, and Shaikh 2016; Campello and Gao 2017). A related literature on traditional public procurement (and not GPP per se) explores the characteristics of government suppliers and examines the impact of government customers on supplier firms (e.g., Goldman et al. 2013; Cohen and Li 2014; Houston, Jiang, Lin, and Ma 2014; Cohen and Malloy 2016; Hadley 2016; Samuels 2021; Cohen, Li, Li, and Lou 2022; Cohen, Li, Li, Lou, and Rast 2022; Cumming et al. 2024; Even-Tov, She, Wang, and Yang 2025; Kim, Sun, Xiang, and Zeng 2025). Given the significant economic scale of GPP and its role in addressing climate change while generating economic benefits—such as green job creation, improved efficiency, and enhanced innovation—this study presents the first large-scale, multi-country analysis of supplier firms engaged in green procurement contracts, examining their characteristics and the impact on their environmental performance.

Second, our article adds to research on factors influencing corporate environmental strategies (e.g., Flammer 2018; Krueger, Sautner, and Starks 2020; Xu and Kim 2022). Recent studies underscore the influence of corporate customers in shaping supplier firms' environmental and social policies (e.g., Dai, Liang, and Ng 2021; Schiller 2022; Pankratz and Schiller, 2022). We contribute by highlighting the role of government customers in incentivizing supplier firms to adopt environmentally sustainable practices. Unlike corporate customers, whose influence may be shaped by market competition and consumer preferences, governments' green procurement policies explicitly integrate environmental criteria, thereby exerting a more direct and substantial impact on firms' environmental commitments.

Finally, the study carries potential policy implications. In the absence of governmental intervention—whether through regulatory measures, financial incentives, or mechanisms that expose firms to reputational risks—businesses often prioritize short-term profitability over long-term environmental sustainability. This tendency may result in inadequate investment in environmentally responsible practices. Although supply-side policies such as R&D tax credits and direct subsidies for private R&D projects have traditionally been employed by governments to stimulate innovation in sustainability, demand-side policies such as GPP have gained increasing attention from policymakers in recent decades. Our findings underscore the effectiveness of GPP as a distinct environmental policy tool, demonstrating its capacity to directly incentivize firms to adopt eco-friendly technologies and promote sustainable business practices.

2. Institutional Background, Related Literature, and Our Research Focus

2.1 Green Public Procurement (GPP) and Sustainable Development Initiatives

The shareholder primacy theory asserts that corporations prioritize profit maximization for shareholders, often resisting socially or environmentally driven practices unless mandated by regulations or market forces (e.g., Friedman 1980). In contrast, the stakeholder theory contends that corporations have a duty to consider the interests of a broader range of stakeholders, including employees, customers, communities, and society at large (e.g., Freeman 1984). Freeman (1984) argues that an exclusive focus on shareholder interests can lead to adverse societal consequences and advocates for a balanced approach, where businesses create long-term value by addressing the needs of all stakeholders.

Markets often lack sufficient incentives for corporations to invest in environmentally responsible practices due to demand uncertainties, information asymmetry, and dual externalities. Businesses that contribute to pollution or environmental harm impose negative externalities or costs on society, while their investments in environmentally responsible practices generate positive externalities (e.g., knowledge spillovers) with limited immediate returns for the investing firms. Without governmental regulation (e.g., demand- and supply-side policies), financial incentives, or reputational risks, firms tend to prioritize short-term profits over long-term environmental sustainability.

Governments are among the largest consumers in most economies, wielding significant purchasing power through public procurement that serves as a powerful mechanism for influencing markets. On average, public procurement accounts for 10-15% of GDP, equating to around USD 13 trillion annually

(World Bank 2021).[2] Although supply-side policies, such as R&D tax credits and direct subsidies for private R&D projects, have been long utilized by governments, demand-side policies such as GPP, have garnered increasing attention from policymakers in recent decades (OECD 2017; Bleda and Chicot 2020; Krieger and Zipperer 2022). The European Commission defines GPP as "a process whereby public authorities seek to procure goods, services, and works with a reduced environmental impact throughout their life cycle when compared to goods, services, and works with the same primary function that would otherwise be procured."[3] A survey by the OECD reveals that all 26 OECD member countries, along with Brazil, have established regulations or strategies promoting at least one responsible business conduct objective within their public procurement systems.

These efforts are part of a broader global movement toward responsible public procurement. The United Nations Environment Program (UNEP) has played a significant role in advancing strategic sustainable public procurement through initiatives such as the One Planet Network SPP Program, launched in 2014.[4] The United Nations SDGs, particularly Goal 12—Ensure Sustainable Consumption and Production Patterns—emphasize the importance of sustainable public procurement in achieving global sustainability objectives. Specifically, Target 12.7 calls on governments to "promote public procurement practices that are sustainable, in accordance with national policies and priorities." These developments underscore GPP's political priority as a tool for advancing sustainable development.

Consistent with these developments and to promote environmental stewardship across corporate sectors, governments worldwide have adopted GPP (OECD 2020). GPP offers two key environmental benefits. First, by adopting GPP policies, governments can influence firms to prioritize low-carbon goods

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[2] For instance, the U.S. government annually awards over $400 billion in contracts, comprising 20% of U.S. GDP, while European Union (EU) Member States collectively allocate an average of 14% of GDP to public procurement (Cohen and Li 2020; World Economic Forum 2022). See https://single-market-economy.ec.europa.eu/single-market/public-procurement_en
[3] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52008DC0400&tnqh_x0026;from=EN
[4] This program serves as a global multi-stakeholder platform to facilitate the worldwide adoption of sustainable procurement practices. By 2020, over 130 countries had joined the One Planet Network, highlighting the global commitment to sustainable procurement.

and services, create markets for emerging green technologies, and drive innovation by awarding public R&D contracts aimed at addressing climate challenges. In doing so, GPP helps reduce information asymmetry and mitigate demand uncertainty, thereby creating a more supportive environment for sustainable innovation (e.g., Cohen and Li, 2021). Second, GPP can help governments reduce their *own* carbon footprint. According to the World Economic Forum (WEF 2022), government procurement is estimated to be directly or indirectly responsible for 15% of global greenhouse gas (GHG) emissions reduction and is estimated to generate a USD 4 trillion boost to the green economy and create approximately three million net new jobs.

GPP projects typically subject supplier firms to stringent government monitoring and entail higher upfront costs, with potential benefits taking longer to materialize. Despite their significant economic scale and their potential for promoting sustainable development, research offers limited large-sample empirical analyses of supplier firms' characteristics that commit to GPP projects and their impact on firms' environmental performance. This study aims to provide the first systematic large-sample evidence.

General public procurement and GPP differ in their objectives, criteria, and broader impacts. Traditional public procurement focuses on the efficient acquisition of goods and services to meet the operational needs of public institutions, prioritizing cost-effectiveness, competition, and compliance with regulatory standards (OECD 2015b). In contrast, GPP serves as a strategic policy tool to influence market practices by encouraging suppliers to invest in environmental abatement and green innovation. This approach promotes the adoption and diffusion of sustainable technologies and products. While research on traditional public procurement explores the characteristics of government suppliers and the influence of governments as major customers, GPP merits standalone analysis due to its broader objectives, distinct impacts, and substantial role in the economy.

2.2 Determinants of Winning Green Procurement Contracts

An important part of this study is our investigation of determinants of green contracts. We consider three sets of factors that we believe are interesting potential determinants (and control for a variety of other firm characteristics and fixed effects in our empirical analyses). First, we examine whether firms with *political connections* are more likely to be awarded green contracts. Extant research identifies political connections as a significant factor influencing the allocation of public procurement contracts in general. For example, Goldman et al.(2013) demonstrate that political connections among a firm's board members significantly affect contract awards. Similarly, Cumming et al. (2024) find that politically connected firms are more likely to secure government procurement contracts, especially those of higher value.

However, in the context of GPP contracts, it is not immediately clear whether political connections confer the same advantages. Several factors suggest a departure from traditional public procurement dynamics. First, the GPP process often involves heightened scrutiny and stringent government oversight, given its broader policy objective of mitigating climate change. Second, green contracts are typically complex and require significant upfront investments, which may shift the focus away from political considerations. Third, GPP contracts are widely regarded as adhering to principles of fairness, ethics, and sustainability, with environmental priorities potentially outweighing political influence. These characteristics suggest that political connections might play a limited or negligible role in the allocation of GPP contracts. In other words, the presence of political connections introduces a conceptual tension. While such connections may provide firms with advantages in navigating administrative processes or influencing outcomes, the normative expectations of green procurement suggest these connections could be irrelevant. This inherent contradiction underscores the significance of examining this variable, as it challenges the alignment of green procurement practices with their goals of transparency, equity, and sustainability.

Second, we analyze whether firms with *negative environmental externalities* are more likely to secure green contracts. This relation is contingent on the strategic objectives of the awarding entity. If the awarding government aims to *incentivize* firms with weaker environmental records to enhance their environmental practices and innovation, a positive association is expected between negative environmental externalities and the likelihood of obtaining such contracts. Under this approach, green contracts are strategically used as tools to drive transformative change, with a preference for engaging firms that have the potential for substantial improvement rather than those already exhibiting high environmental performance. However, there is tension to this argument – if specific expertise is needed on a green contract in an area with a small contractor base, green contracts may be allocated based on a firm's demonstrated *ability* to adhere to or implement sustainable practices effectively. In such a case, the relation would be inversed.

Third, we examine whether firms with *existing government contracts* (not green contracts per se) are more likely to secure green contracts. On one hand, the existence of prior contracts may indicate that these firms possess distinct advantages that enable them to navigate the complexities of government procurement effectively. These advantages might include well-established networks or connections within governmental or administrative entities, akin to political connections. Such relationships can grant preferential access to critical information, decision-makers, or resources, providing a strategic edge in the bidding process. Additionally, firms with prior government contracts often acquire procedural expertise and institutional knowledge, which enhance their ability to meet regulatory and operational requirements. This familiarity with procurement processes allows them to identify and capitalize on new opportunities efficiently, including environmentally focused or green procurement initiatives. On the other hand, while these advantages can boost a firm's competitiveness, they raise concerns about fairness and inclusivity. The preferential positioning of firms with prior contracts may inadvertently disadvantage smaller or newer firms, restricting their ability to compete and potentially undermining the core principles of equity, transparency, and accessibility in green procurement.

2.3 Consequences of Green Government Contracts

Studies explore the role of government customers (not related to green contracting per se) in shaping supplier firms' financial outcomes and operational environments. For example, Dhaliwal et al. (2016) conclude that firms with a concentrated government customer base experience lower equity costs. Cohen and Li (2021) further establish that government customer concentration enhances profitability (see also Patatoukas 2012).[5] In contrast, Cohen and Malloy (2016) find that government contracts adversely affect suppliers' fundamentals by limiting investments in physical and intellectual capital and constraining future sales growth. More closely related to our study, Even-Tov et al. (2025) document that supplier firms with substantial exposure to government procurement opportunities exhibit improvements in voluntary climate-related disclosures as well as reductions in toxic emissions and increased development of green products. In a related study, Kim et al. (2025) conclude that firms from countries requiring mandatory environmental disclosure are more likely to secure higher-value procurement contracts from foreign governments compared to firms in countries without such regulations.

In the GPP setting, we primarily examine the *environmental impacts* of green contracts on supplier firms. First, we investigate whether supplier firms that obtain green contracts exhibit subsequent *reduction* in CO_2 *emissions*. Not only can governments reduce information asymmetries regarding their innovation demands by issuing well-defined green procurement tenders but also due to the large scale of GPP, governments can create a sufficient market size, enabling supplier firms to achieve early economies of scale and accelerate the amortization of their innovation investments. This market-driven mechanism can

[5] Research also underscores the informational and monitoring advantages associated with government contracts (e.g., Hope, Jiang, and Vyas 2021; Cohen, Li, Li, and Lou 2022; Chircop et al. 2024).

enhance supplier firms' environmental practices and reduce environmental harm (Krieger and Zipperer 2022).

Companies with green contracts also face heightened scrutiny from the media, investors, and stakeholders regarding their environmental performance. This external attention, coupled with stakeholders' increased expectations, creates pressure for firms to meet government environmental standards. As a result, corporate management may be more likely to prioritize environmental factors in decision-making, aiming to align with stakeholder expectations and improve overall environmental performance (Clarkson, Li, Richardson, and Vasvari 2008).[6] Accordingly, we examine whether supplier firms with green contracts exhibit *greater environmental responsibility*. Specifically, we consider whether they exhibit greater *product responsibility* (i.e., whether their product choices and quality are more customer and environmentally conscious) and whether they rejig their supply chains to *terminate relationships with partners that do not meet environmental criteria*.

Lastly, we also test whether the awarding of green procurement contracts creates a potential trade-off between environmental efforts and financial outcomes. Specifically, we investigate whether heightened environmental scrutiny and the corresponding pressure to adopt sustainable practices affect firms' financial performance, measured by return on assets (*ROA*).

3. Data and Methodology

3.1 Government Contracts Data

We obtain government contracting data from TenderAlpha, a provider of global procurement data, tracking both general and green procurement. This dataset includes over 85 million contracts overall and

[6] These arguments relate at least indirectly to the body of research focusing on the political costs faced by government suppliers. Watts and Zimmerman's (1986) political-cost hypothesis predicts that firms that are subject to government scrutiny often take actions to deflect or preempt potential negative government actions that can result in increased political costs. Extending this to the public procurement setting, Mills, Nutter, and Schwab (2013) find that politically sensitive firms pay higher federal taxes. Karpoff, Lee, and Vendrzyk (1999) show that public revelations of government supplier fraud are typically associated with significantly negative stock returns. Hadley (2016) observes that CEOs of politically sensitive suppliers receive lower compensation compared to those of less politically sensitive suppliers.

4.5 million green contracts awarded across more than 50 nations. Each record identifies the contracting agencies and firms, specifies their geographic locations, and details award dates, and total monetary values in U.S. dollars. TenderAlpha also categorizes contracts using industry codes and includes ISINs for publicly listed firms, allowing integration with Worldscope. Our sample encompasses contracts issued between 2010 and 2023.

TenderAlpha classifies green contracts through a three-pillar methodology. First, it uses industry codes to identify goods and services that meet the criteria to be a green contract, capturing products that are energy-efficient or have reduced negative impact on the environment. Second, it applies keyword analysis to key sections of the tender documents that capture the nature and description of the contract. It then selects by key environmental terms such as “emission” and “pollution” as well as specific known pollutant names. Third, TenderAlpha evaluates contracts based on their compliance with sustainability standards and regulations. For example, for the EU sample, they incorporate the EU's GPP criteria, which offer voluntary guidelines for environmentally sustainable practices. For U.S. sample firms, the database references environment-related clauses from the U.S. Federal Acquisition Regulation (FAR). By using the TenderAlpha data, we are able to employ a large panel sample that is generalizable and where we can also explore heterogeneity across institutional and country-level factors.

3.2 Firm-Level and Country-Level Data

We obtain firm-level financial data from Worldscope, and environmental and institutional ownership data from Refinitiv. We obtain direct GHG emissions, product responsibility scores, and environmental supply-chain changes data from Refinitiv. We use BoardEx for data on firm board members and connect this to data on government agency individuals provided in TenderAlpha. Additionally, we gather data on sustainability-linked loans following Carrizosa and Ghosh (2022) and Kim, Kumar, Lee, and Oh (2022) as well as data on sustainability-linked bonds from Flammer (2021) and Kölbel and Lambillon (2022).

We acquire data on countries with mandatory environmental disclosures from Lin, Shen, Wang, and Yu (2024).[7] For country environmental sensitivity, we use the Environment Performance Index data provided by Block et al. (2024) and Yale University.[8] See Appendix A for detailed variable definitions and data sources.

3.3 Variable Measurement and Research Design

We break down our analyses into three sections. First, as our paper is the first to provide an insight into worldwide green procurement contracts, we begin by providing stylized facts about the data in our sample. Second, we investigate determinants for being awarded green contracts. Third, we assess outcomes of green contracting for firms.

3.3.1 Determinants of Green Contracts

Regarding our second research objective, we estimate the following OLS model for determinants of green procurement contracting:[9]

$$GPP_{i,t+1} = \alpha + \beta_1 Political\ Connections_{i,t} + \beta_2 CO2_{i,t} + \beta_3 Other\ Procurement\ Experience_{i,t} + \beta_4 Firm\ Characteristics_{i,t} + \gamma Industry\ FE + \delta Country\ FE + \lambda Year\ FE + \varepsilon_{i,t+1} \quad (1)$$

The dependent variable *GPP* is one of two measures, *GPP Indicator* and *GPP Size*. *GPP Indicator* is an indicator variable equal to 1 if a firm has green procurement contracts, and zero otherwise. *GPP Size* is the natural logarithm of the dollar value of all green procurements a firm has been awarded. As firm-level variables are reported at the end of the year, we use one-year forward measure for *GPP* so that we can capture what is observed during the procurement process. As described in Section 2.2, we employ

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[7] See https://github.com/jar-es-disclosure/global-es-disclosure
[8] See https://epi.yale.edu/
[9] Sections 4.4 and 4.5 provide a number of robustness tests, including alternative regression specifications.

three determinant variables, *Political Connections*, *CO2* (i.e., negative environmental externalities), and *Other Procurement Experience.*

Political Connections is an indicator variable equal to one if the firm has at least one board member who currently holds or previously held an appointment in a government agency from the contract-awarding country, and zero otherwise. Cumming et al.(2024) show that politically connected firms are more likely to secure general government procurement contracts. Building on such evidence, the normative expectation in our setting is also that *GPP* should be positively associated with *Political Connections*. However, due to the heightened scrutiny, complexity, and greater expectations of fairness as it relates to green contracts versus general purpose procurement contracts, in our setting, it is possible that *Political Connections* should *not* matter or not matter as much (i.e., there may be a departure from the norm of political connections playing a key factor in securing procurement contracts).

To measure *negative environmental externalities*, we use *CO2,* defined as a firm's natural log of direct GHG emissions (i.e., Scope 1 emissions) as provided by Refinitiv. A firm's CO_2 emissions capture the direct negative impact that its operations have on the environment. Our aim is to select a metric that effectively captures the negative environmental externalities governments can measure and target for transformational change, while remaining free from rating biases (e.g., Berg, Fabisik, and Sautner 2021). We expect *CO2* to be positively related to *GPP* if governments aim to *incentivize* firms with weaker environmental records to enhance their environmental practices and innovation.

Other Procurement Experience is an indicator variable that equals one if the firm has any other government procurement contract in year *t*, and zero otherwise.[10] Firms with such contracts may leverage established networks, procedural expertise, and familiarity with regulatory processes to navigate

[10] In untabulated analyses, we evaluate two alternative specifications of *Other Procurement Experience*. Specifically, we redefine the indicator variable as equal to one if the firm has any other government procurement contract in year t or t–1 (and zero otherwise), and alternatively, as one if the firm has such a contract at any time between year t and t–2 (and zero otherwise). Our inferences remain robust under both specifications.

procurement complexities, enhance compliance, and increase competitiveness. This experience can also help firms identify and capitalize on new opportunities, including green procurement initiatives. Therefore, we expect *Other Procurement Experience* to be positively associated with GPP.

We address otherwise potential correlated omitted variables in our empirical analyses in the following ways. First, we include a vector of control variables motivated by extant research (e.g., Samuels 2021; Cummings et al. 2024). *Firm Characteristics* captures other firm-level variables shown to be correlated with government contracting, including firm size (*Size*), the book-to-market ratio (*BM*), profitability (*ROA*), stock-return volatility (*Volatility*), annual stock returns (*Return*), financial leverage (*Leverage*), tangibility of assets (*Tangibility*), dividends (*Dividends*), and institutional ownership (*Institutional Ownership*). Appendix A provides variable definitions.

Second, we include industry, country, and year fixed effects. Industry fixed effects control for unobservable time-invariant differences across industries, allowing us to estimate the effect of within-industry associations between our variables of interest. Country fixed effects achieve the same objective but within-country of the firms being awarded the contracts. The year fixed effects control for common time-varying factors, such as macroeconomic conditions. Together, they help control for several unobservable variables that may be associated with a firm obtaining a green contract. We assess the completeness of our controls and fixed effects in Section 4.5.

Third, similar to other research on general government contracts (i.e., not on green contracts per se), we do not observe firms that bid for a green procurement award but do not get one, nor firms that never applied. Accordingly, we employ entropy balancing with matching up to the third moment. This approach controls for observable confounding variables by ensuring that the treatment and control groups are balanced across the firm-level covariates used in our regressions. It also allows for estimating the effect of the independent variables on *GPP* while accounting for the entropy-balanced weights, resulting in more robust inferences.

Finally, we regress our dependent variable, *GPP,* in year *t+1* on test and control variables from year *t*. This temporal separation helps address the possibility of reverse causality and strengthens the validity of *Political Connections*, *CO2*, and *Other Procurement Experience* as determinants in securing green contracts. While none of the four steps we take individually address all sources of endogeneity, the combination of the four, we believe, should mitigate a major portion of potential endogeneity.[11]

3.3.2 Consequences of Green Contracts

To examine the potential environmental consequences of green contracts on supplier firms, we estimate the following OLS regression model:

$$\textit{Environmental Outcome}_{i,t+n} = \alpha + \beta_1 \textit{GPP Indicator}_{i,t} + \beta_2 \textit{Firm Characteristics}_{i,t} + \gamma \textit{FE Term} + \lambda \textit{Year FE} + \varepsilon_{i,t+n} \quad (2)$$

We measure the dependent variable*, Environmental Outcome,* using three variables that capture greater environmental responsibility by firms: *Change in CO2, Change in Product Responsibility Score*, and *Change in Environmental Supply Chain Partnership Termination. CO2* measures the supplier firm's CO_2 emissions as previously defined. *Product Responsibility Score* measures the supplier firm's capacity to produce goods and services that are sustainable, safe, and ethically produced. We expect that if GPP is an incentive in promoting more environmentally responsible products or services, there should be an improvement in this score following a GPP contract. Lastly, *Environmental Supply Chain Partnership Termination* gauges the supplier firms' readiness to terminate a supplier relationship if environmental criteria are not met. We expect a positive association between GPP and changes in this variable. If so it would suggest that subsequent to GPP contracts supplier, supplier firms are more inclined to sever ties with suppliers failing to meet environmental criteria.

[11] In Sections 4.4 and 4.5 we conduct several robustness tests.

We evaluate changes in each of these variables in both levels and percentages, using levels when we use a firm fixed effects model and using percentage changes when we use an industry and country fixed-effects model. The *FE Term* in equation (2) varies as a result: it implies firm fixed effects when we use levels, and industry and country fixed effects when we use percentage changes. The changes are assessed between time t and t+2 or t+3, as well as between time t and the average of t+2 and t+3. We skip time t+1 as we believe such meaningful real changes should take a non-trivial amount of time to manifest fully. We regress *Environmental Outcome* on *GPP Indicator* in year *t*. If green contracts are effective in curbing supplier firms' negative environmental impact and incentivizing positive environmental practices, then we expect the coefficient on *GPP Indicator* to be negative for *Change in CO2* and positive for *Change in Product Responsibility Score* and *Change in Environmental Supply Chain Partnership Termination.*

To assess whether green procurement contracts relate to changes in financial performance, we adopt a similar OLS regression model to equation (2). Specifically, we estimate the model using *ROA* as the dependent variable to gauge whether a shift toward more environmental focus from GPP contracting affects supplier firms' profitability.

3.3.3 Predicted Cross-Sectional Variations

To examine heterogenous effects and also to further address potential endogeneity, we conduct cross-sectional analyses for each of *Political Connects*, *CO2*, and *Other Procurement Experience*. Political connections influence contracting in two ways: they can smooth the contracting process, increasing the probability of securing a contract, or they can unfairly advantage firms with political ties over other bidders. We expect political connections to matter less when governments contract with firms from countries close to their environmental targets, as indicated by a high *Country EPI.*[12] This is because,

[12] *Country EPI*, derived from Yale University's Environmental Performance Index, assesses a nation's progress toward its environmental policy targets, reflecting the effectiveness of its institutional frameworks in achieving these goals. This variable is measured for the supplier firm's country.

bidding firms from such countries are likely to have stronger environmental knowledge, reducing information asymmetry and the need for relationship-based contracting.

Next, for the impact of negative environmental externalities, we expect that in countries with a mandatory environmental disclosure regime, *CO2* plays a greater role in securing green contracts. This is because a mandatory disclosure regime enhances the reliability of disclosed information compared to voluntary disclosures, allowing governments to more confidently rely on the disclosed information when awarding contracts to firms with CO_2 emissions *Mandatory Environmental Disclosure,* obtained from Lin et al. (2024), is a country-level indicator variable equal to one if the country that the firm is headquartered in has a mandatory environmental disclosure regime, and zero otherwise.

Additionally, for CO2, we examine whether its effect varies across different GPP categories. If governments use GPP to incentivize environmental improvements, we expect negative externalities to play a greater role for firms in strategically important categories. Governments may prioritize higher-emitting firms in areas with the greatest potential for environmental gains. To capture this strategic relevance while mitigating measurement errors, we apply Principal Component Analysis (PCA) to the eight categories of GPP.[13] The resulting PCA-based indices represent two continuous measures of strategic environmental content, with higher values indicating greater firm involvement in high-priority environmental procurement areas. We also investigate whether the effect of *CO2* is moderated by other environmental monitoring mechanisms, such as relationships with sustainability-oriented lenders, who may already impose environmental expectations. In such cases, the need for GPP to incentivize improvements may be diminished. *Green Monitor* is a firm-level indicator variable, equal to one if the firm has a sustainability-linked loan or bond

[13] PCA is well-suited for this context, as the eight GPP categories may capture overlapping dimensions of environmental objectives. By summarizing the underlying correlation structure among these variables, PCA enables us to reduce the dimensionality of the data while preserving its informational content and addressing potential multicollinearity concerns in the analysis.

Lastly, regarding *Other Procurement Experience*, we expect the relation with securing a green contract to be weaker for domestic firms compared to foreign firms. While firms with other procurement experience are generally more likely to secure green contracts, this effect is plausibly diminished for domestic firms that have easier access to procurement process information and local networks. Conversely, foreign firms face higher information asymmetry, making procurement experience more critical for securing a GPP contract. We define *Domestic GPP* as equal to one if the contracting firm is headquartered in the same country as the contracting entity, and zero otherwise.

4 Empirical Results

4.1 Stylized Facts and Summary Statistics

A primary goal of this study is to provide descriptive empirical evidence on firms that successfully secure GPP with governments around the world. In line with this purpose, we begin our empirical investigation with a trend analysis of the GPP dataset by TenderAlpha. Specifically, Figure 1 illustrates the evolution of GPP over time, capturing both the total value (in billion USD) and the number of GPP contracts (in thousands). Notably, we observe a clear upward trend in GPP adoption, both in terms of monetary value and contract volume, particularly from 2016 onward. The figure reveals a sharp rise in the number of green contracts, reaching a peak in 2020. However, the number of contracts stabilizes after 2020. Similarly, the total value of GPP exhibits a strong growth trajectory, with a marked acceleration between 2016 and 2020. The peak in 2020, where the total GPP value surpasses USD 6 trillion, indicates a significant shift in procurement spending toward sustainability. After 2020, while the GPP value fluctuates, it remains substantially higher than pre-2016 levels. Overall, the trends observed in Figure 1 underscore the substantial transformation in public procurement strategies and the growing importance of GPP as a governmental tool to promote environmental impact.

In Figure 2, we explore the variation in GPP across *countries that award green contracts*.[14] Panel A presents the cumulative value of GPP, while Panel B displays the cumulative number of GPP contracts. The maps show that while the U.S. exhibits the highest *number* of GPP contracts (as expected), the U.K. leads in terms of the *value* of GPP contracts awarded. his geographic variation in both the value and number of GPP contracts highlights the variations in the adoption of green procurement practices globally, which are influenced by differing national policies, institutional frameworks, and environmental goals.

For our empirical analyses, we utilize a panel dataset covering the period from 2010 to 2023. This dataset includes 27,173 firm-year observations across 82 firm-headquarter countries where firms awarded tender contracts are headquartered.[15] Our final sample is composed of the intersection of firms covered by both Worldscope and Refinitiv.

Table 1 presents the distribution of observations by year, firm-headquarter country, and industry. Panel A highlights a steady increase in firms awarded GPP contracts, rising from 150 in 2010 to 449 in 2021, followed by a slight decline in 2022. This upward trend reflects the growing policy focus on sustainable procurement and the increasing significance of GPP. Leveraging the comprehensive TenderAlpha dataset, we further examine the composition of GPP contract *types*. The most frequently adopted categories include Eco-Regulation and Energy and Resource Efficiency, while Eco-Labels procurements remain less common.

[14] This figure is purely descriptive in nature and provides an overview of the countries that provide GPP, as per the raw data. Countries awarding GPP contracts have an extremely large range of values for contract size. To provide meaningfulness to the visual scale, we plot only the 50 highest-ranking countries that award green contracts in terms of contract size This is done to highlight both the dominant countries for GPP contracting and how these countries compare against each other in terms of contract size.

[15] As we use a one-year lag in our empirical analyses, the final year for the independent variables is 2022.

Panel B presents the distribution of the sample by firm-headquarter country, highlighting a diverse set of nations. The United States has the highest representation, followed by the United Kingdom, Japan, and China. Finally, Panel C presents the industry distribution of the sample based on the Fama-French 30 classification. The industries with the highest representation include Banking, Insurance, Real Estate, Trading, and Business Equipment. Among firms awarded GPP contracts, Business Equipment remains a key sector, while Personal and Business Services represents the most frequently awarded industry.

Panel A of Table 2 presents the descriptive statistics for all variables used in our analyses. In our sample, 14% of firms hold green contracts. On average, a firm has approximately one government contract and 0.26 green contracts, though the median firm has none. The average dollar value of a green contract is USD 7.4 million.[16]

Focusing on our determinant variables *Political Connections*, *CO2*, and *Other Procurement Experience*, 7% of sample firms have political connections in the countries where they secure contracts. The mean *CO2* value of 10.5 corresponds to an average of 36,315 metric tons of CO_2 emissions per firm. Moreover, 31% of sample firms are existing contractors (i.e., hold general government procurement contracts). These statistics suggest that while political connections are relatively uncommon in our sample, prior procurement experience is more prevalent.

Regarding firm-level controls, the average firm has an institutional ownership percentage of 30%, reflecting the international nature of the sample and the wide range of firm sizes.[17] The mean of *Mandatory Environmental Disclosure* is 0.36, indicating that 36% of sample firms fall within country-years where environmental disclosures are mandatory. The mean *Country EPI* index score of 57.37 suggests a moderately high sensitivity to environmental issues across the sample countries.

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[16] Note that several variables (as defined in Appendix A), are in natural log format, including the value of green contracts. We present the antilog versions for readability and ease of interpretation in the texts. For the log values, please refer to the corresponding tables.

[17] The average firm has a log size of 8.79, book-to-market ratio of -0.67, ROA of 5%, leverage of 0.25, tangibility of 0.30, return of 14%, return volatility of 25.96%, and pays dividends of 0.34 per dollar of net income.

Lastly, for our outcome variables, the mean firm has a *Product Responsibility Score* of 0.57, denoting a moderately high average product quality in this metric. The mean of 0.27 for *Environmental Supply Chain Partnership Termination* suggests that 27% of the firms in our sample terminate their relationships with suppliers who do not meet environmental criteria during the sample period.

Panel B of Table 2 provides Pearson correlations. *GPP Indicator* is highly correlated with procurement value, *GPP Size* (*r* of 0.94. As a result, we discuss the correlations of all other variables with *GPP Indicator* only. *Political Connections* shows a strong positive correlation with *GPP Indicator* (r = 0.67). Similarly, *Other Procurement Experience* has a strong positive correlation of 0.56 with *GPP Indicator*. *CO2* exhibits a positive correlation of 0.13 with *GPP Indicator*. Overall, these findings provide preliminary empirical support for the importance of these determinants of green contracting.[18]

4.2 Results – Determinants of Green Contracts

Table 3 presents the results for the determinants of securing green contracts. Panel A documents the results for the *probability* of a green contract being awarded (*GPP Indicator)* using a linear probability model, while panel B reports the results for the *value* of green contracts awarded (*GPP Size)*. Column 1 reports the results without any fixed effects, while Column 2 reports the results with year, industry, and country fixed effects included. We present both to show the robustness of the relation with the test variables with or without fixed effects.

In Panel A, *Political Connections*, *CO2* (i.e., negative environmental externalities*)*, and *Other Procurement Experience* show a significant positive association with *GPP Indicator* across both specifications. Focusing on Column 2, the coefficient estimate on *Political Connections* is positive and

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[18] *BM* is negatively correlated (*r* = 0.10), *Tangibility* is also negatively correlated (r = -0.12), *Return* has a negative correlation of -0.01, *Volatility* is negatively correlated (*r* = -0.15) and *Dividend* is positively correlated (*r* = 0.03).
Size and *ROA* have moderate positive correlations with *GPP Indicator* (r = 0.16 and 0.02, respectively), indicating that larger firms and more profitable firms are more likely to engage in green procurement, while leverage shows no significant relation. *Institutional Ownership* is also positively correlated with *GPP Indicator* (r = 0.17).
For the cross-sectional variables*,* while *Domestic GPP* and *Country EPI* exhibit a positive correlation with *GPP Indicator* (r = 0.78 and 0.21, respectively), *Mandatory Environmental Disclosure* exhibit a weak negative correlation (r = –0.04).

statistically significant (0.463, 1% level), suggesting that *Political Connections* increases the chance by 46.3% of securing a green contact in the following year. The coefficient estimate on *CO2* is positive and statistically significant (0.014, 1% level), indicating that a one percent increase in CO_2 emissions is associated with a 1.4% increase in the probability of securing a green contract. For our mean firm, this means that the probability of securing a green contract would increase from 14% to 15.5%. The coefficient estimate on *Other Procurement Experience* is positive and statically significant (0.443, 1% level), implying that existing supplier firms have a 44.3% higher probability of securing a green contract in the following year.

Column 2 of Panel B provides evidence that firms with political connections have contracts that are 7.9 times larger than the size of firms without political connections (6.980, 1% level).[19] Consistent with Panel A, a 1% increase in CO_2 emissions is associated with an increase of 30.1% in contract size (0.301, 1% level). Finally, *Other Procurement Experience* shows significant positive association (6.185, 1% level), highlighting that prior contracting experience with the government can increase the contract size by 7.2 times more than not having prior experience.

These findings indicate that despite the perception that green contracts are be more ethical and less influenced by political ties, political connections play an important role in both winning contracts and in contract size in the green contracting setting. Prior contracting experience with the government also plays a crucial role, as it provides familiarity with the bidding process and relationship-building, enhancing competitiveness and competence. CO_2 emissions also play a factor in both winning contracts and contract size, as governments may target net emitters to stimulate operational changes. This aligns with and extends

[19] We note that our sample comprises of both firms that have GPP and firms that do not. When interpreting coefficients for variables such as *Political Connections* where contract size is the outcome, the comparison is against both firms that have GPP but no political connections, *and* firms that *do not* have GPP and do not have political connections. Hence, the size difference is much more pronounced in this *unconditional* comparison than it would be in a conditional comparison isolated for firms that have GPP. This qualifier applies to other variables such as *Other Procurement Experience*, *CO2*, etc.

the findings of Huang (2024) who shows that firms awarded green contracts subsequently invest in pollution abatement.

In Table 4, we explore cross-sectional variations as discussed in section 3.3.3 to examine whether our cross-sections of interest bifurcate the primary results. In Column 1 of Panel A, we observe that while firms with political connections are more likely to obtain green contracts, the likelihood significantly decreases if the country in which they are located has higher than median *Country EPI* (-0.364, 1% level).[20] This suggests that when a firm with a political connection is from a country with high *Country EPI*, political connections matter 36.4% less than they would otherwise. *Country EPI* provides a "a gauge at a national scale of how close countries are to established environmental policy targets" (Block et al. 2024). The relation with contract size, in Column 2, is also significant and negative (-4.338, 1% level), suggesting that the interaction of the two variables is associated with a five-fold decrease in contract size. Overall, these findings suggest that relationship-based contracting matters less for green contracting when information frictions are lower, as the contracting country can have greater confidence in the environmental knowledge capital of the company they are contracting with.

Consistent with the argument that mandatory disclosures increase the reliability of emission disclosures, the results in Columns 1 and 2 suggest that when contracting firms are headquartered in a country with *Mandatory Environmental Disclosure* and have high *CO2*, they are 0.9% more likely to secure a GPP contract (0.009, 1% level) and contract sizes are likely to be 15.8% larger (0.158, 5% level), respectively.

In Panel C, we study whether governments strategically allocate GPP to incentivize improvement in high-priority environmental areas. To capture the environmental content of the awarded contracts, we use

[20] Consistent with the EPI guidelines, the EPI scores are not suitable for constructing a time series due to changes in underlying methodology and data across releases and have to be treated as a time-invariant variable. Consequently, the main effect of *Country EPI* is absorbed by the country fixed effects.

exploratory Principal Component Analysis (PCA) to the eight GPP categories. This statistical technique, which we use to build variables that summarize the observable information in contracts, is useful to reduce measurement errors and avoid multicollinearity. Appendix B presents the details of this analysis.[21] The principal component output shows that only two factors associated with GPP categories have an eigenvalue greater than 1. However, while these factors explain 41.55% of the variation in these characteristics, the first component describes 24.60% of the variation. Hence, for robustness purposes, we build two indices: GPP $\text{Contract}_{\text{FPC}}$, based on the first principal component, and GPP $\text{Contract}_{\text{WAE}}$, a weighted average of the two components with eigenvalues above 1.

Consistent with our expectations, we find positive and statistically significant interaction estimates between *CO2* and both indices. Specifically, when contracting firms have high *CO2* and a higher value of GPP $\text{Contract}_{\text{FPC}}$ (GPP $\text{Contract}_{\text{WAE}}$), they are 10.0% (16.4%) more likely to secure a GPP contract (0.100, 5% level; 0.164, 1% level). These findings support the notion that governments are more likely to engage higher-emission firms when the potential for environmental impact—given the content of the contract—is greatest.

In Column 1 of Panel D, we see that when contracting firms have either a sustainability-linked bond or loan and have high *CO2*, they are 1.7 % less likely to secure a GPP contract (-0.017, 1% level). However, in Column 2, we find a negative but statistically insignificant coefficient for the interaction term. Overall, these results provide partial evidence for our argument that the presence of other green monitors reduces the need for governments to engage using GPP with large emitters.

In Panel E, we explore if firms being headquartered domestically reduces the importance of other procurement experience in securing green contracts. Column 1 documents that *Domestic GPP* intersected with *Other Procurement Experience* has 38.3% lower probability than non-domestic firms with other

[21] To evaluate the adequacy of our sample for PCA, we compute the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. The conventional threshold is 0.600. Our measure is 0.636, so we conclude that our sample is adequate for PCA

procurement experience in securing a green contract (-0.383, 1% level), and Column 2 reports that contract size is also smaller by around 4.4 times (-3.434, 1% level). The findings are consistent with our argument that when firms are headquartered domestically, there is less information asymmetry regarding the local procurement process and so other procurement experience should matter less than when firms are located outside the contracting country.

4.3 Results – Consequences of Green Contracts

In this section, we shift our attention to evaluating potential outcomes of green procurement contracting. In Table 5, we investigate whether firms granted green procurement contracts show subsequent reduction in CO_2 emissions. We use two different models – one with a firm and year fixed-effects model in Columns 1 to 3 that examines a change in CO_2 levels (using firm fixed effects demeans the dependent variable), and then with an industry and firm headquarter country fixed-effects model in Columns 4 to 6 that examines the percentage change in CO_2 emissions. In Columns 1 and 4, we compare emissions in time t+2 to time t. In columns 2 and 5, we compare emissions in time t+3 to time t. In Columns 3 and 6, we compare the average of emissions in t+2 and t+3 to time t. The coefficient is negative across all specifications and is significant across 4 of the 6 specifications. These findings suggest that firms with green contracts exhibit a *decrease* in their subsequent CO_2 emissions. For example, in Column 3 (with year, and firm fixed effects included), the coefficient estimate on *GPP Indicator* is negative and significant (-0.123, 5% level), suggesting that adoption of green procurement contracts is associated with a 12.3% reduction in CO_2 emissions from time *t* to the average over *t+2* and *t+3*, which is economically meaningful. These results are particularly salient for policymakers who may be looking to validate their green contracting model and objectives.

In Table 6, we consider whether firms with green contracts exhibit an increase in future *Product Responsibility Score*. We obtain these data from Refinitiv. We again use two different models – one with a firm and year fixed-effects model in Columns 1 to 3 that examines a change in *Product Responsibility*

Score levels, and then with an industry and firm headquarter country fixed-effects model in Columns 4 to 6 that examines the percentage change in *Product Responsibility Score*. We find some evidence that firms increase their product responsibility following entering GPP contracts. The coefficient is positive across all 6 columns and significant at the 10% level in Columns 5 and 6. The results show some association that after adopting green contracts, firms may enhance their products to be more customer-conscious and environmentally responsible.

In Table 7, we investigate whether contracting with the government leads to changes in the contracting firms' supplier chain. Specifically, if contracting with the government incentivizes contracting firms to improve their environmental processes and sourcing, we expect contracting firms to shift away from suppliers who are not environmentally conscious or compliant. As such, we expect the relations with future *Environmental Supply Chain Partnership Termination* to be positive. In Columns 1 and 3, we compare the change from time t to time t+2 and in Columns 2 and 4, we compare the change from time t to time t+3. The coefficient estimate is positive across all four columns and significant in Columns 1 and 3, suggesting that firms make most significant changes in time t+2 and some moderate changes in t+3. For example, the coefficient of 0.031 in Column 1 suggests that in the second year after taking on a GPP contract, the contracting firm is 3.1% more likely to terminate a contract with a supplier that is not environmentally compliant. These findings suggest that GPP contracts can encourage supplier firms to reassess their supply chains and discontinue partnerships that hinder environmentally sustainable choices. This represents a significant realized benefit of GPP contracts, particularly from the perspective of a government body aiming to drive such changes. Overall, our results suggest that green procurement contracts are positively associated with reducing firm behavior that may negatively impact the environment. [22]

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[22] In untabulated analyses, we explore additional realized benefits that are specifically tied to certain categories of GPP contracts. Specifically, we find that firms receiving GPP contracts related to Biodiversity and Agricultural Preservation are

In Table 8, we examine whether the award of GPP relates to changes in financial performance, measured using *ROA*. This analysis investigates whether GPP contracts create a potential trade-off between environmental efforts and financial outcomes. While Columns 1 and 3 report negative but statistically insignificant coefficients when comparing *ROA* between year t+2 and t, we find a negative and statistically significant association in Columns 2 and 4 when examining changes between year t+3 and t (–0.004 and –0.003, both at the 10% level).

4.4 Difference-in-Differences Analyses

Although we include control variables and fixed effects motivated by relevant research and conduct cross-sectional analyses, a potential concern is that the awarding of green contracts may be influenced by unobserved factors correlated with a firm's environmental performance, raising potential issues of self-selection, reverse causality, and identification bias. To mitigate these challenges, we perform difference-in-differences (DID) analyses around the passage of the 2018 EU Renewable Energy Directive (RED II). Specifically, the Directive's implementation represents an exogenous regulatory shock across EU Member States (i.e., a subset of our overall sample), which increases reliance on renewable sources and driving demand for renewable-related procurement in the EU. This policy shift serves as a natural experiment to assess the causal impact of green contract awards on supplier firms' environmental performance.

We identify the treatment sample as the subset of firms that were awarded at least one GPP contract in both the pre- and post-RED II periods and whose contracts are specifically related to renewable energy, energy/resource efficiency, life-cycle costing and environmental impact analysis, or emissions and toxicity reduction. We implement the DID model across two alternative specifications. We use a broad control group consisting of all firms that do not meet the treatment criteria (Columns 1 and 2 of Table 9) and

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more likely to publish a Sustainability Report with global activities in year t+3. In addition, firms awarded Reduction of Emissions Toxicity GPP contracts are more likely to conduct supplier ESG training in year t+2.

entropy balancing (EB) up to the third moment on control variables used in the regression on the pre-treatment year (Columns 3 and 4 of Table 9).

Table 9 report the results across both specifications. These results verify the parallel-trends assumption in Figure 3. Our coefficient of interest is POST×TREAT, which captures the differential change in CO_2 emissions for treated firms following the implementation of RED II. Consistent with our expectations, we find that treated firms reduce their emissions significantly more than control firms in the post-RED II period. The results are statistically significant and robust across specifications.[23] These findings provide further support to our primary findings.

4.5 Other Robustness Checks (Untabulated)

We conduct a series of robustness checks to ensure the validity of our findings. First, given the heterogeneous nature of our sample, which spans multiple countries, we assess whether the presence of underrepresented countries affects our results. To do so, we re-run our main analyses while imposing two arbitrary thresholds—a minimum of 50 and 100 observations per country across the sample. In both cases, our inferences remain unchanged.

Second, while our primary analyses rely on entropy balancing to improve covariate balance, we verify the robustness of our results by conducting the main tests *without* sample matching. The results remain consistent, implying that our inferences are not driven by the matching procedure.

Third, to further assess the robustness of our findings, we examine the potential influence of omitted variable bias using the Impact Threshold for a Confounding Variable (ITCV) approach. The ITCV estimates for our three key determinants indicate that an omitted variable would need to exhibit a product of correlations with both the dependent and independent variables well beyond those observed for the strongest included controls to overturn our conclusions. Specifically, we follow Larcker and Rusticus

[23] In untabulated tests, we find robust results using difference-in-differences model with dynamic treatment as well.

(2010) and compare the thresholds with the product of partial correlations that each control variable has with the dependent and the independent variables. Among all existing control variables, *BM* and *Tangibility* consistently have the largest products of partial correlations; however, they are always smaller than our key determinants' estimates. This suggests that omitted variable bias is unlikely to affect our inferences.

Fourth, to address the possibility that our inferences are affected by winsorization, we re-run all main tests without winsorizing any variables. Inferences are unaffected.

Fifth, we re-estimate our main determinants analysis by including both *CO2* and the Refinitiv *E Score* to jointly account for negative and positive environmental externalities. While *CO2* captures measurable negative environmental externalities that governments may aim to target for transformational change, the *E Score* reflects firms' positive environmental efforts but is subject to potential measurement and rating bias (e.g., Berg, Fabisik, and Sautner 2021). The *E Score* does not load strongly in the regressions. Nevertheless, its inclusion alongside *CO2* does not alter the inference of our key test variables, further supporting the robustness of our conclusions.

Finally, we confirm that our baseline test for determinants yields consistent results when estimated using a logit specification, both with and without year fixed effects. Collectively, these tests reinforce the robustness of our conclusions.

5. Conclusion

Market inefficiencies, including demand uncertainty, information asymmetry, and externalities, often deter firms from investing in environmentally responsible practices at socially optimal levels. GPP has emerged as a strategic policy instrument to address these challenges by leveraging government purchasing power to promote environmental responsibility among supplier firms. Unlike traditional procurement, which prioritizes cost efficiency and regulatory compliance, GPP integrates sustainability criteria to incentivize green innovation and pollution reduction. Despite GPP's considerable economic scale and its pivotal role in advancing sustainable development, existing literature provides limited large-scale empirical analysis of the characteristics of supplier firms engaged in GPP projects and the resulting impact on their environmental performance. This study seeks to address this gap by providing the first large-sample, multi-country empirical analysis of supplier firms participating in green procurement contracts. Specifically, the objective of this study is threefold. First, as this study represents the first comprehensive examination of global green procurement contracts, we begin by presenting stylized facts derived from our sample. Second, we analyze the factors influencing the likelihood of firms being awarded green contracts. Finally, we assess the impact of green contracting on supplier firms' environmental performance and outcomes.

Our descriptive statistics reveal a marked increase in the adoption of GPP, both in terms of contract volume and monetary value, especially from 2016 onward. This trend underscores the increasing significance of GPP as a strategic instrument for integrating environmental sustainability into government procurement policies. Furthermore, our findings highlight notable geographic disparities in GPP adoption, reflecting variations in national policy priorities, institutional capacities, and regulatory frameworks. Countries with well-established sustainability mandates and stronger institutional support mechanisms demonstrate higher levels of GPP integration, whereas others exhibit relatively lower adoption rates, potentially due to regulatory gaps or economic constraints. In terms of contract types, energy and resource efficiency, and life-cycle costing with environmental impact analysis are the most prevalent, while biodiversity preservation and eco-label-based procurement remain less common. From an industry perspective, Communications, and Healthcare, Medical Equipment, Pharmaceutical Products Chemicals exhibit the highest representation.

Determinant analyses suggest that firms with political connections, higher levels of CO_2 emissions, and pre-existing procurement contracts are more likely to be awarded green contracts. Cross-sectional analyses further corroborate these findings, revealing significant heterogeneity in the relation between our determinant factors and the probability of obtaining green contracts. Overall, these findings contribute to the understanding of the complex dynamics that shape the allocation of green procurement contracts, highlighting the roles of political connections, environmental performance, and established relationships in influencing contract awards.

To address our third research objective, we examine the environmental consequences of GPP contracts on supplier firms. We find that the adoption of green procurement contracts is associated with a subsequent reduction in CO_2 emissions among supplier firms, highlighting the role of GPP as an effective mechanism for encouraging firms to adopt more sustainable operational practices in line with environmental policy objectives. We also find improvements in product sustainability and customer consciousness. This heightened awareness often translates into enhanced corporate social responsibility initiatives and a stronger commitment to environmental stewardship, further reinforcing the sustainable business practices of supplier firms. Last, we find a higher likelihood that supplier firms will sever relationships with suppliers that fail to meet established environmental compliance standards, emphasizes the role of GPP contracts in promoting environmental accountability throughout supply chains, ensuring that only those suppliers who align with sustainability objectives remain in business relationships.

In conclusion, our findings underscore the effectiveness of GPP as a distinct environmental policy tool for fostering sustainable development, providing insights of significant socio-economic relevance and important policy implications.

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Appendix A: Variable Definitions

Variable	Description	Source
Dependent Variables		
GPP Indicator	Indicator variable = 1 if firm has green procurement contracts	TenderAlpha
GPP Count	Ln of number of green procurement contracts	TenderAlpha
GPP Size	Ln of value of green procurement contracts (USD)	TenderAlpha
Determinant Variables		
Political Connections	Indicator variable = 1 if the firm has at least one board member who currently holds or previously held an appointment in a government agency from the same country as the source of the green procurement contract	BoardEx and TenderAlpha
Other Procurement Experience	Indicator variable = 1 if firm has other procurement contracts	TenderAlpha
CO2	Ln of direct GHG emissions	Refinitiv
Size	Ln of total assets (USD million)	Worldscope
BM	Ln of book value of CE / market value of equity	Worldscope
ROA	Net Income / Total Assets	Worldscope
Leverage	Total Debt / Total Assets	Worldscope
Tangibility	PPE / Total Assets	Worldscope
Return	Stock return compounded over the year	Worldscope
Volatility	Standard deviation of stock returns in %	Worldscope
Dividends	Dividends / Net Income	Worldscope
Institutional Ownership	Fraction of equity owned by institutional investors	Refinitiv
Cross-sectional Variables		
Country EPI	Country-specific Environmental Performance Index	Yale University
Mandatory Environmental Disclosure	Indicator variable = 1 if the firm has HQ in a country with mandatory environmental disclosure	Lin et al. (2024)
GPP $Contract_{FPC}$	Index constructed as the first principal component of the types of GPP	TenderAlpha
$Contract_{WAE}$	Index constructed as the explained variation weighted average of the principal components that have eigenvalues greater than 1	TenderAlpha
Type LCC and Environmental Impact Analysis	Indicator variable = 1 if firm has at least one green procurement contract that is classified as a delivery of product or service that has been chosen based on its environmental impact throughout its entire lifecycle	TenderAlpha
Type Biodiversity and Agricultural Preservation	Indicator variable = 1 if firm has at least one green procurement contract that is classified as a delivery of product or service that will contribute to the preservation of biodiversity and natural and agricultural resources	TenderAlpha

Appendix A: Variable Definitions (continued)

Variable	Description	Source
Dependent Variables		
Type Energy and Resource Efficiency	Indicator variable = 1 if firm has at least one green procurement contract that is classified as a delivery of product or service that makes more efficient use of energy	TenderAlpha
Type Renewable Energy	Indicator variable = 1 if firm has at least one green procurement contract that is classified as a delivery of product or service in the renewable energy field	TenderAlpha
Type Recycling and Waste Reduction	Indicator variable = 1 if firm has at least one green procurement contract that is classified as a delivery of product or service that can either be recycled or has been made from recycled materials, and that contributes to the reduction of waste	TenderAlpha
Type Reduction Emission Toxicity	Indicator variable = 1 if firm has at least one green procurement contract that is classified as a delivery of product or service that directly results in or specifically targets reducing emissions and toxicity	TenderAlpha
Type EcoLabels and International Standards	Indicator variable = 1 if firm has at least one green procurement contract that is classified as a delivery of product or service that meets the criteria of specific local and/or national Ecolabels or international standards, whose role is to promote sustainable procurement and sustainable economic development	TenderAlpha
Type EcoRegulation	Indicator variable = 1 if firm has at least one green procurement contract that is classified as a delivery of product or service that meets specific environmental legislative requirements (EU and US only)	TenderAlpha
Green Monitor	Indicator variable = 1 if the firm has either a sustainability-linked loan or a sustainability-linked bond	Dealscan and Bloomberg
Domestic GPP	Indicator variable = 1 if the firm is awarded GPP from the same country as the country of the firm's HQ	TenderAlpha and Worldscope
Outcome Variables		
Product Responsibility Score	Score reflecting a company's capacity to produce quality goods and services that are sustainable, safe, and ethically produced	Refinitiv
Environmental Supply Chain Partnership Termination	Indicator variable = 1 if the company reports ending partnership with a sourcing partner if environmental criteria are not met	Refinitiv

Appendix B: Principal Component Analysis of GPP Characteristics

Panel A: Principal Components

Contract Characteristics	Eigenvalue	Proportion of the Variation Explained	Cumulative Proportion of the Variation Explained
1st	1.968	0.246	0.246
2nd	1.356	0.170	0.416
3rd	0.970	0.121	0.537
4th	0.937	0.117	0.654
5th	**0.790**	**0.099**	**0.753**
6th	0.766	0.096	0.849
7th	0.675	0.084	0.933
8th	0.538	0.067	1.000

Appendix B: Principal Component Analysis of GPP Characteristics (continued)

Panel B: Principal Components Eigenvectors

Contract Characteristics	**First Principal Component Weights**	**Second Principal Component Weights**
Type EcoRegulation	0.059	0.742
Type LCC and Environmental Impact Analysis	0.404	-0.103
Type Biodiversity and Agricultural Preservation	0.340	0.100
Type Energy and Resource Efficiency	0.352	0.569
Type Renewable Energy	0.335	-0.056
Type Recycling and Waste Reduction	0.415	-0.1706
Type Reduction Emission Toxicity	0.458	-0.189
Type EcoLabels and International Standards	0.315	-0.191

Appendix B: Principal Component Analysis of GPP Characteristics (continued)

Figure 1: Evolution of GPP over Time in Total Value (in billion USD) and Number of GPP Contracts (in Thousands)

This figure shows the evolution of GPP over the sample period. The data include all GPP contracts identified TenderAlpha from 2010 to 2023. The bars represent the total value of GPP contracts awarded each year (in billion USD, left axis). The solid line represents the number of GPP contracts awarded in the same year (in thousands, right axis).

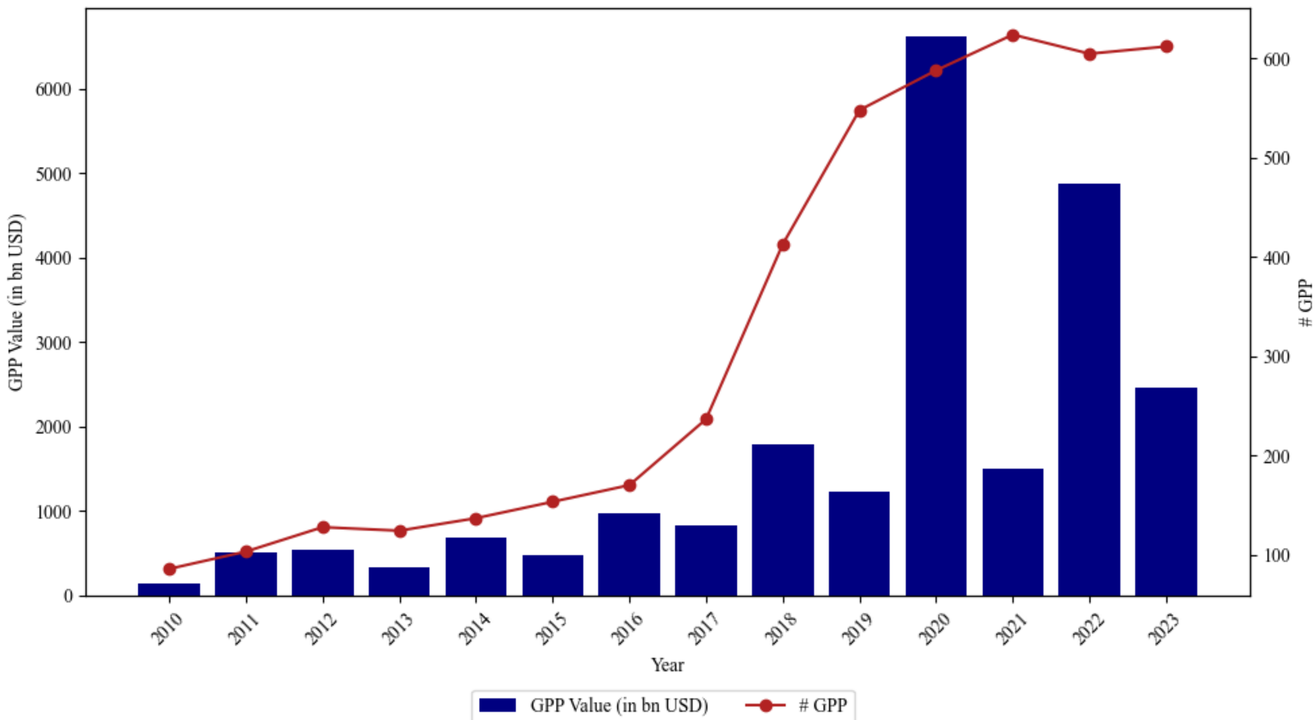


Figure 2: Cross-Country Variation in GPP

This figure illustrates cross-country variation in GPP over the sample period. Panel A displays the cumulative total value of GPP contracts awarded by country (in billion USD), while Panel B shows the cumulative number of GPP contracts awarded (in thousands). This figure is purely descriptive and provides an overview of countries awarding GPP contracts, as captured in the raw data. Given the wide range in contract values and volumes across countries, we limit each panel to the top 50 countries based on total contract value (Panel A) and total number of contracts (Panel B), respectively. This approach highlights the dominant players in GPP and facilitates meaningful visual comparisons across countries.

Panel A: Variation in cumulative value of GPP

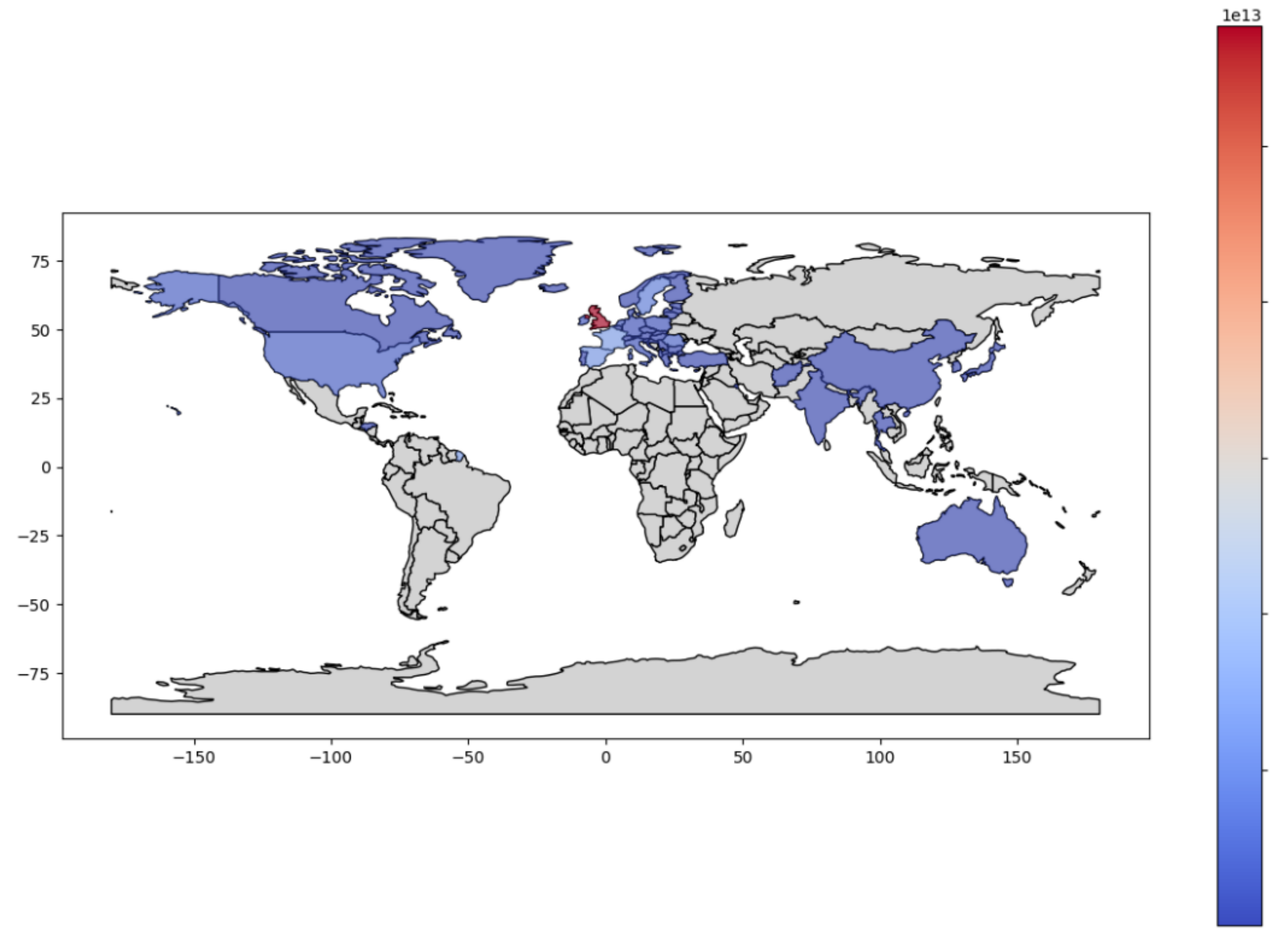


Figure 2: Cross-Country Variation in GPP (continued)

Panel B: Variation in Cumulative Number of GPP

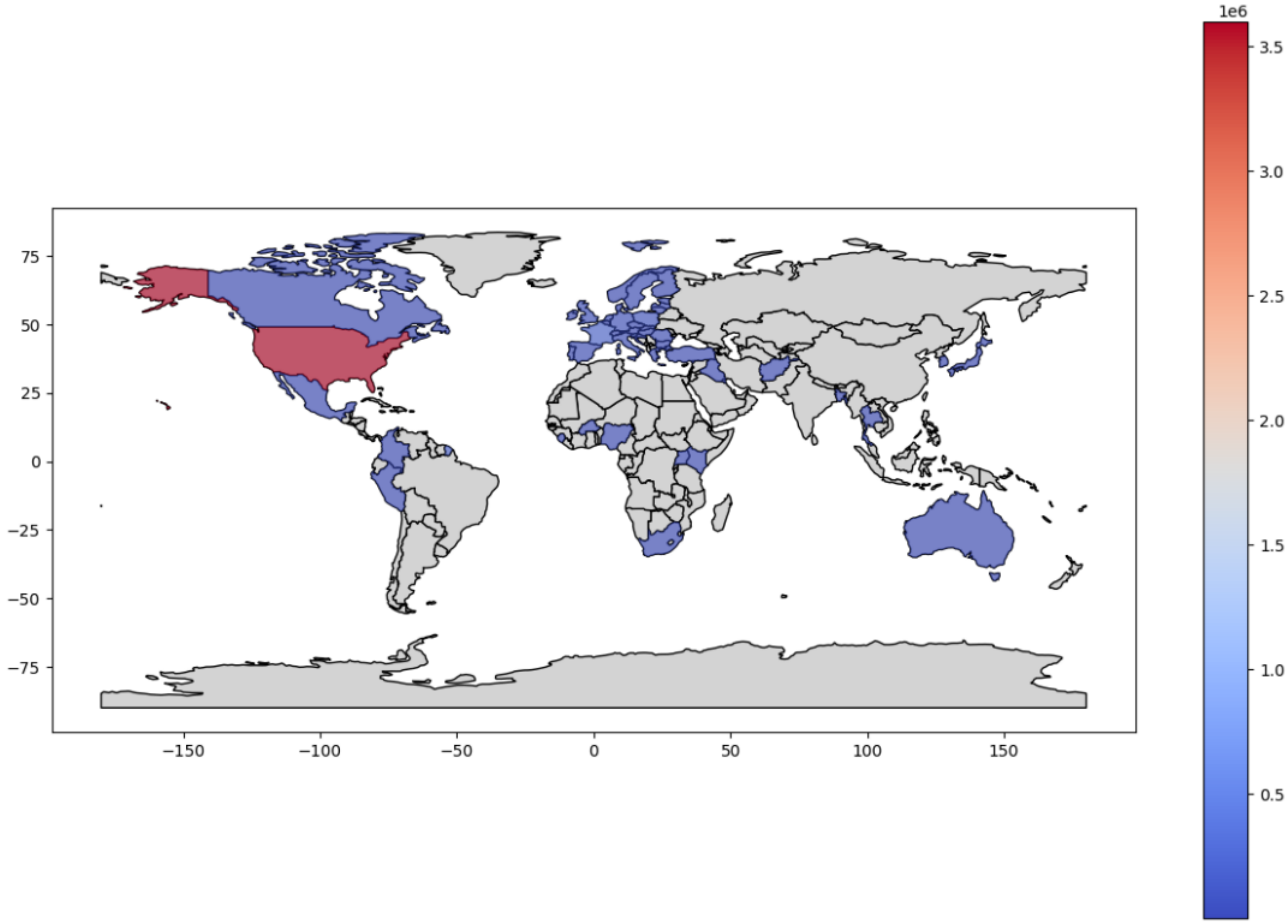
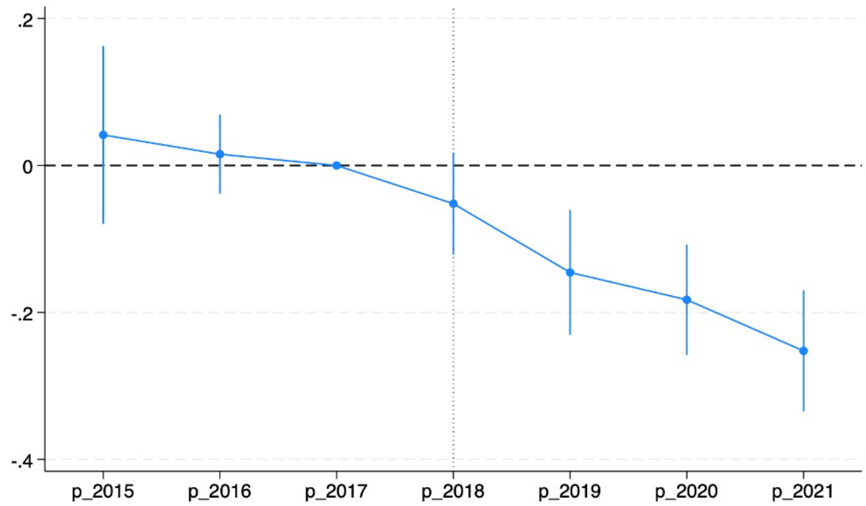


Figure 3: Parallel Trends around the Passage of RED II

The figures below plot the parallel trends around the passage of RED II. Panel A shows the parallel trends using the unrestricted control group. Panel B presents the parallel trends using Entropy Balancing. Panel C presents the parallel trends using Propensity Score Matching. The treatment year is 2018. The benchmark year for the plots is 2017. 90% confidence intervals are plotted for each year.

Panel A: Unrestricted Control Group



Panel B: Entropy Balancing

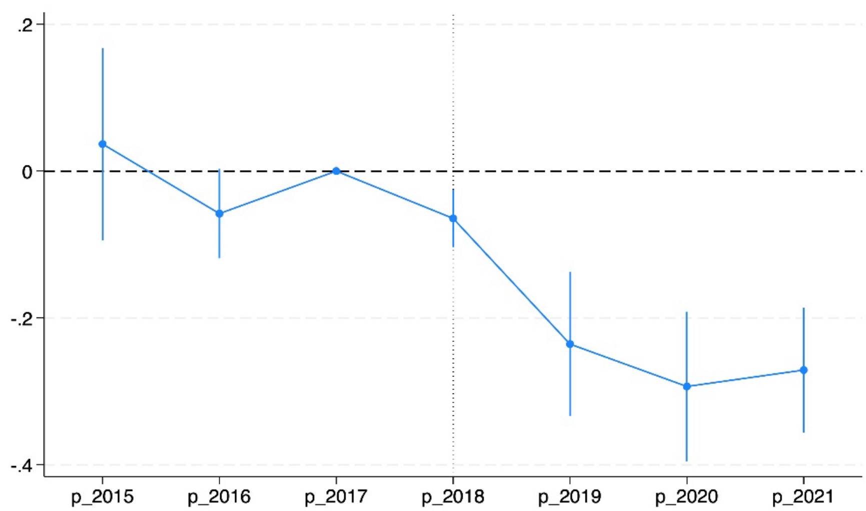


Table 1: Sample Distribution

This table presents the distribution of the sample used in our analyses. The sample spans from 2010 to 2022 and includes 27,173 firm-year observations. Panel A reports the distribution by year. Panel B reports the distribution by country of the awardee firm. Panel C presents the distribution by industry classification.

Panel A: Sample Distribution by Year

			N by Type of GPP							
Year	**N**	**N with GPP**	**Eco Regulation**	**LCC & Environmental Impact Analysis**	**Biodiversity & Agricultural Preservation**	**Energy & Resource Efficiency**	**Renewable Energy**	**Recycling & Waste Reduction**	**Reduction Emission Toxicity**	**EcoLabels & International Standards**
2010	967	150	87	15	26	19	18	32	16	2
2011	1,007	226	115	43	43	72	31	66	49	11
2012	1,096	226	116	36	51	99	45	76	55	16
2013	1,089	226	110	41	48	98	45	60	43	9
2014	1,141	225	110	37	43	105	36	71	48	8
2015	1,254	244	117	35	45	110	41	74	59	13
2016	1,477	253	122	31	56	102	44	70	63	10
2017	1,834	308	138	52	51	120	62	83	81	23
2018	2,246	333	139	61	63	130	61	101	104	32
2019	2,759	377	154	55	70	151	79	110	103	29
2020	3,335	388	158	63	62	164	93	123	110	29
2021	4,631	449	175	85	79	170	89	117	137	30
2022	4,337	402	158	66	81	148	82	104	120	38
Total	27,173	3,807	1,699	620	718	1,488	726	1,087	988	250

Table 1: Sample Distribution (continued)

Panel B: Sample Distribution by Country

Country	N	N with GPP	N by Type of GPP							
			Eco Regulation	LCC & Environmental Impact Analysis	Biodiversity & Agricultural Preservation	Energy & Resource Efficiency	Renewable Energy	Recycling & Waste Reduction	Reduction Emission Toxicity	EcoLabels & International Standards
Argentina	79	0	0	0	0	0	0	0	0	0
Australia	909	39	10	7	3	7	3	10	11	0
Austria	153	52	5	12	15	20	14	28	25	10
Bahrain	16	0	0	0	0	0	0	0	0	0
Belgium	182	49	7	10	3	9	4	6	9	3
Bermuda	66	0	0	0	0	0	0	0	0	0
Brazil	519	1	0	0	1	0	0	0	0	0
Cambodia	2	0	0	0	0	0	0	0	0	0
Canada	988	17	10	0	0	6	2	1	0	0
Cayman Islands	13	0	0	0	0	0	0	0	0	0
Chile	145	3	1	0	0	1	0	0	0	0
China	1,250	2	0	0	0	0	0	0	0	0
Colombia	106	0	0	0	0	0	0	0	0	0
Cyprus	14	1	0	0	0	0	0	0	0	0
Czech Republic	11	3	0	0	0	2	3	2	2	0
Denmark	226	47	3	4	5	4	2	15	14	1
Egypt	22	0	0	0	0	0	0	0	0	0
Faroe Islands	6	0	0	0	0	0	0	0	0	0
Finland	252	83	26	6	17	31	15	42	17	3
France	838	370	59	67	85	140	101	138	140	46
Georgia	3	0	0	0	0	0	0	0	0	0
Germany	892	221	68	64	48	98	71	96	95	40
Gibraltar	3	0	0	0	0	0	0	0	0	0

Greece	101	8	0	0	1	2	3	1	3	0
Guernsey	14	0	0	0	0	0	0	0	0	0
Hong Kong	625	9	0	0	0	0	0	9	5	6
Hungary	32	18	0	3	1	5	0	3	7	9
Iceland	21	0	0	0	0	0	0	0	0	0
India	557	18	2	5	1	4	1	3	3	1
Indonesia	199	0	0	0	0	0	0	0	0	0
Ireland	184	64	34	12	4	27	23	23	13	2
Isle of Man	10	0	0	0	0	0	0	0	0	0
Israel	129	18	3	9	4	0	0	1	1	0
Italy	496	75	10	8	8	12	20	14	41	1
Japan	2,328	262	126	52	29	99	21	58	57	19
Jersey	23	1	0	0	0	0	0	0	1	0
Jordan	22	0	0	0	0	0	0	0	0	0
Kazakhstan	3	0	0	0	0	0	0	0	0	0
Kenya	5	0	0	0	0	0	0	0	0	0
Korea (South)	874	32	10	6	0	16	2	11	6	1
Kuwait	30	1	1	0	0	0	0	0	0	0
Liechtenstein	5	0	0	0	0	0	0	0	0	0
Luxembourg	79	1	0	0	0	0	0	0	0	0
Macau	11	0	0	0	0	0	0	0	0	0
Malaysia	541	0	0	0	0	0	0	0	0	0
Malta	7	0	0	0	0	0	0	0	0	0
Mexico	279	9	9	0	0	0	0	0	0	0
Monaco	8	0	0	0	0	0	0	0	0	0
Mongolia	2	0	0	0	0	0	0	0	0	0
Morocco	5	0	0	0	0	0	0	0	0	0
Netherlands	280	63	23	35	15	15	16	16	21	2
New Zealand	123	6	4	0	0	2	0	0	2	0
Nigeria	6	0	0	0	0	0	0	0	0	0

Norway	246	29	5	4	9	4	2	10	12	0
Oman	13	0	0	0	0	0	0	0	0	0
Pakistan	3	0	0	0	0	0	0	0	0	0
Panama	3	0	0	0	0	0	0	0	0	0
Papua New Guinea	9	0	0	0	0	0	0	0	0	0
Peru	76	0	0	0	0	0	0	0	0	0
Philippines	178	0	0	0	0	0	0	0	0	0
Poland	147	67	1	7	5	2	42	33	7	6
Portugal	77	12	0	0	2	5	1	2	3	0
Qatar	35	0	0	0	0	0	0	0	0	0
Romania	13	1	0	0	0	0	0	0	1	1
Russia	130	10	0	4	0	1	4	2	5	4
Saudi Arabia	78	0	0	0	0	0	0	0	0	0
Singapore	244	12	2	0	0	0	0	9	0	0
Slovenia	9	1	0	1	0	0	0	0	0	0
South Africa	724	11	0	1	3	0	2	4	2	0
Spain	399	131	22	9	25	65	48	50	41	18
Sri Lanka	7	0	0	0	0	0	0	0	0	0
Sweden	632	130	20	37	37	44	20	58	66	14
Switzerland	576	135	56	32	33	43	19	40	26	8
Taiwan	1139	3	2	0	0	1	0	1	0	0
Thailand	421	2	2	0	0	0	0	0	0	0
Turkey	375	5	0	1	0	4	0	0	2	0
Ukraine	10	0	0	0	0	0	0	0	0	0
UAE	108	0	0	0	0	0	0	0	0	0
U.K	2,427	458	160	67	84	171	110	166	128	14
U.S.	5,384	1,327	1,018	157	280	648	177	235	222	41
Uruguay	7	0	0	0	0	0	0	0	0	0
Vietnam	9	0	0	0	0	0	0	0	0	0
Total	27,173	3,807	1,699	620	718	1,488	726	1,087	988	250

Table 1: Sample Distribution (continued)

Panel C: Sample Distribution by Industry

Industry	N	N with GPP	N by Type of GPP							
			Eco Regulation	LCC & Environmental Impact Analysis	Biodiversity & Agricultural Preservation	Energy & Resource Efficiency	Renewable Energy	Recycling & Waste Reduction	Reduction Emission Toxicity	EcoLabels & International Standards
Food Products	1,101	51	12	2	4	2	0	5	3	0
Beer & Liquor	233	9	3	0	5	0	0	0	0	0
Tobacco Products	81	0	0	0	0	0	0	0	0	0
Recreation	276	19	14	0	2	8	0	0	1	1
Printing and Publishing	63	16	12	0	1	1	1	0	1	0
Consumer Goods	533	39	32	14	3	25	1	14	8	8
Apparel	208	1	1	0	0	0	0	0	0	0
Healthcare, Medical Equipment, Pharmaceutical Products	1,277	424	173	126	122	135	69	95	106	38
Chemicals	1,081	99	27	9	51	17	7	28	25	4
Textiles	87	13	12	0	0	6	0	0	0	0
Construction and Construction Materials	1,887	293	86	46	145	148	83	178	110	27
Steel Works Etc.	588	24	7	1	1	7	4	6	4	0
Fabricated Products and Machinery	966	230	144	36	38	98	42	53	55	8
Electrical Equipment	358	63	52	18	12	46	37	22	23	6
Automobiles and Trucks	778	181	61	55	14	115	13	77	72	41
Aircraft, ships, and railroad equipment	254	117	93	20	10	78	53	17	53	4

Precious Metals, Non-Metallic, and Industrial Metal Mining	903	8	3	0	0	1	0	2	0	0
	124	4	0	0	0	0	0	3	0	0
Coal	1,016	73	16	5	6	25	31	25	38	19
Petroleum and Natural Gas	1,456	285	119	24	29	121	109	83	34	2
Utilities	716	100	32	11	0	32	7	5	17	6
Communication	1,989	544	229	121	98	192	91	186	133	28
Personal and Business Services	2,151	419	260	58	71	204	83	83	105	23
Business Equipment	511	57	28	2	1	18	2	19	4	0
Business Supplies and Shipping Containers	1,295	83	44	8	7	33	5	15	15	6
Transportation	680	170	80	14	45	63	33	51	41	7
Wholesale	1,201	70	38	3	5	26	6	10	7	2
Retail	393	29	21	1	4	8	1	8	0	2
Restaurants, Hotels, Motels	4,676	309	66	25	26	54	44	63	116	15
Banking, Insurance, Real Estate, Trading	291	77	34	21	18	25	4	39	17	3
Other	1,101	51	12	2	4	2	0	5	3	0
Total	27,173	3,807	1,699	620	718	1,488	726	1,087	988	250

Table 2: Descriptive Statistics

This table reports descriptive statistics for the variables used in our analyses. The sample spans from 2010 to 2022 and includes 27,173 firm-year observations. Panel A presents summary statistics for the main variables used in the analysis. Panel B reports the Pearson correlation matrix for these variables. See Appendix A for variable definitions.

Panel A: Main Variables

Variable	N	SD	p25	p50	Mean	p75
GPP Indicator	27,173	0.35	0	0	0.14	0
GPP Count	27,173	0.78	0	0	0.26	0
GPP Size	27,173	5.26	0	0	2	0
Political Connections	27,173	0.25	0	0	0.07	0
CO2	27,173	3.28	8.27	10.39	10.5	12.71
Other Procurement Experience	27,173	0.46	0	0	0.31	1
Size	27,173	1.81	7.65	8.76	8.86	9.97
BM	27,173	0.87	-1.2	-0.59	-0.66	-0.06
ROA	27,173	0.06	0.02	0.05	0.05	0.08
Leverage	27,173	0.16	0.12	0.24	0.25	0.36
Tangibility	27,173	0.26	0.08	0.24	0.3	0.46
Return	27,173	0.41	-0.11	0.08	0.14	0.31
Volatility	27,173	8.6	19.68	24.69	26.01	30.91
Dividends	27,173	0.27	0.11	0.31	0.34	0.52
Institutional Ownership	27,173	0.3	0.08	0.19	0.3	0.42
Country EPI	26,387	11.61	50.6	57.2	57.37	66.9
Mandatory Environmental Disclosure	27,173	0.48	0	0	0.36	1
$GPPIndex_1$	27,173	0.53	0.00	0	0	0
$GPPIndex_2$	27,173	0.36	0.00	0	0	0
Green Monitor	27,173	0.14	0.00	0	0.02	0
Domestic GPP	27,173	0.29	0	0	0.09	0
Product Responsibility Score	26,611	0.29	0.33	0.61	0.57	0.83
Environmental Supply Chain Partnership Termination	26,424	0.44	0	0	0.27	1

Table 2: Descriptive Statistics (continued)

Panel B. Pearson Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) GPP Indicator												
(2) GPP Count	0.81***											
(3) GPP Size	0.94***	0.86***										
(4) Political Connections	0.55***	0.60***	0.55***									
(5) CO2	0.56***	0.47***	0.53***	0.39***								
(6) Other Procurement Experience	0.13***	0.13***	0.13***	0.14***	0.13***							
(7) Size	0.16***	0.15***	0.15***	0.17***	0.19***	0.30***						
(8) BM	-0.10***	-0.10***	-0.09***	-0.09***	-0.15***	0.09***	0.20***					
(9) ROA	0.02***	0.02***	0.01**	0.01	0.03***	0.02***	-0.17***	-0.40***				
(10) Leverage	0.00	0.01	0.00	0.04***	0.00	0.19***	0.09***	-0.02***	-0.22***			
(11) Tangibility	-0.12***	-0.12***	-0.12***	-0.05***	-0.14***	0.42***	-0.16***	0.10***	0.00	0.29***		
(12) Return	-0.01*	-0.01	-0.01**	-0.01	-0.01**	0.03***	-0.05***	-0.23***	0.19***	-0.04***	0.03***	
(13) Volatility	-0.15***	-0.14***	-0.15***	-0.14***	-0.18***	-0.05***	-0.32***	0.07***	-0.10***	-0.02***	0.06***	0.12***
(14) Dividends	0.03***	0.03***	0.03***	0.02***	0.03***	0.03***	0.11***	-0.12***	0.14***	-0.01*	0.00	-0.09***
(15) Institutional Ownership	0.17***	0.16***	0.15***	0.21***	0.26***	0.04***	0.11***	-0.29***	0.10***	0.03***	-0.05***	0.00
(16) Country EPI	0.22***	0.17***	0.21***	0.11***	0.27***	-0.04***	-0.02***	-0.03***	-0.04***	-0.01	0.00	-0.06***
(17) Mandatory Environmental Disclosure	-0.04***	-0.05***	-0.02***	-0.09***	-0.09***	-0.16***	-0.21***	0.01*	0.01*	-0.02***	-0.05***	0.01*
(18) $GPPIndex_1$	0.00	0.37***	0.15***	0.15***	0.02***	0.05***	0.04***	0.01**	-0.02***	0.00	-0.03***	-0.01
(19) $GPPIndex_2$	0.00	0.41***	0.13***	0.22***	0.03***	0.05***	0.04***	-0.03***	0.01	0.01**	-0.02***	0.00
(20) Green Monitor	0.03***	0.03***	0.04***	0.03***	0.04***	0.04***	0.06***	0.00	-0.01*	0.05***	0.04***	0.02***
(21) Domestic GPP	0.78***	0.72***	0.76***	0.60***	0.44***	0.12***	0.12***	-0.08***	0.01	0.03***	-0.07***	-0.01*
(22) Product Responsibility Score	0.10***	0.10***	0.11***	0.08***	0.11***	0.13***	0.22***	-0.02***	0.02**	0.01	-0.09***	-0.02***
(23) Environmental Supply Chain Partnership Termination	0.12***	0.13***	0.13***	0.12***	0.12***	0.11***	0.15***	-0.11***	0.05***	0.05***	-0.04***	-0.01

Table 2: Descriptive Statistics (continued)

Panel B. Pearson Correlation Matrix

Variables	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
(1) GPP Indicator											
(2) GPP Count											
(3) GPP Size											
(4) Political Connections											
(5) CO2											
(6) Other Procurement Experience											
(7) Size											
(8) BM											
(9) ROA											
(10) Leverage											
(11) Tangibility											
(12) Return											
(13) Volatility											
(14) Dividends	-0.44***										
(15) Institutional Ownership	-0.08***	-0.09***									
(16) Country EPI	-0.09***	0.02**	0.16***								
(17) Mandatory Environmental Disclosure	0.07***	0.00	-0.25***	0.01*							
(18) $GPPIndex_1$	-0.02***	0.02***	-0.03***	0.04***	0.04***						
(19) $GPPIndex_2$	-0.04***	0.01	0.05***	0.00	-0.02***	0.87***					
(20) Green Monitor	-0.06***	0.03***	0.05***	0.04***	0.01*	0.02**	0.01**				
(21) Domestic GPP	-0.12***	0.01**	0.19***	0.15***	-0.05***	0.11***	0.15***	0.04***			
(22) Product Responsibility Score	-0.14***	0.07***	-0.01	-0.04***	0.00	0.03***	0.02***	0.03***	0.08***		
(23) Environmental Supply Chain Partnership Termination	-0.09***	0.08***	0.09***	0.07***	0.02***	0.06***	0.06***	0.06***	0.10***	0.20***	

Table 3: Determinants of Green Public Procurement Contracts

This table reports estimates from the analysis of determinants of the award of GPP. In Panel A, the dependent variable, GPP Indicator, is an indicator variable that equals one if the company is awarded a GPP contract at t+1, and zero otherwise. In Panel B, the dependent variable, GPP Size, is the natural logarithm of the value of the GPP (in USD). The rest of the variables are defined in Appendix A. All continuous variables are winsorized at the 1st and 99th percentiles. Standard errors are clustered at the country-industry level and are reported in parentheses. ***, **, * denote statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Panel A: Probability of Obtaining Green Procurement Contracts

Der. Variable = ***GPP Indicator (t+1)***	**(1)**	**(2)**
Political Connections	0.470***	0.463***
	(0.033)	(0.032)
CO2	0.010***	0.014***
	(0.004)	(0.004)
Other Procurement Experience	0.535***	0.443***
	(0.026)	(0.025)
Size	-0.031***	-0.015**
	(0.005)	(0.008)
BM	0.015	0.011
	(0.010)	(0.010)
ROA	0.049	0.037
	(0.117)	(0.103)
Volatility	0.004***	0.003***
	(0.001)	(0.001)
Return	0.001	0.011
	(0.009)	(0.010)
Leverage	-0.044	-0.017
	(0.054)	(0.047)
Tangibility	-0.124***	-0.046
	(0.044)	(0.041)
Dividends	0.026	0.017
	(0.030)	(0.026)
Institutional Ownership	-0.219***	-0.152***
	(0.025)	(0.023)
N	27,173	27,173
Year FE	No	Yes
Industry FE	No	Yes
Country FE	No	Yes
Cluster	Country-Industry	Country-Industry
Adj. R^2	0.569	0.611

Table 3: Determinants of Green Public Procurement Contracts (continued)

Panel B: Value of Green Procurement Contracts

Der. Variable = GPP Size (t+1)	**(1)**	**(2)**
Political Connections	7.379***	6.980***
	(0.427)	(0.414)
CO2	0.275***	0.301***
	(0.070)	(0.080)
Other Procurement Experience	7.682***	6.185***
	(0.426)	(0.377)
Size	-0.533***	-0.079
	(0.107)	(0.131)
BM	0.174	0.070
	(0.170)	(0.177)
ROA	-1.714	-1.824
	(2.202)	(1.737)
Volatility	0.015	0.016
	(0.022)	(0.018)
Return	-0.243	0.059
	(0.190)	(0.181)
Leverage	-0.675	-1.012
	(1.006)	(0.869)
Tangibility	-3.953***	-1.909***
	(0.818)	(0.683)
Dividends	0.080	0.211
	(0.554)	(0.435)
Institutional Ownership	-3.752***	-2.248***
	(0.515)	(0.402)
N	27,173	27,173
Year FE	No	Yes
Industry FE	No	Yes
Country FE	No	Yes
Cluster	Country-Industry	Country-Industry
Adj. R^2	0.514	0.577

Table 4: Cross-Sectional Tests

This table presents cross-sectional analyses examining how the relation between the likelihood (Column 1) and the size (Column 2) of green procurement contracts and the determinants varies across different firm- and country-level conditions. Panel A reports results based on the Country EPI. Panel B examines the role of mandatory environmental disclosure regimes. Panel C explores heterogeneity based on the content of awarded GPP contracts. Panel D focuses on the presence of sustainability-based lenders. Panel E examines differences between domestic and foreign contractors. The rest of the variables are defined in Appendix A. All continuous variables are winsorized at the 1st and 99th percentiles. Standard errors are clustered at the country-industry level and are reported in parentheses. ***, **, * denote statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Panel A: Cross-Sectional Effects of Country EPI

Der. Variable =	**(1)** ***GPP Indicator* (t+1)**	**(2)** ***GPP Size* (t+1)**
Above Median EPI x Political Connections	**-0.364*** **	**-4.338*** **
	(0.052)	**(0.687)**
Above Median EPI x CO2	0.009**	0.279***
	(0.004)	(0.066)
Above Median EPI x Other Procurement Experience	0.232***	3.956***
	(0.041)	(0.609)
Political Connections	0.645***	9.194***
	(0.048)	(0.579)
Other Procurement Experience	0.009**	0.148*
	(0.004)	(0.081)
CO2	0.305***	3.906***
	(0.038)	(0.507)
Size	-0.011	-0.045
	(0.007)	(0.126)
BM	0.013	0.094
	(0.010)	(0.172)
ROA	0.072	-1.297
	(0.101)	(1.754)
Volatility	0.004***	0.016
	(0.001)	(0.018)
Return	0.011	0.095
	(0.009)	(0.182)
Leverage	-0.020	-0.919
	(0.043)	(0.822)
Tangibility	-0.041	-1.645**
	(0.037)	(0.643)
Dividends	0.024	0.410
	(0.026)	(0.417)
Institutional Ownership	-0.158***	-2.348***
	(0.025)	(0.417)
N	27,173	27,173
Year FE	Yes	Yes
Industry FE	Yes	Yes
Country FE	Yes	Yes

Cluster	Country-Industry	Country-Industry
Adj. R^2	0.630	0.594

Table 4: Cross-Sectional Tests (continued)

Panel B: Cross-Sectional Effects of Environmental Mandatory Disclosure

Der. Variable =	**(1)** ***GPP Indicator* (t+1)**	**(2)** ***GPP Size* (t+1)**
Mandatory Environmental Disclosure x Political Connections	-0.212***	-2.320***
	(0.041)	(0.644)
Mandatory Environmental Disclosure x CO2	**0.009*** **	**0.158** **
	(0.003)	**(0.063)**
Mandatory Environmental Disclosure x Other Procurement Experience	0.143***	2.713***
	(0.035)	(0.549)
Mandatory Environmental Disclosure	-0.176***	-3.237***
	(0.049)	(0.805)
Political Connections	0.518***	7.610***
	(0.036)	(0.464)
Other Procurement Experience	0.011**	0.247***
	(0.005)	(0.086)
CO2	0.400***	5.379***
	(0.029)	(0.424)
Size	-0.014*	-0.056
	(0.007)	(0.129)
BM	0.012	0.082
	(0.010)	(0.177)
ROA	0.038	-1.826
	(0.103)	(1.756)
Volatility	0.003***	0.015
	(0.001)	(0.018)
Return	0.011	0.080
	(0.009)	(0.177)
Leverage	-0.020	-1.004
	(0.046)	(0.853)
Tangibility	-0.041	-1.745***
	(0.039)	(0.670)
Dividends	0.019	0.244
	(0.026)	(0.430)
Institutional Investors	-0.153***	-2.251***
	(0.024)	(0.410)
N	27,173	27,173
Year FE	Yes	Yes
Industry FE	Yes	Yes
Country FE	Yes	Yes
Cluster	Country-Industry	Country-Industry
Adj. R^2	0.617	0.583

Table 4: Cross-Sectional Tests (continued)

Panel C: Cross-Sectional Effects of GPP Index

Der. Variable =	(1) *GPP Indicator* (t+1)	(2) *GPP Size* (t+1)	(3) *GPP Indicator* (t+1)	(4) *GPP Size* (t+1)
GPP Contract$_{FPC}$ x Political Connections	0.018	0.081		
	(0.021)	(0.304)		
GPP Contract$_{FPC}$ x CO2	**0.008*****	**0.100****		
	(0.003)	**(0.044)**		
GPP Contract$_{FPC}$ x Other Procurement Experience	0.423***	5.375***		
	(0.091)	(1.344)		
GPP Contract$_{WAE}$ x Political Connections			0.098***	1.451***
			(0.033)	(0.507)
GPP Contract$_{WAE}$ x CO2			**0.011*****	**0.164*****
			(0.004)	**(0.063)**
GPP Contract$_{WAE}$ x Other Procurement Experience			0.712***	9.063***
			(0.049)	(0.992)
GPP Contract$_{FPC}$	-0.569***	-5.941***		
	(0.084)	(1.274)		
GPP Contract$_{WAE}$			-0.961***	-11.070***
			(0.057)	(1.104)
Political Connections	0.460***	6.781***	0.462***	6.575***
	(0.031)	(0.445)	(0.033)	(0.447)
Other Procurement Experience	0.017***	0.307***	0.016***	0.301***
	(0.005)	(0.081)	(0.004)	(0.076)
CO2	0.455***	6.479***	0.467***	6.628***
	(0.026)	(0.391)	(0.026)	(0.403)
Size	-0.015*	-0.126	-0.013*	-0.103
	(0.008)	(0.125)	(0.007)	(0.123)
BM	0.011	0.091	0.011	0.101
	(0.010)	(0.168)	(0.010)	(0.164)
ROA	0.057	-1.499	0.062	-1.386
	(0.099)	(1.660)	(0.099)	(1.659)
Volatility	0.003***	0.017	0.003***	0.015
	(0.001)	(0.017)	(0.001)	(0.017)
Return	0.008	0.054	0.006	0.020
	(0.009)	(0.182)	(0.009)	(0.176)
Leverage	-0.002	-0.805	-0.003	-0.772
	(0.048)	(0.867)	(0.048)	(0.849)
Tangibility	-0.061	-1.810***	-0.051	-1.706**
	(0.042)	(0.684)	(0.040)	(0.681)
Dividends	0.020	0.182	0.017	0.190
	(0.027)	(0.433)	(0.027)	(0.432)
Institutional Investors	-0.146***	-2.175***	-0.152***	-2.244***
	(0.023)	(0.376)	(0.022)	(0.374)

N	27,173	27,173	27,173	27,173
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Cluster	Country-Industry	Country-Industry	Country-Industry	Country-Industry
Adj. R^2	0.630	0.588	0.648	0.596

Table 4: Cross-Sectional Tests (continued)

Panel D: Cross-Sectional Effect of Sustainability-Based Lenders

Der. Variable =	**(1)** ***GPP Indicator* (t+1)**	**(2)** ***GPP Size* (t+1)**
Green Monitor x Political Connections	0.009	0.063
	(0.066)	(0.962)
Green Monitor x CO2	**-0.017****	**-0.160**
	(0.008)	**(0.155)**
Green Monitor x Other Procurement Experience	0.084	2.170**
	(0.053)	(0.856)
Green Monitor	0.172*	1.305
	(0.089)	(1.775)
Political Connections	0.463***	6.979***
	(0.032)	(0.414)
Other Procurement Experience	0.015***	0.304***
	(0.004)	(0.079)
CO2	0.440***	6.121***
	(0.025)	(0.374)
Size	-0.016**	-0.088
	(0.008)	(0.132)
BM	0.010	0.064
	(0.010)	(0.178)
ROA	0.034	-1.864
	(0.103)	(1.738)
Volatility	0.003***	0.015
	(0.001)	(0.018)
Return	0.010	0.042
	(0.010)	(0.180)
Leverage	-0.019	-1.018
	(0.048)	(0.870)
Tangibility	-0.046	-1.919***
	(0.041)	(0.679)
Dividends	0.017	0.197
	(0.027)	(0.436)
Institutional Investors	-0.153***	-2.238***
	(0.023)	(0.402)
N	27,173	27,173
Year FE	Yes	Yes
Industry FE	Yes	Yes
Country FE	Yes	Yes
Cluster	Country-Industry	Country-Industry
Adj. R^2	0.611	0.578

Table 4: Cross-Sectional Tests (continued)

Panel E: Cross-Sectional Effect of Domestic Contractors

Der. Variable =	**(1)** ***GPP Indicator* (t+1)**	**(2)** ***GPP Size* (t+1)**
Domestic GPP x Political Connections	-0.365***	-5.609***
	(0.034)	(0.794)
Domestic GPP x CO2	0.001	0.098
	(0.006)	(0.065)
Domestic GPP x Other Procurement Experience	**-0.383*** **	**-3.434*** **
	(0.033)	**(0.774)**
Domestic GPP	0.887***	10.365***
	(0.061)	(1.033)
Political Connections	0.447***	6.650***
	(0.030)	(0.724)
Other Procurement Experience	0.007	0.171**
	(0.005)	(0.081)
CO2	0.386***	5.154***
	(0.027)	(0.386)
Size	0.001	0.162
	(0.006)	(0.114)
BM	0.008	0.022
	(0.009)	(0.155)
ROA	0.035	-1.768
	(0.093)	(1.646)
Volatility	0.002***	0.003
	(0.001)	(0.016)
Return	0.009	0.042
	(0.009)	(0.180)
Leverage	-0.018	-1.011
	(0.043)	(0.748)
Tangibility	-0.023	-1.605**
	(0.036)	(0.657)
Dividends	0.012	0.115
	(0.019)	(0.320)
Institutional Investors	-0.078***	-1.100**
	(0.026)	(0.444)
N	27,173	27,173
Year FE	Yes	Yes
Industry FE	Yes	Yes
Country FE	Yes	Yes
Cluster	Country-Industry	Country-Industry
Adj. R^2	0.690	0.648

Table 5: Consequences - Future CO_2 Emissions

This table reports estimates from the analysis of the association between the award of GPP contracts and subsequent firm-level CO2 emissions. The dependent variable is the change in direct CO2 emissions between year t and future periods (t+2, t+3, and the average of t+2 and t+3). The main independent variable, GPP, is an indicator equal to one if the firm received a green procurement contract in year t, and zero otherwise. The rest of the variables are defined in Appendix A. All continuous variables are winsorized at the 1st and 99th percentiles. Standard errors are clustered at the firm level. *, **, and *** denote significance at the 10%, 5%, and 1% levels (two-tailed), respectively.

Dep. Variable = CO2	**(1) Levels Change (t, t+2)**	**(2) Levels Change (t, t+3)**	**(3) Levels Change (t, average [t+2, t+3])**	**(4) % Change (t, t+2)**	**(5) % Change (t, t+3)**	**(6) % Change (t, average [t+2, t+3])**
GPP Indicator	**-0.097****	**-0.118***	**-0.123****	**-0.072***	**-0.074**	**-0.095**
	(0.048)	**(0.066)**	**(0.058)**	**(0.044)**	**(0.080)**	**(0.063)**
Size	-0.045	0.037	0.027	-0.032**	-0.067**	-0.046**
	(0.061)	(0.164)	(0.127)	(0.015)	(0.030)	(0.023)
BM	-0.073	-0.012	-0.040	-0.020	-0.014	-0.033
	(0.045)	(0.091)	(0.072)	(0.034)	(0.068)	(0.051)
ROA	-0.681	0.094	-0.206	0.055	0.079	0.124
	(0.462)	(1.010)	(0.747)	(0.541)	(1.070)	(0.836)
Return	-0.082**	-0.074	-0.091*	0.052	0.076	0.088
	(0.037)	(0.052)	(0.046)	(0.059)	(0.116)	(0.094)
Leverage	0.473**	0.288	0.223	0.264*	0.569*	0.359
	(0.190)	(0.375)	(0.313)	(0.154)	(0.325)	(0.229)
Tangibility	0.178	0.543	0.407	-0.426***	-0.599**	-0.505***
	(0.485)	(0.841)	(0.757)	(0.115)	(0.244)	(0.189)
Dividends	-0.028	0.004	0.006	-0.200**	-0.326**	-0.282**
	(0.089)	(0.133)	(0.119)	(0.082)	(0.149)	(0.121)
N	18,007	14,012	13,722	19,362	15,041	14,725
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	No	No	No
Country FE	No	No	No	Yes	Yes	Yes
Industry FE	No	No	No	Yes	Yes	Yes
Cluster	Firm	Firm	Firm	Firm	Firm	Firm
Adj. R^2	0.222	0.444	0.406	0.0383	0.0563	0.0574

Table 6: Consequences - Future Product Responsibility Score

This table reports estimates from the analysis of the association between the award of GPP contracts and subsequent firm-level Product Responsibility Score. The dependent variable is the change in Refinitiv Product Responsibility Score between year t and future periods (t+2, t+3, and the average of t+2 and t+3). The main independent variable, GPP, is an indicator equal to one if the firm received a green procurement contract in year t, and zero otherwise. The rest of the variables are defined in Appendix A. All continuous variables are winsorized at the 1st and 99th percentiles. Standard errors are clustered at the firm level. *, **, and *** denote significance at the 10%, 5%, and 1% levels (two-tailed), respectively.

Dep. Variable = Product Responsibility Score	**(1) Levels Change (t, t+2)**	**(2) Levels Change (t, t+3)**	**(3) Levels Change (t, average [t+2, t+3])**	**(4) % Change (t, t+2)**	**(5) % Change (t, t+3)**	**(6) % Change (t, average [t+2, t+3])**
GPP Indicator	**0.011**	**0.012**	**0.011**	**0.028**	**0.044***	**0.044***
	(0.007)	**(0.009)**	**(0.008)**	**(0.017)**	**(0.024)**	**(0.023)**
Size	-0.018*	-0.028*	-0.023*	-0.035***	-0.050***	-0.045***
	(0.010)	(0.015)	(0.013)	(0.006)	(0.011)	(0.010)
BM	-0.005	-0.004	-0.005	0.013	0.021	0.021
	(0.007)	(0.010)	(0.009)	(0.013)	(0.023)	(0.020)
ROA	0.058	0.042	0.055	-0.247	-0.301	-0.329
	(0.063)	(0.086)	(0.078)	(0.186)	(0.350)	(0.322)
Return	0.001	-0.001	-0.001	0.020	0.043	0.042
	(0.007)	(0.010)	(0.009)	(0.026)	(0.042)	(0.039)
Leverage	0.095***	0.140***	0.124***	-0.006	-0.004	-0.020
	(0.036)	(0.053)	(0.046)	(0.057)	(0.107)	(0.096)
Tangibility	-0.108**	-0.169**	-0.150**	-0.034	-0.102	-0.069
	(0.051)	(0.073)	(0.067)	(0.057)	(0.086)	(0.080)
Dividends	-0.005	-0.009	-0.005	-0.103***	-0.175***	-0.159***
	(0.011)	(0.015)	(0.013)	(0.033)	(0.053)	(0.049)
N	19,928	15,653	15,587	20,136	15,690	15,615
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	No	No	No
Country FE	No	No	No	Yes	Yes	Yes
Industry FE	No	No	No	Yes	Yes	Yes
Cluster	Firm	Firm	Firm	Firm	Firm	Firm
Adj. R^2	0.115	0.219	0.200	0.0291	0.0394	0.0348

Table 7: Consequence – Future Environmental Supply Chain Partnership Termination

This table reports estimates from the analysis of the association between the award of GPP contracts and subsequent changes in firms' supply chain relationships. The dependent variable is the change in company reporting ending a partnership with a sourcing partner due to unmet environmental criteria between year t and future periods (t+2 and t+3). The main independent variable, GPP, is an indicator equal to one if the firm received a green procurement contract in year t, and zero otherwise. The rest of the variables are defined in Appendix A. All continuous variables are winsorized at the 1st and 99th percentiles. Standard errors are clustered at the firm level. *, **, and *** denote significance at the 10%, 5%, and 1% levels (two-tailed), respectively.

Dep. Variable = Environmental Supply Chain Partnership Termination	**(1)** **Change (t, t+2)**	**(2)** **Change (t, t+3)**	**(3)** **Change (t, t+2)**	**(4)** **Change (t, t+3)**
GPP Indicator	**0.031****	**0.009**	**0.017****	**0.011**
	(0.014)	**(0.018)**	**(0.008)**	**(0.011)**
Size	0.007	-0.002	-0.010***	-0.015***
	(0.021)	(0.031)	(0.003)	(0.004)
BM	0.029*	0.047**	0.012**	0.017*
	(0.015)	(0.021)	(0.006)	(0.009)
ROA	-0.050	0.094	-0.099	-0.140
	(0.128)	(0.161)	(0.073)	(0.107)
Return	0.022	0.040**	0.014	0.029*
	(0.013)	(0.018)	(0.011)	(0.015)
Leverage	0.039	0.075	0.024	0.056
	(0.081)	(0.105)	(0.027)	(0.041)
Tangibility	-0.021	0.101	0.022	0.042
	(0.111)	(0.150)	(0.023)	(0.036)
Dividends	0.026	0.047	-0.010	-0.022
	(0.024)	(0.030)	(0.014)	(0.020)
N	18,567	14,663	19,913	15,663
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	No	No
Country FE	No	No	Yes	Yes
Industry FE	No	No	Yes	Yes
Cluster	Firm	Firm	Firm	Firm
Adj. R^2	0.0569	0.145	0.0177	0.0219

Table 8: Consequence – Future Financial Performance

This table reports estimates from the analysis of the association between the award of GPP contracts and subsequent changes in firm profitability. The dependent variable is the change in ROA between year t and future periods (t+2 and t+3). The main independent variable, GPP, is an indicator equal to one if the firm received a green procurement contract in year t, and zero otherwise. The rest of the variables are defined in Appendix A. All continuous variables are winsorized at the 1st and 99th percentiles. Standard errors are clustered at the firm level. *, **, and *** denote significance at the 10%, 5%, and 1% levels (two-tailed), respectively.

	(1)	(2)	(3)	(4)
Dep. Variable = ROA	**Change (t, t+2)**	**Change (t, t+3)**	**Change (t, t+2)**	**Change (t, t+3)**
GPP Indicator	**-0.001**	**-0.004***	**-0.001**	**-0.003***
	(0.002)	**(0.002)**	**(0.001)**	**(0.002)**
Size	-0.025***	-0.023***	-0.000	0.001
	(0.004)	(0.004)	(0.001)	(0.001)
BM	-0.022***	-0.015***	-0.017***	-0.016***
	(0.002)	(0.003)	(0.001)	(0.002)
ROA	-1.052***	-1.075***	-0.557***	-0.578***
	(0.026)	(0.025)	(0.025)	(0.030)
Return	0.004**	-0.002	0.009***	0.002
	(0.002)	(0.002)	(0.002)	(0.002)
Leverage	-0.001	-0.001	-0.020***	-0.017**
	(0.010)	(0.012)	(0.006)	(0.007)
Tangibility	0.025	0.010	0.009**	0.015***
	(0.018)	(0.022)	(0.004)	(0.005)
Dividends	-0.005	-0.007*	0.011***	0.009**
	(0.003)	(0.004)	(0.003)	(0.004)
N	20,252	15,843	21,663	17,008
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	No	No
Country FE	No	No	Yes	Yes
Industry FE	No	No	Yes	Yes
Cluster	Firm	Firm	Firm	Firm
Adj. R^2	0.423	0.451	0.228	0.220

Table 9: The Effect of the Passage of RED II on GPP Awarded Firms' Environmental Performance – DID Results

This table provides the difference-in-differences regression results based on the passage of RED II. Treated firms are the subset of firms that were awarded at least one GPP contract in both the pre- and post-RED II periods, and whose contracts are specifically related to renewable energy, energy/resource efficiency, life-cycle costing and environmental impact analysis, or emissions and toxicity reduction. Control variables are defined in Appendix B. All variables are winsorized at the 1st and 99th percentiles. Standard errors are clustered at the industry level. ***, **, * denote statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

	Unrestricted Control Group		**EB**	
	(1)	**(2)**	**(3)**	**(4)**
	CO2	**CO2**	**CO2**	**CO2**
POST_TREAT	**-0.137*** **	**-0.148*** **	**-0.121** **	**-0.184*** **
	(0.051)	**(0.045)**	**(0.055)**	**(0.052)**
Size	0.444***	0.508***	0.363***	0.356***
	(0.041)	(0.057)	(0.068)	(0.089)
BM	-0.002	-0.005	0.055	0.034
	(0.027)	(0.029)	(0.057)	(0.041)
ROA	0.160	0.002	0.123	0.019
	(0.198)	(0.200)	(0.300)	(0.267)
Return	-0.030**	-0.015	0.032	0.058
	(0.014)	(0.017)	(0.042)	(0.038)
Leverage	-0.360***	-0.234**	-0.612*	-0.293
	(0.120)	(0.112)	(0.331)	(0.224)
Tangibility	0.443**	0.452**	0.598*	0.389
	(0.195)	(0.188)	(0.356)	(0.427)
Dividends	0.113***	0.052	0.093	0.049
	(0.033)	(0.035)	(0.105)	(0.107)
N	16,075	16,042	9,886	9,854
Firm FE	Yes	Yes	Yes	Yes
Industry x Year FE	No	Yes	No	Yes
Cluster	Industry	Industry	Industry	Industry
Adj. R^2	0.967	0.967	0.962	0.965