Do Environment Provision in ESG-contingent Executive Compensation Improve Environmental Performance Symbolically or Substantively?

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Abstract

This paper investigates whether, and to what extent, ESG-contingent compensation influences ESG performance. Using a hand-collected dataset from proxy statements to capture ESG-contingent provisions and their associated features, we document the following findings: (1) only environmental provisions exhibit a significant positive association with environmental performance; (2) environmental provisions enhance environmental performance through a symbolic channel, and this effect is robust across various econometric specifications and variable definitions; (3) both the diversification and simplicity of environmental provisions strengthen symbolic performance; and (4) the impact of environmental provisions on symbolic environmental performance is more pronounced among firms with low intangible assets, financial constraints, and within carbon-intensive industries.

Keywords**:** Corporate Governance; Corporate social responsibility; CSR-contingent compensation; Executive compensation

JEL Classification: G30; Q50; D22; K20

1. Introduction

In recent years, integrating nonfinancial metrics into executive compensation has grown increasingly popular, especially those linked to environmental, social and governance provisions (hereafter, refer as "ESG -contingent compensation") in short- and long- term executive incentive plans.[1] Given that the ESG-contingent compensation is an effective managerial tool for driving firm long-term value and enhancing ESG performance (e.g. Flammer et al., 2019; Ikram et al., 2023), which might expect broad adoption.[2] However, in 2021, only 38% of firms worldwide implemented ESG-contingent compensation (Cohen et al., 2023).[3] The relatively low adoption rate raises a concern that why so many firms hesitated to adopt this despite its potential benefits? This concern arises from the fact that adopting ESG-contingent compensations would motivate executives to practice in benefit themselves or truly benefit stakeholders and further benefit shareholders. For instance, the ESG-contingent compensations allow executives to extract rents from shareholders (Bebchuk & Tallarita, 2022) and others suggest that ESG-contingent compensations associated with positive ESG outcomes and therefore benefit stakeholders (e.g. Flammer et al., 2019).

Incorporating ESG provisions into executive compensation has become increasingly common, although its impact on ESG performance remains a debate. According to stakeholders-oriented views, incorporating ESG provisions in remuneration plans increases shareholders value

[1] Short-term plans are annual incentive plans which have one year period and long-term plans are long-term equity plans which have more than one-year plans.

[2] For instance, performance-vesting provisions (p-v provisions) are considered as an effectively managerial tools in corporate governance, Bettis et al. (2018) indicate that the usage of p-v provisions has grown from 20 to 70 percent from 1998 to 2012 in U.S.

[3] In Figure 1 indicates that only 4% of firms around the world adopt ESG-contingent compensation in 2012 and generally increase to 12% in 2018, whereas a rapid speed between 2019 and 2021 (Cohen et al., 2023). However, this speedy trend between 2019 and 2021 might reveal that firms adopt ESG-contingent compensation as a greenwashing in downturn.

more effectively than other traditional financial metrics do, as it directly links executives' personal wealth to corporate social performance, which contribute to shareholder value (Ikram et al., 2023; Qin & Yang, 2022; Flammer et al., 2019). Based on this rationale, ESG-contingent compensation could be viewed as the optimal contract that incorporates non-financial performance hurdle to compensation, thereby incentivizing executives to focus on long-term value creation through non-financial perspective (e.g. Ikram et al., 2023; Cohen et al., 2023).

In contrast, agency-oriented theory proponents assert that diversion of corporate resources toward ESG is viewed as a misuse of shareholder funds (Friedman, 1962; Friedman, 1970). From this perspective, managers' engagement in ESG initiatives would likely be perceived as symbolic initiatives, evaluated unfavorably by shareholders and boards, and vulnerable to attacks by shareholder activists (Duquette & Ohrn, 2018; Desjardine et al., 2021; Berrone & Gomez-Mejia, 2009). In addition, incorporating non-financial targets into compensation may create opportunities for executives to extract rent from shareholders (e.g. Bebchuk & Fried, 2003; Bachmann et al., 2020; Bebchuk & Tallarita, 2022). Furthermore, institutional theory suggests that linking ESG metrics to executive compensation may prompt "greenwashing" concerns where managers try to decorate corporate image (symbolic actions) without taking substantive actions (e.g. Bethello et al., 2023; Haque & Ntim, 2020). Although such practices may signal their commitment to ESG initiatives and assuage stakeholder concerns, it could ultimately undermine the authenticity of ESG performance. These contradictory findings raise a further concern whether incorporating ESG-contingent compensations motivate executives to pursue meaningful substantive practice or encourage symbolic gestures.

To address the above theoretical tension, we decompose E, S, and G provisions in ESG-contingent executive compensations and assess whether those provisions improve ESG

performance substantively or symbolically. Although the recent literature primarily asserts ESG-contingent compensation enhances ESG performance broadly, results are mixed at the broad level. For instance, Maas (2018) find no significant link between ESG-contingent compensation and ESG performance, whereas Flammer et al. (2019) indicate a positive association between ESG-contingent compensation and ESG performance. These studies typically measure ESG-contingent compensation in aggregate, aiming to establish a connection between ESG-contingent compensation and ESG performance. However, few studies focus on granular aspects. For instance, Haque and Ntim (2020) investigate those environmental provisions in ESG-contingent compensation within European countries to enhance environmental performance through symbolic channel. Moreover, Cohen et al. (2023) decompose ESG provision into five categories and indicated that only carbon emission and diversity and inclusion have positive impact on ESG performance. Given the important role of ESG provisions in ESG-contingent compensation, a better understanding of more detailed of the E, S and G provisions implemented by firms is essential (Cohen et al., 2023). Moreover, very few study focus on the detailed of ESG-contingent compensation and whether the improvement attributes to symbolic or substantive, therefore, we address this research gap in the literature.

To investigate the details of ESG-contingent compensations, we hand collect ESG-contingent provisions details in executive compensation data from annual proxy statements (DEF 14A) of S&P 500 firms between 2012 and 2018.[4] This sample provides detailed information on the content, metrics and weight of ESG-contingent provisions in compensation contracts, as well as whether these targets have been achieved. ESG-contingent compensations are present in a relatively small fraction of corporations: 13% of U.S. 500 S&P firms adopted ESG-linked

[4] Our sample start from 2012 and end in 2018 due to merging data available.

contracts in 2012 and generally increase to 24% in 2018.[5] Moreover, 99% of ESG-contingent provisions are short-term ESG targets and 1% are long-term targets in our sample.[6] This provides preliminary evidence that ESG provisions in ESG contract are more likely induce symbolic actions, as substantial improvements typically require longer time horizons (Haque & Ntim, 2020). In addition, following Hawn & Ioannou (2016), we measure substantive performance and symbolic performance to further investigate the effect of ESG-contingent compensation.[7] By using this sample, we document a positive effect of environmental provisions on symbolic environmental performance. For example, economically, a one standard deviation (S.D.) increase in the environmental provision is associated with a 0.037 S.D. increase in symbolic environmental performance. Moreover, we find the similar result by using the alternative symbolic environmental measurement as dependent variable in our robustness test. To address potential endogeneity issues in our study, we employ a fuzzy Difference-in-Differences (DiD) approach, which similar to Ray and Grannis (2015). This exogenous shock exploit firms in the state that first experience this exogenous shock is more likely to adopt environmental provisions to improve their environmental performance.[8]

Furthermore, similar to Chang et at. (2015) and Mei et al. (2024), we also implement instrumental variable (2SLS) approach by leveraging percentage of local, industry-specific

[5] In Table 2 Panel B, we could calculate the percentage of adopting ESG-contingent compensation in 2012 was 13% (117/ (117+ 754)) and 24% (175/ (175 + 550)) in 2018. The total adoption for 7 years was 16.5% (1075/6133).

[6] This finding consistent with Badawi and Bartlett (2024). They indicate that 96.5% of firms tie ESG performance metrics as part of executives' short-term annual incentive award in 2023. According to Badawi and Bartlett (2024), the short-term targets (annual incentive award) are those targets vesting within one year period and long-term targets (long-term equity incentive plan) vesting for 3-year performance period.

[7] According to Bethello et al. (2023) and Hawn and Ioannou (2016), symbolic CSR refers to actions taken primarily to gain legitimacy without incurring substantial costs, often perceived as "greenwashing." In contrast, substantive CSR involves genuine initiatives supported by real actions, positively influencing firm performance through enhanced intangible resources.

[8] The difference between our approach and theirs is they employ the finalization of shock whereas we employ the first adoption as exogenous shocks.

adoption of environmental provisions as our instrumental variable. This is a good instrument because nearby peer firms' compensation structure (such as vesting structure) is similar due to spillover effect and peer firms' compensations are less likely to be correlated with focal firms' environmental performance (Kedia and Rajgopal, 2009). For instance, firms in high pollution industries are more likely imitate peer firms in the same industry to adopt the environmental provision (relevance condition), but other firms' adoption of environmental provision in compensation does not affect focal firms CSR performance (exclusive condition).

In addition, to address the sample selection bias, we employ propensity score matching with kernel matching to compare the symbolic environmental performance between treatment group (adopting environmental provisions) and control group (not adopting environmental provisions). Across all these methods, our results show a significant positive causal relationship between environmental provisions and symbolic environmental performance.

In the cross-sectional analysis, we document the following three key results. First, the influence of environmental provisions on symbolic environmental performance is more pronounced in low intangible assets firms, as such firms with limited resource are more likely to engage in symbolic strategy without taking substantive actions (Tang et al., 2023). Second, the main association is more pronounced in financial constraint firms, where substantive practice demand for significant investment and difficult for financial constraint companies to replicate (e.g. Tang et al., 2023; Haque & Ntim, 2020). Third, the impact of environmental provisions on symbolic environmental performance is more pronounced in firms within carbon intensity industries, where to signal stakeholders that they have mechanism in place to ensure their ESG performance (e.g. Berrone & Gomez-Mejia, 2009; Gull et al., 2023). Furthermore, in the extensional test, we observe that diversification provisions (i.e., provisions with altered context or

measurement) and simplicity of environmental provision (i.e., easy-to-achieve, relatively low performance hurdles or weightings) enhance the effect of environmental provisions on symbolic performance.

This paper makes two key contributions. First, we reconcile conflicting views in the ESG-contingent compensation literature, which alternately suggest that such practices improve ESG performance (e.g., Flammer et al., 2019; Ikram et al., 2023) or enable rent extraction (e.g., Bebchuk & Tallarita, 2022). Our findings show that only environmental provisions—rather than broader ESG provisions—are positively associated with subsequent ESG scores, and primarily in a symbolic way. While these provisions may signal effort and boost reported outcomes, they do not lead to substantive action. Thus, our results align more closely with agency and institutional theories than stakeholder theory, suggesting that environmental provisions tend to motivate symbolic rather than substantive executive behavior.

Second, our research contributes to the insight of environmental provisions in ESG-contingent compensation and to what extent would increase symbolic behavior. In an ideal world, the criterion for determining a performance goal should be both attainable and difficult to achieve. Given that the direct relation between compensation and targets, easy-to-achieve targets could encourage managers to pursue symbolic practices. Our analysis suggests that the diversity and simplicity of environmental provisions are key drivers of executives' engagement in symbolic practices. For example, increasing the scope of environmental targets (i.e., covering multiple areas rather than just one) can lead to complexity and lack of focus. As a result, executives may spend more time understanding and addressing these targets, leaving limited time to demonstrate actual efforts—thereby increasing the likelihood of symbolic compliance. Conversely, the simplicity of environmental provisions aligns with the 'easy life' theory, which posits that executives may favor

symbolic actions that are easier to fulfill in order to maintain their positions (Bertrand & Mullainathan, 2003). These findings offer valuable insights for practitioners seeking to design ESG-contingent compensation schemes that promote substantive, rather than symbolic, executive behavior.

Third, this paper contributes to strategic management literature. Recent studies suggest that the growing legitimacy of ESG motivates firms to engage in symbolic communication—highlighting ESG initiatives without matching them with substantive actions (Bothello et al., 2021). Besides, CEOs may prioritize internally visible ESG efforts aimed at pleasing internal assessors, rather than pursuing more complex external actions that benefit shareholders, even though both types of efforts can create economic value (Hawn & Ioannou, 2016). These studies underscore the need to move beyond broad overarching ESG concepts and examine the specific actions CEOs take, and what drives symbolic versus substantive ESG initiatives. Given that the gap between symbolic and substantive ESG efforts is huge (Bothello et al., 2021; Hawn and Ioannou, 2016), our paper addresses this gap and calls on boards and compensation committees to design ESG-contingent compensation more thoughtfully to prevent rent extraction.

The remainder of the paper is structured as follows. Section 2 provides the institutional background. Section 3 review the related literatures and discusses our hypotheses. Section 4 describes the data, key variables used and model specifications. Section 5 documents the model specifications and empirical results as well as extensional tests. Section 6 shows additional analyses. Section 7 shows implication test. Finally, Section 8 concludes the study.

2. Institutional background – evolution of corporate social responsibility

Corporate social responsibility (CSR) has a long history and has evolved for over 70 years. Bowen (1953) introduces the initial concept of CSR, which indicates that corporations have the obligation to address the social issues and give back to the community. The early stage of CSR focuses on the social responsibilities of business with respect to corporations beginning to consider the consequences of their activities and social consciousness. In the 1960s, literature of CSR expands to include managerial contexts rather than moral contexts. During this period, corporations are expected to fulfill not only their economic and legal responsibilities but also their social obligations, as they use society's resources to achieve broader social goals. Davis (1960) argued that corporations could carry out their social responsibilities by some socially responsible business decision. He asserts that those decisions bring huge gain to the firm and consequence firm pay it back to society. Moreover, McGuire (1963) states that corporations considering social responsibilities in multiple ways, such as politics, welfare of communities, educations, employee happiness. Walton (1967) expands the CSR concept to managerial, which top managers should keep in mind the relationship between corporations and society.

In the 1970s, the concept of CSR expands to a broader responsibility and various interest parties emerged, for instance, environmental protection and employee welfare. Johnson (1971) firstly considers stakeholder interest into CSR, which defines that a socially responsible corporations not only take into account shareholder profit but also consider stakeholder interest, for instance, employee, suppliers, dealers, local communities and the nation. Furthermore, the Committee for Economic Development (CED) provides the notable concept of CSR. They use three concentric circles to define social responsibility, including inner circle (economic responsibilities), intermediate circle (combine economic function with social awareness), outer

circle (new and evolving responsibilities for business to improve social environment). In addition, Eilbirt and Parket (1973) indicate that the best way to interpret social responsibilities is to act like "good neighborhood" which voluntary solve the neighborhood issues such as reduce pollution and protect friendship with neighbor.

Another important contribution of CSR in this period is placing CSR into context like social accounting, social indicators and social audit. For instance, Backman (1975) argues that CSR should be given weight in addition to economic performance. Sethi (1975) states that three dimensions of CSP, which are "social obligation", "social responsibility" and "social responsiveness". In his framework, social obligation is the corporation behavior response to market pressures or regulatory constraints. To compare, he raises social responsibility up and goes beyond the corporation behavior to the same level with social norms, values and expectation of performance. The final stage is regarded as the adoption of corporation behavior to social needs. On the other hand, Carroll (1979) defines that CSR refers to meeting four responsibilities including economic, legal, ethical and the discretionary. The first three components suggest corporations operate under law or regulatory and social expectation. The last component is implicit and driven by social norms, which recommend individual manager and corporations to voluntary behave, such as make philanthropic contributions.

In short, CSR shifts from philanthropy and ethical behavior towards a broader and specific understanding. In the 1980s, CSR became more formalized and institutionalized within practices and legislation. For instance, Jones (1980) emphasized CSR as a process rather than an outcome of the corporations and illustrate how corporations engage into the CSR process. Tuzzolino and Armandi (1981) proposed a need-hierarchy framework based on Maslow's hierarchy to improve CSR assessment. Their model suggests that organizations have physiological, safety, affiliative,

esteem, and self-actualization needs as human demand. Furthermore, there was growing interest in investigating the relationship between CSR and financial performance. Cochran and Wood (1984) use the reputation index developed by Milton Moskowitz to represent CSR and determine whether the profitable firms were also socially responsible. They acknowledged the drawback of measuring CSR by reputation index and advocated for the new measurement. Aupperle et al. (1985) explore the relationship between CSR and successful corporations. Their contributions were implying Carroll's (1983) four parts of CSR into practice and split them into two parts, "concern for economic performance" and "concern for society". The former concern is based on economic component and the last concern include other three components (legal, ethical and discretionary). They further indicate that CSR could be accurately measured by the weight of non-economic components compare to economic components.

In the 1990s and beyond, there were few contributions to the concept of CSR and literature developed various related topic and frameworks. For instance, CSR, Business Ethics, Stakeholder Management, Sustainability and Corporate Citizenship (Carroll, 2015). In 2004, the Environmental, social and governance (ESG) initial proposal and has been widely practiced in developed countries like European and America. [9] Derived from CSR, ESG refers to corporations consider environmental, social and governance matters into their business. One difference between CSR and ESG is that ESG explicitly include governance considerations, in contrast, CSR implicitly include those issues through environmental and social concerns (Gillan et al., 2021). Therefore, CSR and ESG can be used as synonyms (e.g. Gillan et al., 2021; Garcia et al., 2017 and Li et al., 2021).

[9] Please see "Who Cares Wins". https://www.ifc.org.

Overall, there is no consensus about the clear definitions of ESG, leading to the development of various theoretical frameworks to explain the ESG (e.g. McWilliams et al., 2006; Li et al., 2021). Notably, these include agency theory, stakeholder theory and institutional theory. In the context of agent perspective, agency theory posits that managers engage in ESG due to self-serving behavior and consequently maximize their wealth. In term of stakeholder perspective, stakeholder theory stresses engaging in ESG to satisfy the expectation of stakeholders rather than only meet the demand of shareholders. Moreover, institutional theory suggests that organization have homogeneous characteristics within the same field due to institutional pressure. As a result, corporations operate within a social framework of norms through incorporate ESG activities.

3. Literature review and Hypothesis development

3.1 Environmental provisions as symbolic practice

The environmental (E), social (S), and governance (G) pillars within ESG exhibit different impact on financial performance (Friede et al., 2015). Among them, the environmental aspect has been a foundational component of ESG analysis since its inception (Eccles et al., 2020), largely due to the opacity of environmental information, which makes it more susceptible to manipulation (Badawi & Bartlett, 2024). For instance, during the 2015 "Dieselgate" scandal, Volkswagen used emission-cheating software to falsify emissions data, highlighting how environmental metrics can be exploited for symbolic rather than substantive gains. [10] Given these concerns, this study focuses on environmental provisions within the ESG-contingent compensation.

[10] The software, commonly referred to as a "defeat device", was integrated into the vehicles' engine control systems to identify conditions indicative of emissions testing. Upon detection, the software temporarily modified the engine's performance to achieve emissions levels compliant with regulatory standards, notably reducing nitrogen oxide (NOx) output to within legal limits. Conversely, during normal driving conditions, the engine operated in an alternative mode optimized for fuel efficiency and performance. This operational adjustment, however, resulted in NOx emissions that exceeded regulatory thresholds by up to 40 times, highlighting a deliberate circumvention of environmental compliance standards. https://www.bbc.com/news/business-34324772.

In terms of agency theory, there are two reasons why environmental provisions incentive executives to engage in symbolic practices. First, diverting corporate resources toward social causes has traditionally been viewed as a misuse of shareholder funds, given that maximizing profit is considered a firm's primary social responsibility (Friedman, 1962; Friedman, 1970). Under this perspective, corporate social responsibility (CSR) is not only regarded as an inefficient use of resources that detracted from profit-maximizing objectives, but also as evidence of misaligned managerial priorities, potentially harming shareholder wealth. For instance, activists regard as engaging in CSR that prevent firms from maximizing shareholder value in short term and consequently making them attractive targets for hedge funds (e.g. DesJardine et al., 2021; Duquette & Ohrn, 2018). Among the three ESG pillars, the environmental pillar is the least observable and most difficult to measure, unlike the social and governance pillars, which are relatively easier to assess (Bothello et al., 2021). As a result, incorporating environmental provisions into executive compensation may encourage managers to misallocate resources and emphasize symbolic actions over substantive outcomes (Cho et al., 2015; Marquis & Toffel, 2012).

Second, CEOs may use CSR initiatives as an entrenchment strategy to enhance their reputations (Barnea & Rubin, 2010), protect control benefits (Leuz et al., 2003), and advance career prospects (Cespa & Cestone, 2007). When pursued symbolically rather than substantively, such initiatives enable CEOs to extract rents by using corporate resources for personal gain rather than shareholder value. Environmental-contingent compensation, which ties CEO rewards to environmental targets, is particularly vulnerable to this behavior. Because environmental metrics are often vague and difficult to verify, CEOs have strong incentives to meet targets symbolically—through superficial or easily achieved actions—rather than through meaningful environmental improvements (Badawi & Bartlett, 2024; Bebchuk & Tallarita, 2022). As CEOs seek to impress

boards and secure contract renewals, they are more likely to favor symbolic over substantive CSR, especially in the earlier periods of adoption.

According to institutional theory, which suggests that corporations operate within the boundaries of social norms in a given environment, as firms rely on external social approval to ensure survival (Meyer & Rowan, 1977; DiMaggio & Powell, 2000). In other words, corporations adapt their features and practices to align with the characteristics of their environment. This process of adaptation and homogenization is referred to as isomorphism (Hawley, 1968). DiMaggio and Powell (2000) identify three forms of isomorphism: coercive pressures (e.g., regulatory mandates), mimetic pressures (e.g., imitation of industry peers), and normative (e.g., professional standards). In the context of environmental governance, firms might adopt environmental provision not as a strategic but as a response to institutional pressures (e.g. Haque & Ntim, 2020; Campbell et al., 2007; Mahoney and Thorn, 2006). For instance, firms in environmentally sensitive industries often adopt ISO 14001 certifications or publish sustainability reports to signal compliance with stakeholder expectations, even when such actions decouple from actual environmental performance (e.g., Boiral, 2007; Chowdhury & Jayaram, 2018). Moreover, voluntary ESG practices are more likely to be symbolic actions without sanctions mechanism (Delmas & Montes-Sancho, 2010).[11] This decoupling demonstrates a symbolic approach to legitimacy, in which corporations prioritize appearances over substantive change (e.g., Walker & Wan, 2012; Bothello et al., 2023).

From the agency theory and institutional theory perspectives, we hypothesize that environmental provisions in ESG-contingent compensations incentive executives to engage into

[11] In the present, the practice of adopting environmental provisions is a voluntary practice in U.S.

symbolic environmental initiatives to improve environmental performance. Thus, our first hypothesis is:

H1a *The environmental provisions in ESG-contingent compensation improve the symbolic environmental performance rather than substantive environmental performance.*

3.2 Environmental provisions as substantive practice

In contrast to agency theory and institutional theory, stakeholder theory provides the opposite side of theoretical tension. Stakeholder theory posits that engaging in Corporate Social Responsibility (CSR) brings value to stakeholders. It emphasizes the relationship between corporate actions and the value they generate for individuals or groups impacted by those actions. According to this view, ESG-contingent compensations are considered as an effective managerial tool and thus positively impact ESG performance (e.g., Flammer et al., 2019; Ikram et al., 2023). By linking compensation to performance, ESG-contingent compensation can redirect executives' attentions towards stakeholders and consequence contribute long-term value creation such as improving corporate governance and its impact on society and natural environment. For instance, substantive environmental initiatives (e.g., improve carbon emission technology) enhance firms value by fostering stakeholder trust and preempting regulatory penalties (Nardi, 2022; Truong & Berrone, 2021). Moreover, firms with a stakeholder-oriented approach gain a competitive advantage through value creation by leveraging information and resources associated with their stakeholders (e.g., Harrison et al., 2010; Jones et al., 2018; McWilliams & Siegel, 2011).

Furthermore, when a firm's activities are perceived as being substantive by stakeholders, corporate philanthropy is likely to be more positively associated with firm value (e.g. Cuypers & Wang, 2016; Truong & Berrone, 2021). In contrast, symbolic environmental initiatives, often characterized by superficial actions, fails to meet stakeholder expectations and can erode trust and

credibility over time. Substantive environmental initiatives, however, aligns with stakeholder theory by fostering trust, demonstrating accountability, and delivering tangible benefits. Therefore, we conjecture that executives engage into substantive environmental initiatives, as those not only strengthen stakeholders' relationships but also enhance firms' long-term value.

From the stakeholder theory perceptive, we hypothesize that environmental provisions in ESG-contingent compensations incentive executives to engage into substantive environmental initiatives to improve environmental performance.

H1b *The environmental provisions in ESG-contingent compensation improve the substantive environmental performance rather than symbolic environmental performance.*

Appendix 1 summarizes literatures on the topic related to ESG-contingent compensation and ESG performance.

4. Data and Methodology

4.1 Sample selection

Our sample begins with 14,798 firm-year observations of S&P 500 companies between 2012 and 2018. [12] Following prior studies (e.g., Maas, 2018; Flammer et al., 2019; Ikram et al., 2023), we manually collect information on ESG provisions in ESG-contingent compensation from annual proxy statement filings (DEF 14A) provided by the U.S. Securities and Exchange Commission (SEC).

We merge the collected data with control variables, excluding public utility and financial firms. Financial information is obtained from COMPUSTAT and the Center for Research in

[12] According to Li and Thibodeau (2019), ESG data are more complete after 2013. Moreover, there are substantial sustainability disclosures report the companies link their compensations to ESG goals after UNPRI release guidance for integrating ESG goals to executive compensations in June 2012 (Lewis, 2016).

Security Prices (CRSP) database, and industry classifications are aggregated using the Fama-French 48 industry classification scheme. [13] Following Bizjak et al. (2019), we exclude firm-years with missing control variables in COMPUSTAT, as well as public utilities (Standard Industrial Classification [SIC] codes 4900–4940) and financial firms (SIC codes 6000–6999). After these steps, our final dataset comprises 6,511 firm-year observations.

Finally, we merge ESG scores from the MSCI ESG Stats (KLD) database, resulting in a final sample of 6,133 firm-year observations covering the period from 2012 to 2018. Within the final sample, only 1,075 observations include ESG provisions in executive compensation, but 4,916 observations do not include ESG provisions in executive compensations. [14] Panel A of Table 2 presents the data attrition process.

Panel B of Table 2 shows the distribution of ESG-contingent provisions over time. Among 1,075 observations with ESG provisions, environmental provisions are notably prominent, appearing in 222 cases (20.65%). Employee-related provisions dominate with 968 cases (90.05%), followed by diversity-related (54, 5.02%), human rights-related (19, 1.77%), and product-related provisions (203, 18.88%).[15] Figure 1 highlights an increasing trend in firms adopting ESG-linked contracts from 2012 to 2018, consistent with findings by Qin and Yang (2022). Notably, firms tend to prioritize provisions related to employees, environment, and diversity, aligning with prior research by Ikram et al. (2023) and Maas (2018), which emphasizes the frequent linkage of executive compensation to these ESG dimensions. [16]

[13] See https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/det_48_ind_port.html.
[14] There are 142 observations are missing because we could not find the DEF 14A file in firm year in SEC database (4916 + 1075 + 142 = 6133). For instance, we could only find the 2015 and 2017 DEF 14A files for Fiesta Restaurant Group, Inc. Therefore, we keep the missing value for this company in 2016.
[15] In here, the percentage is calculated each provision in ESG-contingent compensation in total. Firm adopt ESG-contingent compensation would include multiple provisions. For instance, SUNCOKE ENERGY INC (Ticker: SXC) adopt ESG-contingent compensation in 2012 include two provisions: Safety performance 15% and Environmental performance 15%.
[16] See Table 2 in in Ikarm et al., (2019) and Table 3 in Maas (2018).

In this study, we focus on the relationship between environmental provisions and environmental ESG performance. More importantly, we assess whether these provisions enhance performance through symbolic actions, such as surface-level compliance, or substantive efforts that reflect meaningful and enduring change. By doing so, we aim to provide deeper insights into the effectiveness and implications of ESG-contingent compensation design.

Panel C of Table 2 presents the distribution of ESG-contingent compensation across industries. The "Petroleum and Gas" industry stands out, adopting environmental-related provisions most frequently, with 130 instances. This aligns with prior research (e.g., Ikram et al., 2023; Flammer et al., 2019), which shows that firms in highly regulated, high-pollution industries, such as Oil and Petroleum Products, are more likely to implement ESG contracts to address stakeholder and regulatory scrutiny. [17] These industries face significant environmental challenges, such as pollution, resource depletion, and societal impact, making ESG provisions critical to incentivize executives toward environmental goals.

Moreover, cross-sectional tests reveal that high carbon-intensity industries are more likely to adopt ESG-contingent compensation linked to environmental provisions. Employee-related and environmental provisions dominate in these industries, reflecting a focus on employee safety and environmental issues. Interestingly, two non-emission-intensive industries—Business Services and Food Products—are also among the top adopters of ESG contracts, primarily linked to employee satisfaction and diversity. Overall, these findings underscore the importance of tailoring ESG provisions to industry-specific challenges and priorities.

[17] See Table 1 in Ikarm et al., (2019), they use the percentage to measure the firms provide ESG contracts, in contrast, our sample use the absolute number to measure the firm provide ESG contracts. Also, we exclude financials (SIC codes 6000–6999) and utilities (SIC codes 4910–4940), therefore, our financial and utilities sample is smaller. Referring Flammer et al. (2019), Table 2 in their paper suggests that carbon intensive industries like mining and gas are more likely to provide ESG contracts.

[Insert Table 2 here]

4.2 Dependent variable

4.2.1 CSR measures

Wood (1991) developed a corporate social performance (CSP) framework emphasizing the societal, stakeholder, and firm-level outcomes of corporate social responsibility (CSR) initiatives. CSP reflects a firm's accountability in addressing social responsibilities through ESG activities, providing non-financial information that helps stakeholders, particularly investors, identify risks and opportunities (Maas, 2018; Serban et al., 2022). Prominent ESG rating providers, including Kinder, Lydenberg, Domini (KLD), Sustainalytics, Moody's ESG, Refinitiv, MSCI (formerly KLD), and S&P Global, enable investors to evaluate firms' ESG performance (Berg et al., 2022).

This paper employs the KLD database as the primary ESG performance measurement and uses Refinitiv ESG (version 2) as an alternative.[18] The MSCI ESG STATS database, formerly known as the KLD database, categorizes firms' CSR ratings into strengths and concerns across seven dimensions: community, environment, employee relations, diversity, human rights, products, and corporate governance. Refinitiv ESG (version 2) provides global coverage and continuous numerical scores for various ESG metrics. While both databases track CSR performance, KLD offers broader historical coverage and is recognized as one of the most comprehensive measures of social and environmental performance (Shin et al., 2022). To maintain consistency, ESG provisions in this study are categorized according to KLD dimensions.

MSCI ESG research database provides the social and environmental performance of most listed companies worldwide. The KLD score falls into mainly six categories, including employee,

[18] Refinitiv has updated its ESG database, now referred to as Refinitiv ESG (version 2). The earlier version, known as version 1, was entirely based on the Asset4 ESG database.

environment, community, human rights, diversity and product. Each category contains strengths and concerns. The ESG performance is calculated by the total strengths minus total concerns:

$$Score_{i,t} = \sum_{t=1}^{t} Strength_{i,x} - \sum_{t=1}^{t} Concern_{i,y} \quad (1)$$

where $Strength_{i,x}$ is strength in x in the category i of firm i in year t, $Concern_{i,y}$ is the concern in y in the category i of firm i in year t. $Score_{i,t}$ is performance in the category i of firm i in year t.

4.2.2 Symbolic and substantive ENV score

The ESG decoupling proxy introduced by Hawn and Ioannou (2016), which focused on special ESG items of the former Asset4 (Refinitiv) database, has been widely used in recent studies (e.g., Velte, 2023; Bothello et al., 2023). We identify the ESG provisions in ESG-contingent compensations based on the KLD categories. Therefore, to maintain consistency, we map the symbolic environmental score to MSCI KLD based on the symbolic items in Hawn and Ioannous' method related to environment.

We construct substantive and symbolic environmental score using the following procedures: First, we collect all environmental indicators and their associated indices from MSCI KLD. Then, we follow Hawn & Ioannou (2016) and Bothello et al. (2023) to identify Refinitiv ESG Version 1 Code and define substantive and symbolic environmental score. Finally, we map Refinitiv Version 1 and KLD based on the description of each index. For example, ENPRD046 (Does the company make use of renewable energy?) corresponds to one strength category in KLD: ENV-STR-M (ENVIRONMENTAL OPPORTUNITIES – RENEWABLE ENERGY). Another example is ENRRDP052 (Does the company report about environmentally friendly or green sites or offices?) correspond to one strength category in KLD: ENV-STR-L (GREEN BUILDINGS). The items and mapping process is in Appendix 5. After mapping the items to KLD, we calculate the symbolic

and substantive environmental score through total strengths minus total concerns like eq. (1):

$$Symbolic\ ENV\ Score_{i,t} = \sum_{t=1}^{t} Strength_{i,t,sym} - \sum_{t=1}^{t} Concern_{i,t,sym} \quad (2)$$

$$Substantive\ ENV\ Score_{i,t} = \sum_{t=1}^{t} Strength_{i,t,sub} - \sum_{t=1}^{t} Concern_{i,t,sub} \quad (3)$$

where $Symbolic\ ENV\ Score_{i,t}$ is symbolic environmental score in MSCI KLD of firm i in year t, $Strength_{i,t,sym}$ is the strength for mapping symbolic categories in MSCI KLD of firm i in year t. $Concern_{i,t,sym}$ is the concern for mapping symbolic categories in MSCI KLD of firm i in year t.$Substantive\ ENV\ Score_{i,t}$ is substantive environmental score in MSCI KLD of firm i in year t, $Strength_{i,t,sub}$ is the strength for mapping substantive categories in MSCI KLD of firm i in year t. $Concern_{i,t,sub}$ is the concern for mapping substantive categories in MSCI KLD of firm i in year t. Moreover, as the ESG items of Refinitiv database have changed throughout the years, the original items of Hawn and Ioannou (2016) cannot be used for recent time periods. [19] Therefore, we construct symbolic and substantive environmental score based on the new version of Refinitiv database through mapping Refinitiv Version 1 and Version 2 based on the description of each index. The items and mapping process is in the Appendix 5.

A potential concern regarding our measure of symbolic and substantive environmental score is that it might not completely capture the symbolic and substantive environmental performance. To address this issue, we follow DesJardine et al. (2023) method to construct immaterial (symbolic) and material (substantive) environmental score according to SASB's industry-specific framework. The items and mapping process is in Appendix 6.

[19] Version 1 of Refinitiv ESG has been removed at the end of August 2023, and the Version 2 will be released in WRDS. Please see https://wrds-www.wharton.upenn.edu/pages/data-announcements/immediate-changes-to-refinitiv-esg/.

4.3 Explanatory variables

4.3.1. ESG provisions in ESG-contingent contract

To construct the ESG contract data, we manually collect the compensation data from annual proxy statements filed (form DEF 14A) within the U.S. Securities and Exchange Commission (SEC) to get the data related to ESG incentives for each firm in Standard & Poor's 500 Index (S&P 500) for the years from 2012 to 2018. To further identify the ESG-related criteria in compensation, we follow Maas (2018) and Ikram et al. (2023). Specifically, we search for the following keywords:

- Employee relations (to capture the phrases related to employee wealth like employee satisfaction, employee engagement, safety, teamwork, employee development, employee retention, employee turnover, health, safety and environment (HSE) and etc.)
- Community relations (like community development, community engagement, stakerholders, voluntary work, contribution to community and etc.)
- Environment relations (like environmental stewardship, environmental goals, sustainable related to environmental, emission reduction, health, safety and environment (HSE) and etc.)
- Product relations (like product quality, product safety, product innovation and etc.)
- Diverse/Diversity relations (e.g. diverisity, female inclusion, LGBT and etc.)
- Human right relations (like human right and etc.)
- Qualitative/Quantitative (to identify if there are any other ESG-related variables that firms specifically mention as qualitative measures linked to individual executive compensation component)
- Short-term/Long-term (to identify if there are any other ESG-related variables that firms specifically mention linked to short-term and long-term incentive plan)

Given those words help us to identify whether the corporations pay their executives to achieve ESG-related landmarks. Moreover, we take the value of 1 if the proxy statement indicates the executive remuneration linked to ESG-related landmarks and zero otherwise. For the ESG contract, we classify all our ESG-related variables into six categories similar to KLD categories (Employee, Community, Environment, Product, Human right, Diversity). For instance, *ENV Dummy* is an indicator that equals 1 if the firm adopts environmental provisions in fiscal year and otherwise 0. For our sample, it is possible that one ESG-contingent compensation includes multiple ESG dimensions.

4.3.2. Environmental provision diversity

The environmental provision diversity measured as dummy variable that whether the content of the environmental targets change or not compared with previous year. For instance, HESS corporation (Ticker: HES) in 2015 employed four metrics to measure their environmental, health and safety (EHS), including safety observations, Integrity Critical Equipment (ICE) performance standard implementation, high potential incident rate, and spills & releases gross BOE / gross operated MMBOE. In 2016, HESS corporation similarly employed four metrics to measure their EHS with different content, including Integrity Critical Equipment (ICE) performance standard implementation, high potential incident rate for safety and environmental and asset integrity assessments. Therefore, the environmental provision diversity of HESS in 2016 would be dummy equals to one because it changes ESG provision content.

4.3.3. Environmental provision difficulties

Performance-vesting (p-v) compensation typically includes multiple targets (Bettis et al., 2010), allowing us to assess the difficulty of environmental provisions relative to total provisions. We measure environmental provision difficulty as the percentage of environmental targets within a

firm's annual incentive plan. Following Locke and Latham (2002), a higher percentage indicates a more challenging hurdle, providing stronger incentives for executives to commit serious effort toward achieving substantive outcomes. Conversely, a lower percentage reflects easier-to-achieve targets, enabling executives to secure payoffs through symbolic actions rather than contributing meaningful value to the company. [20]

4.4 Firm Controls

We collect the control variables from CRSP and Compustat. These variables are categorized into three groups: firm fundamental, executive characteristics and corporate governance.

Based on previous studies (e.g. Flammer et al., 2019; Ikram et al., 2023; Maas, 2018; Qin & Yang, 2022), we include common financial controls that might affect the adoption of ESG-contingent compensation and the dependent variables of interest. For the firm fundamental, *Firm Size* is the natural logarithm of the total assets. *MTB* is the ratio of the market value to book value. *ROA* is the ratio of the income before extraordinary items scaled by total assets. *Cashholding* is the ratio of Cash and short-term investments scaled by total assets. *Volatility* is the standard deviation of monthly stock returns of the fiscal year (Qin & Yang, 2022). *Leverage* is the ratio of total debt scaled by total assets.

Prior research highlights the influence of executive characteristics on a firm's sustainable performance. For example, Hyun et al. (2020) find that female executives positively impact a

[20] We also consider an alternative measure of the difficulty of environmental provisions: task completeness, which reflects whether environmental targets are met, exceeded, or fully achieved (e.g., 100%, 150%, or 200%). However, the recent growth in adoption of ESG-based compensation suggests that firms are still trying to explore to set appropriate thresholds, making completeness a less reliable metric and difficult to gauge using same ruler. First, the frequent changes in environmental target criteria make it difficult to determine whether these targets are becoming more challenging over time. Second, the criteria may be adjusted to favor executives' ability to achieve completeness. For example, Celanese Corporation set an environmental target criterion of 40% (weight 5%) in 2015, which executives failed to meet. In 2016, the company revised the target to 6 (weight 5%), enabling executives to meet and exceed the goal. Overall, the use of task completeness as a measure of environmental provision difficulty is limited by inconsistencies and frequent changes in target criteria.

firm's ESG rating because female participation brings more attention to remediating CSR concerns. To capture this, we include a binary variable, *Female executive*, which equals 1 if the firm has at least one female executive (Ikram et al., 2023). Additionally, corporations often adjust CEO incentives, such as option grants, to align with ESG performance. Dunbar et al. (2020) show that CEO Vega, a measure of the sensitivity of CEO wealth to stock return volatility, can significantly correlate with both ESG performance and ESG contingent compensation. Specifically, firms with improved CSR status tend to increase Vega, encouraging CEOs to leverage the enhanced risk capacity created by CSR initiatives. This relationship is particularly pronounced in firms with strong corporate governance. To control for these effects, we introduce two variables: *CEO Delta*, which measures the sensitivity of CEO wealth to stock price changes, and *CEO Vega*, reflecting the sensitivity of CEO wealth to stock return volatility (Coles et al., 2006). Lastly, we also include *Total Compensation*, which measures the overall remuneration of executives, to account for the broader financial incentives influencing decision-making.

We also account for corporate governance factors that may influence ESG performance. Strong corporate governance can encourage firms to incorporate ESG dimensions into compensation plans by prioritizing long-term value and enhancing corporate social responsibility. For example, Aguilera et al. (2015) highlight that six external governance mechanisms can prevent managers from engaging in ESG activities that fail to maximize stakeholders' long-term value, which would negatively impact firm value. To measure corporate governance, we introduce the *E-Index* (entrenchment index) developed by Bebchuk et al. (2009). This index is based on six governance provisions: staggered boards, limits on shareholder bylaw amendments, poison pills, golden parachutes, and supermajority requirements for mergers and charter amendments. The E-Index ranges from 0 to 6, with higher values indicating greater managerial entrenchment and,

consequently, weaker corporate governance.

5. Model Specifications and Empirical Result

5.1 Descriptive statistic

Table 2 show the summary statistics. The dependence variables for *Symbolic ENV Score* have the mean (median) of 0.033 (0.000) and *Substantive ENV Score* have the mean (median) of 0.501 (0.000). Regarding explanatory variable, *ENV Dummy* has the mean (median) of 0.042 (0.000). Figure 1 show the trend of ESG-contingent compensation with different provisions in our sample.

[Insert Table 2 and Figure 1 here]

5.2 Baseline regression analysis

5.2.1 Environmental provision and symbolic vs. substantive environmental practices

Hypothesis 1 investigates the whether the adoption of ESG contract linked to environmental provisions improve the symbolic environmental performance or the substantive environmental performance. We formally use the following model to test this relationship:

$$Symbolic\ ENV\ Score_{i,t} = \alpha + \beta_1\ ENV\ Dummy_{i,t} + Controls + \gamma_{i,t} + \delta_{i,t} + \theta_{i,t} + \varepsilon_{i,t} \quad (4)$$

$$Substantive\ ENV\ Score_{i,t} = \alpha + \beta_1\ ENV\ Dummy_{i,t} + Controls + \gamma_{i,t} + \delta_{i,t} + \theta_{i,t} + \varepsilon_{i,t} \quad (5)$$

where $Symbolic\ ENV\ Score_{i,t}$ is symbolic environmental score in MSCI KLD of firm i in year t. $Substantive\ ENV\ Score_{i,t}$ is substantive environmental score in MSCI KLD of firm i in year t. And $ENV\ Dummy_{i,t}$ is the indicator variable that equals one if firm i in year t adopt ESG-contingent compensation linked to environmental provisions and zero otherwise. The lagged

independent variables are not considered here because serval reasons. First, according to Bellemare and Pepinsky (2017), lagged variables are appropriate only under specific conditions, such as the absence of reverse causality or when reverse causality is contemporaneous and does not influence the temporal dynamics of the dependent variable.[21] Second, literatures suggest that symbolic practices produce short-term effects rather than long-term effects (e.g., Berrone et al., 2009; Truong et al., 2021; Zajac & Westphal, 2004). This temporal limitation makes lagged variables unsuitable for accurately capturing the immediate and transient nature of symbolic actions. Therefore, employing lagged independent variables in the analysis of symbolic practices risks misrepresenting the underlying causal relationships and theoretical assumptions. Finally, $\gamma_{i,t}$ captures firm fixed effects, $\delta_{i,t}$ captures industry fixed effects and $\theta_{i,t}$ captures year fixed effects to control for firm, industry and year invariant effects. All control variables are described in Appendix 2.

Table 3 presents the result of Hypothesis 1. Column (1) and (2) present the baseline regression result without including control variables, whereas Column (3) to (6) present the baseline regression including control variables. Column (1) indicates that coefficient of *ENV Dummy* is 0.191, suggesting positive association between environmental provisions and symbolic environmental performance. Column (3) shows *ENV Dummy* is significantly and positively associated with *Symbolic ENV Score* ($\beta_{ENV\ Dummy} = 0.187,\ p = 0.037$), which suggests that compared with non-environment-contingent compensation, environment-contingent

[21] In scenarios where reverse causality is contemporaneous but unobserved factors (U_t) exhibit temporal dynamics, lagging the independent variable (X_t) fails to resolve endogeneity. This is because the lagged variable (X_{t-1}) remains correlated with the unobserved factors that influence the outcome (Y_t), effectively shifting the endogeneity problem to an earlier time period. Moreover, when the causal relationship between X_t and Y_t is contemporaneous, using X_{t-1} incorrectly assumes that the effect operates with a lag, leading to mis-specified models and biased estimates. These biases can be even larger than those from ignoring endogeneity altogether, particularly when unobserved factors are highly autocorrelated. Therefore, lagged variables are unsuitable when unobservable confounders and reverse causality dynamics are present.

compensation is more likely to improve subsequent symbolic environmental performance. Column (4) shows the coefficient of *ENV Dummy* is insignificantly, meaning that environmental provisions in ESG contingent compensation do not spur substantive environment performance. In terms of economic significance, one standard deviation increases in *ENV Dummy* is associated with 0.037 (0.187 * 0.201) S.D. increase in *Symbolic ENV Score*.

We perform a channel test to determine whether the improvement in environment-related ESG scores associated with the ENV dummy arises from symbolic or substantive environmental activities. Following Hermansson et al. (2022) methodology, we include *Symbolic ENV Score*, *Substantive ENV Score* separately into baseline regression. If *ENV dummy* increases *ENV KLD score* through symbolic channel, we should observe the coefficient of *ENV dummy* will be insignificant, but the channel will be significant (fully mediated). If *ENV dummy* is still significant but coefficient reduces, that will be partial mediation. Column (5) and (6) show the result of channel test.

In column (5), the ENV Dummy is insignificant for the *ENV KLD Score*, while the Symbolic ENV Score is significant, indicating that the impact of environmental provisions on overall environmental dimension of ESG score (*ENV KLD Score*) is fully mediated through the symbolic channel. Conversely, in column (6), both the *ENV Dummy* and *Substantive ENV Score* are significant and the coefficient of the *ENV Dummy* does not decrease, suggesting that substantive environmental actions do not mediate the effect of environmental provisions on the ENV score. Furthermore, our untabulated results reveal that only environmental provisions are significantly and positively associated with environmental performance. [22]

Panel A of Table 5 presents robustness checks using alternative measures of symbolic and

[22] In Appendix 3, ENV Dummy is positive and significant at 1% level to environmental performance.

substantive environmental performance, as well as environmental provisions. Specifically, we replace the Symbolic ENV Score with the Immaterial ENV Score and the Substantive ENV Score with the Material ENV Score, following DesJardine et al. (2023). These scores are constructed based on SASB's industry-specific framework, which distinguishes between financial materiality, with material ENV focusing on financially significant aspects and immaterial ENV on less financially impactful factors.

In columns (1) and (2), the *ENV Dummy* is significantly positively associated with the *Immaterial ENV Score* but shows no significant relationship with the *Material ENV Score*. Notably, firms adopting environmental provisions experience a 0.155-point higher *Immaterial ENV Score* compared to non-adopting firms. Similarly, in columns (3) and (4), using Refinitiv ESG scores to construct symbolic and substantive measures, we find a significant positive relationship with the *Symbolic Refinitiv ENV Score*, while the relationship with the *Substantive Refinitiv ENV Score* remains insignificant.[23]

Panel B of Table 5 shows the robustness tests by using Global Industry Classification Standard (GICS) as alternative measures of industry fixed effects. The results remain consistent with *ENV Dummy* is positively significant with *Symbolic ENV Score* and insignificant with *Substantive ENV Score.*

Overall, the results suggest that incorporating environmental provisions into ESG-contingent compensation motivates managers to prioritize symbolic environmental actions over substantive ones. This finding supports H1a but rejects H1b, indicating that agency theory outweighs stakeholder theory. Additionally, environmental provisions enhance environmental performance primarily by improving symbolic outcomes.

[23] In untabulated results, we also find that the impact of the ENV Dummy on overall ENV scores occurs through the improvement of immaterial ENV scores, as the effect is fully mediated by this channel.

[Insert Table 3 and Table 4 here]

5.2.2 Addressing endogeneity concerns

Our study faces three potential endogeneity concerns: reverse causality, sample selection bias, and unobserved omitted variables. First, reverse causality may occur if firms implement stricter ESG provisions when their ESG performance is largely symbolic. Second, sample selection bias arises because firms that adopt ESG-contingent compensation linked to environmental provisions may differ from those that do not, and factors influencing adoption could be correlated with symbolic environmental performance. Third, unobserved omitted variables may bias our results if factors affecting both the dependent and independent variables are excluded from the regression model. To address these endogeneity concerns, we perform three quasi-natural experiments to strengthen causal evidence.

5.2.2.1 Fuzzy DiD approach

To address endogeneity concerns, we use State Climate Change Adoption Plans (SAP) as exogenous shocks. U.S. states voluntarily implement SAPs to prepare for climate change impacts (e.g., Ray & Grannis, 2015; He et al., 2023). These plans, tracked and publicly reported by the Georgetown Climate Center, vary in adoption and implementation timelines.[24] While market forces primarily drive the adoption of ESG provisions (as noted by the Conference Board), firms in states with SAPs are more likely to adopt environmental provisions, both to signal their commitment to environmental performance and to influence other firms in the state to follow suit.[25] Therefore, SAP adoption serves as a useful exogenous shock to examine environmental

[24] Please see https://www.georgetownclimate.org/adaptation/plans.html.
[25] Please see https://www.conference-board.org/pdfdownload.cfm?masterProductID=41301.

provisions in compensation. Between 2012 and 2018, 34 states initiated SAPs, with 17 finalizing them. Notably, the finalization of SAPs indicates a stronger commitment to substantive environmental action. We use the first adoption of SAPs as exogenous shocks to capture the potential symbolic performance of firms in those states. [26] This shock is appropriate for two reasons: (1) it is random, as state-level SAP adoption is voluntary, with treatment groups being states that adopted SAPs and control groups being states that did not; and (2) it is unlikely to be influenced by symbolic environmental performance, as early adopters of SAPs are motivated by a need to address climate change through substantial environmental practices. Based on this, we estimate a fuzzy DiD model following He et al. (2023).

$$Symbolic\ ENV\ Score_{i,t} = \alpha + \beta_1\ SAP_{i,t} + Controls + \gamma_{i,t} + \delta_{i,t} + \theta_{i,t} + \varepsilon_{i,t} \quad (5)$$

where $Symbolic\ ENV\ Score_{i,t}$ is symbolic environmental score in MSCI KLD of firm i in year t. And $SAP_{i,t}$ is the indicator for whether the firm's historical headquarter state first adopt the SAP. Finally, $\gamma_{i,t}$ captures firm fixed effects, $\delta_{i,t}$ captures industry fixed effects and $\theta_{i,t}$ captures year fixed effects to address the concern that results are driven by invariable characteristics. And the standard errors clustered at firm level. All control variables are described in Appendix 2.

Following fuzzy DiD model (equation 5), we conduct the empirical test and document the results in Table 5. The treatment group is firms within states adopting SAP, while the control group is firms outside states adopting SAP. First, we test whether firms within states adopting SAP are more likely to adopt the environmental provision. In the Column (1), we find that there is a positive and significant relationship between SAP and environmental provisions ($\beta_{SAP} = 0.032,\ p = 0.061$). In Column (2), *SAP* is positive and significant at 10% level to *Symbolic ENV Score*

[26] The appendix 4 shows the timeline of first adoption of SAP.

($\beta_{SAP} = 0.061,\ p = 0.064$). Specifically, compared with control firms, treated firms have 0.061 significantly higher symbolic environmental performance outcomes during the post SAP adoption period.

To validate the quasi-natural experiment, we test for parallel trends to confirm that the staggered treatment effect of SAP on symbolic environmental performance is not influenced by pre-existing differences between treatment and control firms. We use a dynamic DiD regression framework to pinpoint the timing of the treatment effect. Figure 2 illustrates the parallel trend, and Table 6 presents the results. The coefficients for the pre-treatment periods (*Pre2* and *Pre1*) are close to zero and not significant, supporting the parallel trends assumption. Additionally, the *Post1* coefficient is positive and significant, indicating a treatment effect following SAP implementation. In column (1), the coefficients for *Pre2, Pre1*, and *Current* are small and insignificant, while the *Post1* coefficient is larger and significant at the 5% level.[27]

Moreover, to mitigate the influence of the random factors that impact the significant of the SAP, we create a "pseudo treatment group" through random sampling following La Ferrara et al. (2012). To formally conduct the placebo test, we randomly assign the treatment firms and control firms and then replicate the fuzzy DiD tests. We repeated this process for 1,000 times and find that those pseudo treatment effects are not significantly different from zero. Figure 3 presents the kernel density map of those estimated pseudo-DiD coefficients with the mean of zero and SD of 0.03.[28] The actual DiD coefficient, 0.061, is statistically different from those pseudo-DiD coefficients – zero. In particular, the t-statistic of the actual coefficient for SAP is statistically significant and different from coefficients in pseudo DiD tests.[29] In addition, we use the McCrary density

[27] *Post 2* drop significantly because symbolic practices typically have short-term effects. Furthermore, once the SAP is fully finalized, it becomes challenging for firms to continue engaging in symbolic actions.
[28] Two-side p-value is 0.016 and 95% confidence level, therefore, the standard deviation = (0.060898 / 1.96) = 0.0311.
[29] Two-side p-value is 0.016, right-side p-value is 0.090 and the left-side p-value is 0.991. These results are untabulated.

discontinuity test (2008) as a robustness check that quasi-random assignment assumption underlying the fuzzy DID identification. The result is showed in Appendix 7. We use the firm leverage (*Leverage*) as variable with threshold of 0.238 and fixed bandwidth (0.05, 0.06 and 0.07) and optimal bandwidth. Both discontinuity estimates are negative and significant at 5% and 10% confidence levels. For instance, with a bandwidth of 0.05, the discontinuity estimate is -0.8897 ($p < 0.05$) with a 95% confidence interval from -1.7512 to -0.0282. The Figure 5 shows the manipulation test with the bandwidth of 0.05, showing a slight downward shift in the density at the threshold. Those results provide weak evidence of manipulation around the cutoff, supporting the quasi-random assignment assumption underlying the fuzzy DID identification. Overall, those findings suggest that the parallel trend assumption for our fuzzy DiD approach is satisfied and not caused by random variation.

In addition, there are several concerns regarding our fuzzy DiD regression. First, the early-treated firms are used as control firms for later-treatment firms (Baker et al., 2022). Second, the initial adoption of SAP is not completely exogenous since there are some unobserved time-varying variables associated with both likelihood for state to adopt SAP and improving symbolic environmental performance. Therefore, to address the concerns above, we employ stacked cohort DiD following Gormley and Matsa (2011). Specifically, for each initial adoption event, we form a cohort. For instance, we identify firms that headquartered in the initial adoption of SAP state *S* as treated firms, and match the treated firms in the initial adoption event with control firms whose headquarters states never adopt SAP form a cohort c. Finally, we stack all cohorts together to form the final stacked cohort DiD sample. Table 7 shows the result of stacked cohort DiD. The effect of *SAP* is still significant and positive for treatment groups relative to control groups. The economic magnitude is comparable: on average, the treated firms improve 0.077 symbolic

environmental score relative to control firms after initial SAP adoption, where the positive effect is 0.061 in the staggered DiD regression.

[Insert Table 5, Table 6, Table 7, Figure 2, Figure 3 and Figure 5here]

5.2.2.2 Instrumental variable approach

Similar to Mei et al. (2024) and Chang et al. (2018), we use the percentage of environmental provisions adoption for other peer firms in the same industry and same state as an instrumental variable (variable name: $ENV\ Dummy_{(peer)}$). [30] The proposed instrumental variable is considered appropriate if it meet the following two conditions: (1) (relevance condition) it is strongly correlated with the independent variable—the environmental provisions dummy—and (2) (exclusion condition) it is unlikely to be correlated with the dependent variable—symbolic environmental performance. This is because corporations within the same locations confront similar local labor market conditions and have strong social relationships with neighboring firms (Kedia and Rajgopal, 2009). Moreover, we select the percentage of adoption of environmental provisions as our instrument to alleviate their direct influence on symbolic environmental performance. This is because the motivation to adopt environmental provisions is not geared toward symbolic environmental performance among similar firms. In addition, the environmental performance is less likely to correlate to the percentage of adopting ESG-contingent compensations for other firms. We estimate the following two-stage least square (2SLS) model:

$$1st\ Stage: ENV\ Dummy_{i,t} = \alpha + \beta_1\ ENV\ Dummy_{(peer)_{i,t}} + Controls + \gamma_{i,t} + \delta_{i,t} + \theta_{i,t} + \varepsilon_{i,t} \quad (6)$$

[30] We use the IV from the same industry because it is hard to say that low pollution industry firm would imitate the high industry firm to adopt the similar environmental provisions.

$$2nd\ Stage: Symbolic\ ENV\ Score_{i,t} = \beta_1\ ENV\ \widehat{Dummy}_{\iota,t} + Controls + \gamma_{i,t} + \delta_{i,t} + \theta_{i,t} + \varepsilon_{i,t} \quad (7)$$

where $ENV\ Dummy_{(peer)_{i,t}}$ is percentage of environmental provisions adopted for other peer firms in the same industry and same state in year t. Finally, $\gamma_{i,t}$ captures firm fixed effects, $\delta_{i,t}$ captures industry fixed effects and $\theta_{i,t}$ captures year fixed effects to address the concern that results are driven by invariable characteristics. And the standard errors clustered at firm level. All control variables are described in Appendix 2.

Table 8 shows the result of two-stage instrumental variable approach. Column (1) presents the 1st stage regression model where we regress the independent variable, *ENV Dummy*, on instrument variable, $ENV\ Dummy_{(peer)}$. The coefficient of the $ENV\ Dummy_{(peer)}$ is 1.245 and significant at the 1% level, indicating that firms surrounded by peers in the same industry adopting environmental provisions are more likely to implement similar ESG contracts. This aligns with Kedia and Rajgopal (2009), who describe a spillover effect, where peer firms' compensation structures influence those of focal firms. Besides, the Stock-Yogo test score of 129.872 exceeds the critical threshold, confirming that $ENV\ Dummy_{(peer)}$is a strong instrumental variable. [31]

Column (2) of Table 8 presents the 2nd stage regression results where the dependent variable is *Symbolic ENV Score* and the independent variable is the predicted ENV Dummy, $ENV\ \widehat{Dummy}$. The coefficient of the $ENV\ \widehat{Dummy}$ is 0.401 and significant at the 1% level. This supports the expectation that adopting ESG contracts tied to environmental provisions is more likely associated with symbolic practices.

[31] According to Stock and Yogo (2002), Stock-Yogo Test is used to test whether the given instrumental variables are weak. The critical value for the Kleibergen-Paap statistic based on the Stock-Yogo weak instrument test with a size distortion of maximum 5% and one just-identified endogenous variable is 16.38.

[Insert Table 8 here]

5.2.2.3 Propensity Score Matching (PSM) approach

To further alleviate the endogeneity concern, we adopt propensity score matching (PSM) techniques to control the selection bias and reduce divergence in covariates between the treatment and control groups (Rosenbaum & Rubin, 1983). We use the kernel matching to match firms adopt environmental provisions to those without adoption in our test, which using weighted averages of the outcomes of all individuals in the control group (Heckman et al., 1997). The logit model based on PSM is constructed as follows:

$$Logit(ENV\ Dummy_{i,t}) = \alpha + \beta_1\ Predictors_{i,t} + \gamma_{i,t} + \delta_{i,t} + \theta_{i,t} + \varepsilon_{i,t} \quad (8)$$

$$Symbolic\ ENV\ Score_{i,t} = \beta_1\ ENV\ Dummy_{i,t,after\ matching} + Controls + \gamma_{i,t} + \delta_{i,t} + \theta_{i,t} + \varepsilon_{i,t} \quad (9)$$

where $Predictors_{i,t}$ is predicator variables for each firm based on the observable similarities in firm-specific characteristics, year and industry. We further matched adoption firms (treatment sample), and non-adoption firms (control sample) based on their propensity scores by using the kernel matching approach. Finally, $\gamma_{i,t}$ captures firm fixed effects, $\delta_{i,t}$ captures industry fixed effects and $\theta_{i,t}$ captures year fixed effects. Further details of the descriptive statistics after matching are presented in Appendix 7.

Table 9 shows the result of PSM approach. Column (1) presents the first stage of PSM, where we compute propensity scores for each firm based on the observed similarities in firm-specific characteristics, year, industry and country. We further matched firms with adopting environmental provisions and firms without adopting environmental provisions based on their

propensity score by using the kernel matching approach. Figure 4 and Appendix 7 further shows the balance test comparing the pre-match and post-match, suggesting most covariates are improved after matching. Column (2) shows the result of re-estimated Eq (4) through matched sample. The coefficient of the independent variable is 0.149 and significant at 5% level, which indicates that environmental provision improves symbolic environmental performance.

[Insert Table 9 and Figure 4 here]

5.3 Extensional Tests

Our baseline results reveal that environmental provisions in ESG-contingent compensation tend to incentivize symbolic over substantive environmental performance (H1a), the mechanisms driving this preference remain unexplored. To explore the contractual processes behind this association, we apply multitask agency theory (Holmström & Milgrom, 1991), which identifies task diversification and task easiness as inherent design features shaping effort allocation in complex incentive systems. By examining these dimensions, we test whether symbolic practice arises from contractual complexity and task easiness.

5.3.1 Environmental provision diversification and symbolic environmental practices

The multitask setting introduces significant challenges to incentive design, as incentives influence not only effort direction, duration, and intensity but also strategy development (Bonner & Sprinkle, 2002). While multitask incentives aim to encourage executives to focus on multiple CSR dimensions and increase their efforts, they can have unintended consequences. For instance, frequently revising targets to optimize incentives may confuse managers and temporarily reduce performance (e.g., Naylor & Clark, 1968; Naylor & Dickinson, 1969). Additionally, when rewards remain constant, individuals tend to prioritize less demanding tasks to achieve quicker results

(Bonner & Sprinkle, 2002).

CEOs with shorter contracts often prioritize symbolic actions due to limited attention and the pressure to show quick results (Chen et al., 2024). Similarly, as environmental provisions in ESG-contingent compensation become more diversified, executives may face increased difficulty in allocating attention and resources effectively. Diversified provisions demand simultaneous focus on multiple areas, leading executives to prioritize symbolic practices that are easier to implement and appear to fulfill requirements without achieving substantial outcomes. This behavior can be seen as a form of "greenwashing," where firms use symbolic ESG actions to project an image of environmental responsibility while avoiding substantive changes (Bethello et al., 2023).

In this context, diversified environmental provisions in ESG-contingent compensation may lead executives to favor symbolic actions over substantive ones. As the range of environmental provisions diversifies, the time and effort required to address these provisions increase, leaving executives with limited capacity to implement substantive practices. Instead, they may choose symbolic actions that signal compliance without meaningful outcomes. Thus, we propose that greater diversification of environmental provisions is positively associated with symbolic environmental performance.

To investigate whether symbolic environmental practice initiation is positively associated with diversity of environmental provision in ESG-contingent compensation. We use the context change to measure the diversification of environmental provisions. For instance, Coeur Mining, Inc. adopt four subcategories to measure the environmental performance for executives, whereas it adopts two other subcategories to measure in the next year.[32] We formally use the following

[32] Please see Coeur Mining, Inc. Form DEF 14A filed on Mar-28-2018 (capitaliq.com) and Coeur Mining, Inc. Form DEF 14A

model to test this relationship:

$$Symbolic\ ENV\ Score_{i,t} = \alpha + \beta_1\ ENV\ Change_{i,t} + Controls + \gamma_{i,t} + \delta_{i,t} + \theta_{i,t} + \varepsilon_{i,t} \quad (10)$$

where $Symbolic\ ENV\ Score_{i,t}$ is symbolic environmental score in MSCI KLD of firm i in year t. And $ENV\ Change_{i,t}$ is the indicator variable that equals one if firm i in year t change the context of environmental components in contract and zero otherwise. Finally, $\gamma_{i,t}$ captures firm fixed effects, $\delta_{i,t}$ captures industry fixed effects and $\theta_{i,t}$ captures year fixed effects to address the concern that results are driven by invariable characteristics. All control variables are described in Appendix 2.

Table 10 presents the results on the relationship between environmental provision diversification and symbolic environmental performance. In Column (1), the coefficient of *ENV Change* is 0.178 and significant at the 5% level, indicating that greater diversification of environmental provisions enhances symbolic environmental performance. These findings support Hypothesis 2, confirming that the initiation of symbolic environmental practices is positively associated with the diversification of environmental provisions in ESG-contingent compensation.

[Insert Table 10 here]

5.3.2 Environmental provision intensity and environmental performance

Incentive intensity plays a critical role in compensation design, as it not only motivates effort but also attracts higher-caliber talent to participate in compensation plans (Ehrenberg & Bognanno, 1990; Lazear & Rosen, 1981). Locke and Latham (2002) further suggest that incentives tied to

filed on Mar-28-2019 (capitaliq.com). In 2017 fiscal year, firm set four targets (No Employee Fatalities, Reduce TRIFR by 20%+, Reduce Immediately Reportable Spills by 20%+ and No NOVs) for executives and only two targets (Reduction in Companywide TRIFR and Decrease in Significant Spills) for executives in 2018 fiscal year. By analyzing the context of environmental provision, we could measure the diversity of environmental provisions.

moderately challenging goals elicit the highest levels of effort, while very easy or overly difficult goals lead to the lowest levels of effort. Supporting this, Bettis et al. (2018) argue that risk-taking incentives exhibit a convex relationship with performance hurdles in compensation plans, indicating that the optimal hurdle should balance difficulty and achievability to maximize performance.

Similarly, Mei et al. (2022) find a convex relationship between risk-taking incentives and hurdle difficulty, emphasizing that moderately challenging hurdles optimize outcomes. Achievable but demanding goals push individuals toward substantive performance, as substantive practices require sustained effort, strategic planning, and a long-term commitment to success. In contrast, easier hurdles may encourage symbolic practices, which allow for the appearance of compliance with minimal effort or genuine engagement. This dynamic suggests that the design of ESG-contingent compensation provisions plays a crucial role in determining whether executives pursue substantive or symbolic environmental practices.

When ESG-contingent provisions are less difficult, executives face fewer incentives to take risks or invest substantial effort. Instead, they are more likely to engage in symbolic actions that create the appearance of compliance without requiring meaningful change. This approach allows executives to maintain a "quiet life," avoiding the challenges and complexities associated with substantive environmental practices. By minimizing effort and risk, they can satisfy the requirements of ESG provisions superficially while preserving their own convenience and stability. Consequently, easier ESG provisions in compensation plans are more likely to be associated with symbolic, rather than substantive, environmental practices. Thus, we propose that easiness of environmental provisions is positively associated with symbolic environmental performance.

To examines whether the initiation of symbolic environmental practices is positively associated with the ease of environmental provisions in ESG-contingent compensation. We measure the difficulty of environmental provisions using their environmental provision percentage out of total provisions, with higher percentages indicating a more prominent and challenging task. However, because environmental provisions inherently carry non-zero weights when granted, it is challenging to determine whether they are becoming easier or harder over time. To address this, we use changes in the weights of environmental provisions as a measure of their ease. We establish the following model:

$$Symbolic\ ENV\ Score_{i,t} = \alpha + \beta_1\ Easiness_{i,t} + Controls + \gamma_{i,t} + \delta_{i,t} + \theta_{i,t} + \varepsilon_{i,t} \quad (11)$$

where $Symbolic\ ENV\ Score_{i,t}$ is symbolic environmental score in MSCI KLD of firm i in year t. And $Easiness_{i,t}$ is the indicator variable that equals one if the weight of environmental provision changes less or equals to zero in year t and otherwise zero. Finally, $\gamma_{i,t}$ captures firm fixed effects, $\delta_{i,t}$ captures industry fixed effects and $\theta_{i,t}$ captures year fixed effects to address the concern that results are driven by invariable characteristics. All control variables are described in Appendix 2.

Table 11 presents the association between the ease of environmental provisions and symbolic environmental performance. In Column (1), the coefficient of the independent variable is 0.247 and significant at the 1% level, indicating that easier environmental goals positively enhance symbolic environmental performance. This aligns with findings by Bebchuk and Tallarita (2022), which suggest that corporations set easy-to-achieve goals to incentivize executives to engage in symbolic efforts, ultimately increasing their payoffs. Overall, these results support Hypothesis 3, confirming that the initiation of symbolic environmental practices is positively

associated with the ease of environmental provisions in ESG-contingent compensation.

[Insert Table 11 here]

6. Cross-sectional Tests

6.1 Low vs. high intangible

Substantive CSR initiatives improve firm performance by enhancing intangible resources such as human capital, knowledge capital, and corporate reputation (Hawn & Ioannou, 2016; Bothello et al., 2023). In contrast, symbolic CSR initiatives often negatively impact corporate reputation due to their lack of genuine commitment (Cho et al., 2012; Truong et al., 2021). Intangible resources play a critical role in enabling firms to implement substantive CSR actions. Firms with insufficient human capital, technical expertise, or knowledge assets like green patents may lack the capacity to execute real CSR actions, resorting instead to symbolic efforts as a facade of environmental responsibility. However, it remains unclear whether firms with greater intangible resources demonstrate better environmental performance when environmental provisions are included in executive compensation plans.

We propose that the positive relationship between environmental provisions and symbolic environmental performance is more pronounced in firms with low levels of intangible assets. This is based on two key considerations. First, intangible assets serve as a source of competitive advantage, enhancing a firm's social performance (e.g., Surroca et al., 2010; Aragón-Correa & Sharma, 2003). Firms with greater intangible resources are less inclined to engage in symbolic practices, as such actions could undermine their valuable intangible assets. Second, Bethello et al. (2023) highlight differences between apex and non-apex firms, showing that non-apex firms invest in substantive CSR practices to build intangible resources, while apex firms leverage symbolic

practices to capitalize on their existing advantages. [33]

Second, costly signals are represented by substantive practices, which make it expensive and difficult to imitate for less quality firms (Truong et al., 2021). To test whether firm with less intangible resources further improve symbolic environmental performance through environmental provisions, we partition the sample into two subgroups: those with environmental provisions with less intangible resources and those with environmental provisions with greater intangible resources.

Second, substantive practices act as costly signals, making them expensive and challenging for lower-quality firms to replicate (Truong et al., 2021). To examine whether firms with fewer intangible resources are more likely to enhance symbolic environmental performance through environmental provisions, we divide the sample into two subgroups: firms with lower intangible resources and those with higher intangible resources.

Column (1) and (2) of Table 12 show the cross-sectional heterogeneity test results. Firms with low intangible assets show a prominent positive association between ESG-contingent compensation linked to environmental provisions and symbolic environmental performance ($\beta = 0.341,\ p = 0.004$). In specific, the environmental provisions effectively spur 0.341 higher symbolic environmental performance in low intangible assets firms. In contrast, the high intangible assets group does not show similar associations when they adopt the environmental provisions. Therefore, we show that the environmental provisions and intangible assets are important in symbolic environmental performance. We also conduct a Wald test for the coefficients of the environmental provision. The Wald test show the coefficient difference between low and high intangible assets groups is 0.243 and significant at 5% level. [34]

[33] According to Bethello et al. (2023), apex-firms are the top corporate owner within the business groups (BGs) which responsible for control and coordination of the BGs.
[34] We only present the p-value of the Wald test here.

6.2 High vs. low financial constraint

We examine whether financial constraints moderate the relationship between environmental provisions and symbolic environmental performance. Given that substantive practices are more costly than symbolic ones (e.g., Haque & Ntim, 2020; Bothello et al., 2023; Truong et al., 2021), we hypothesize that financial constraints limit a firm's ability to invest in substantive practices, thereby amplifying the reliance on symbolic environmental performance when adopting environmental provisions.

To empirically test this hypothesis, we divide our sample into two subgroups based on firm financial constraint, defining financial constraint firms as those whose Z-score below 1.81 and financial soundness firms as those whose Z-score higher than 2.67 (Altman, 1968). Column (3) and (4) in Table 12 show the results. We find that a higher environmental provision is more effectively in symbolic environmental performance in the financial constraint companies than in financial soundness companies. We find that in the financial constraint groups, the environmental provision effectively improves 0.228 symbolic environmental performance ($\beta = 0.028,\ p = 0.034$). Furthermore, the Wald test shows that the coefficient difference between financial constraint and financial soundness groups is 0.246 and significant at 10% level.

6.3 High vs. low carbon intensity industries

The impact of firms adopting symbolic practices varies across industries, particularly those facing intense scrutiny and strong social norms (e.g., Marquis et al., 2016; Walker & Wan, 2012). Industries may therefore moderate the relationship between environmental provisions and symbolic environmental performance. Delmas and Montes-Sancho (2010) highlight the challenges of improving environmental outcomes through voluntary agreements without enforcement mechanisms, making firms more likely to adopt symbolic measures, such as environmental

provisions, to signal cooperation. Consequently, we hypothesize that the link between environmental provisions and symbolic environmental performance is more pronounced in high-pollution industries. Following Ehlers et al. (2022), we define high-pollution industries as those with higher carbon intensity and compare them to low-carbon-intensity industries.[35]

Column (5) and (6) in Table 12 show cross-sectional heterogeneity test results. A significant positive association between environmental provision and symbolic environmental performance is more pronounced in high carbon intensity industries. For instance, in Column (5), firm adopt environment provisions is significantly associated with 0.167 higher symbolic environmental performance when it belongs to high carbon intensity industries ($\beta = 0.167,\ p = 0.076$). The Wald test shows that the coefficient difference between high carbon intensity and low carbon intensity industry groups is 0.007 and insignificant.

[Insert Table 12 here]

7. Implication Tests

7.1 Future financial performance

Given the evidence that environmental provision primarily improves the symbolic environmental performance rather than substantive environmental performance. Firms with superior symbolic environmental performance tend to exhibit stronger financial outcomes (e.g., Haque & Nitm, 2020; Bethello et al., 2023). Such symbolic actions can enhance environmental legitimacy and positively influence investor perceptions. This suggests that market participants may not interpret the dissociation between firms' symbolic and substantive CSR actions as greenwashing; rather, they might view symbolic actions as credible signals, potentially contributing positively to market

[35] We compare the high carbon sectors (Energy, Industries, Materials and Utilities) and low carbon sectors (Consumer Discretionary, Consumer Staples, Health Care, Information Technology, Real Estate and Telecommunication Services)

valuation. Thus, an important empirical question arises regarding the economic consequences of symbolic environmental practices: Does symbolic environmental performance improve firm value? This motivates our subsequent analysis examining the impact of symbolic environmental performance on firms' economic outcomes.

Empirically, we run ordinary least square (OLS) regression models with the dependent variable: firm value (*TobinQ*) from one to five years (T+1 to T+5).[36] The key independent variable is *Symbolic ENV Score* and *Substantive ENV Score.*

Table 13 documents the regression results. Column (1) to (5) show that the *Symbolic ENV score* is insignificant with Tobin's Q, which consistent with the symbolic environmental performance is perceived as greenwashing and destroy the firm value. Column (6) to (10) show that substantive environmental performance is only positively associated with firm value in T+5 year and that such association is statistically significant. One possibility is that the substantive environmental performance contributes to the firm value only after a lag due to the time required for intangible investments to materialize. Additionally, substantive environmental performance has a negative relationship with Tobin's Q from T+1 to T+3 year, consistent with the short-term financial costs associated with genuine environmental investments.

8. Conclusion

This paper examines the growing trend of linking ESG goals to executive compensation by analyzing the impact of ESG-contingent compensations on ESG performance across various dimensions, including employee, product, community, environment, human rights, and diversity. Our baseline results show a significant association between environmental provisions and symbolic environmental performance, with environmental provisions fully mediating symbolic

[36] Our sample period last six years from 2012 to 2018. Therefore, we only examine five years period.

performance and partially mediating substantive performance. These results remain robust when alternative symbolic measurements are used.

To address potential endogeneity concerns, we conduct several tests. First, we use the first adoption of state agency plans (SAP) as an exogenous shock to environmental provisions and apply a difference-in-differences (DiD) approach. The fuzzy DiD results reveal that companies adopting SAP show increased symbolic environmental performance compared to those that do not. Second, we employ an instrumental variable approach, using the proportion of similar firms adopting ESG contracts linked to environmental provisions. The results confirm a positive and significant relationship between environmental provisions and symbolic performance. Third, we apply propensity score matching (PSM) to mitigate sample selection bias, finding consistent support for our hypotheses. Overall, these results suggest that ESG contracts tied to environmental provisions primarily improve symbolic scores, supporting agency theory and institutional theory, where such contracts are seen as symbolic practices (Haque & Ntim, 2020; Bebchuk & Tallarita, 2022; Walker, 2022).

In the cross-sectional test, we find that the impact of environmental provisions on symbolic environmental performance is more pronounced among firms with low intangible assets, financial constraints, and within carbon-intensive industries. Furthermore, we explore the characteristic of provisions such as the diversity and "easiness" of environmental provisions affect symbolic performance. Our findings indicate that a more diverse ESG-contingent compensation design enhances symbolic performance, as it encourages executives to engage in symbolic actions. Additionally, simpler environmental provisions are linked to higher symbolic performance, as easy-to-achieve targets motivate executives to focus on symbolic efforts to enhance their payoffs.

This paper makes several important contributions to the literature on ESG-contingent compensation. First, it significantly advances the ESG-contingent compensation literature. While previous studies generally focus on integrated ESG-contingent compensations, we adopt a more granular approach by examining the specific environmental, social, and governance (E, S, and G) provisions within such contracts. More importantly, it reconciles conflicting perspectives in the literature, which either argue that such compensation practices enhance ESG performance (e.g., Flammer et al., 2019; Ikram et al., 2023) or serve as mechanisms for rent extraction (e.g. Bebchuk & Tallarita, 2022). Our findings reveal that only environmental provisions, rather than broader ESG provisions, are positively associated with subsequent performance, but primarily in a symbolic manner. This suggests that while these provisions signal effort, they do not drive substantive actions. Our results therefore align more closely with agency theory than stakeholder theory, highlighting that environmental provisions incentivize executives to engage in symbolic rather than substantive practices.

Second, our research contributes to understanding how environmental provisions in ESG-contingent compensation influence symbolic behavior. In an ideal scenario, performance goals should be both attainable and challenging. Given the direct link between compensation and targets, easy-to-achieve goals can incentivize symbolic practices (Mei et al., 2024). Our analyses show that the diversity and simplicity of environmental provisions are key drivers of executives' engagement in symbolic behaviors. For example, increasing the diversity of targets may increase their complexity, leading executives to focus more on achieving symbolic goals. Conversely, simplified provisions align with the "quiet life" theory, where executives benefit from symbolic actions that are easier to accomplish. These findings provide valuable insights for practitioners,

offering guidance on how to design ESG-contingent compensations that encourage executives to adopt more substantive practices rather than symbolic ones.

Our paper has several limitations that also suggest directions for future research. First, our analysis is based on DEF 14A documents, which relies on the disclosure of ESG metrics in compensation contracts. Future studies could expand this by examining ESG provisions using alternative databases. Second, our sample uses the Maas (2018) methodology to define ESG contracts and categorizes them into six groups based on MSCI KLD. However, different methodologies and definitions of ESG contracting, such as those used by Glass Lewis (2016), result in varying proportions of firms adopting ESG contracts. Additionally, there is significant divergence in ESG metrics and their coverage (e.g., Berg et al., 2022; Dobrick et al., 2023). Future research could explore alternative approaches to identifying ESG-contingent compensations, such as utilizing AI tools, especially for firms with limited ESG metric disclosures.

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Figure 1. ESG-contingent Compensation with Different Provisions

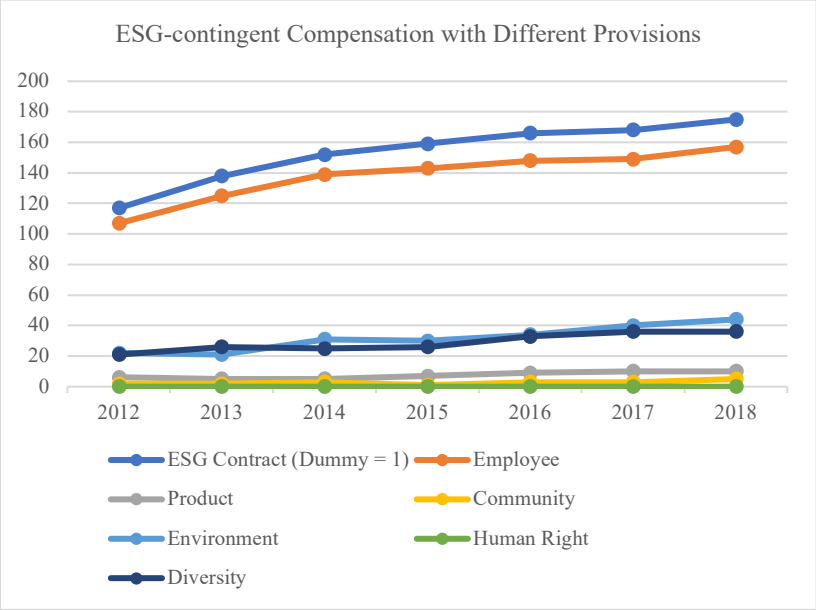


Figure 2. Parallel Trend Test

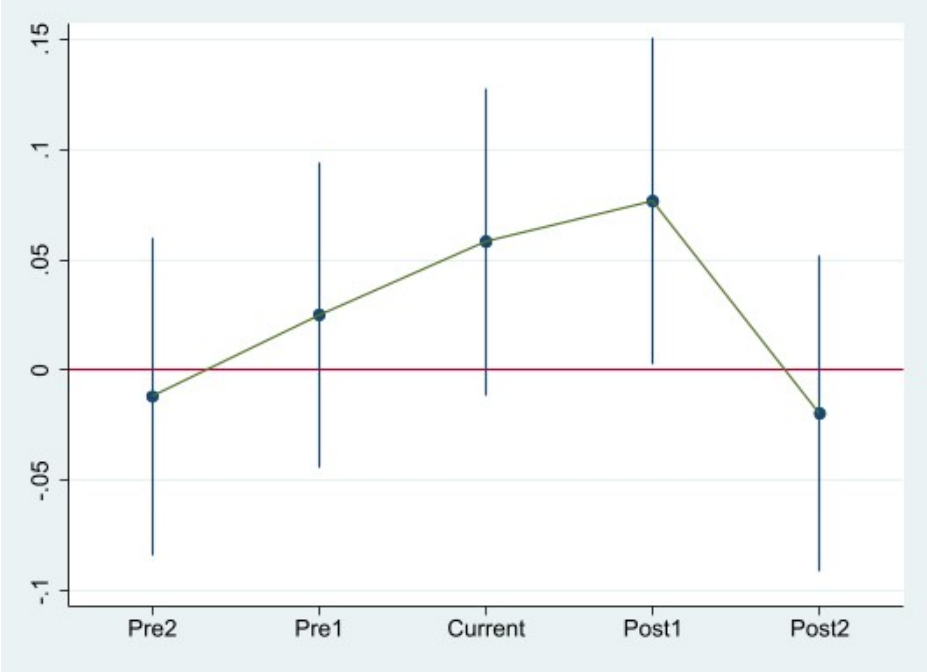
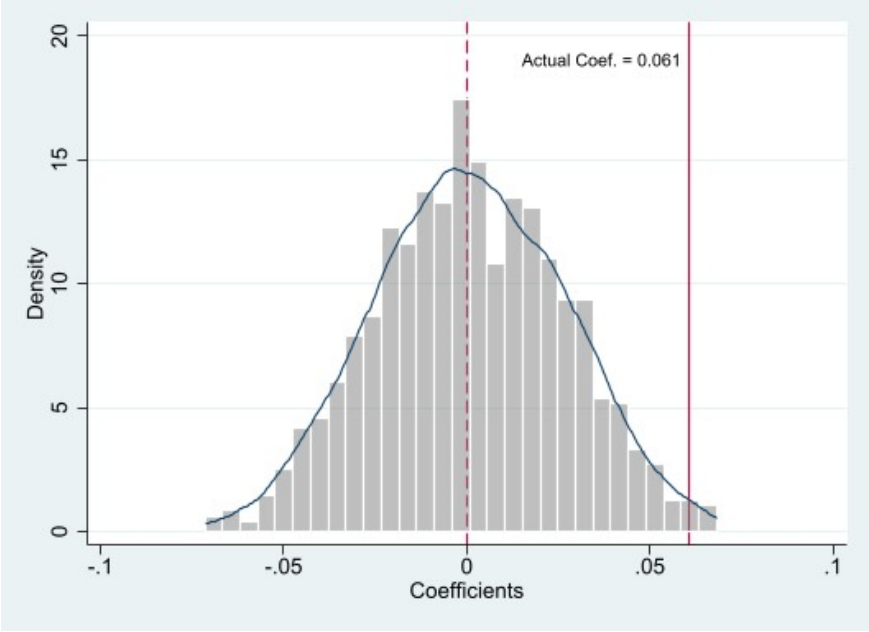
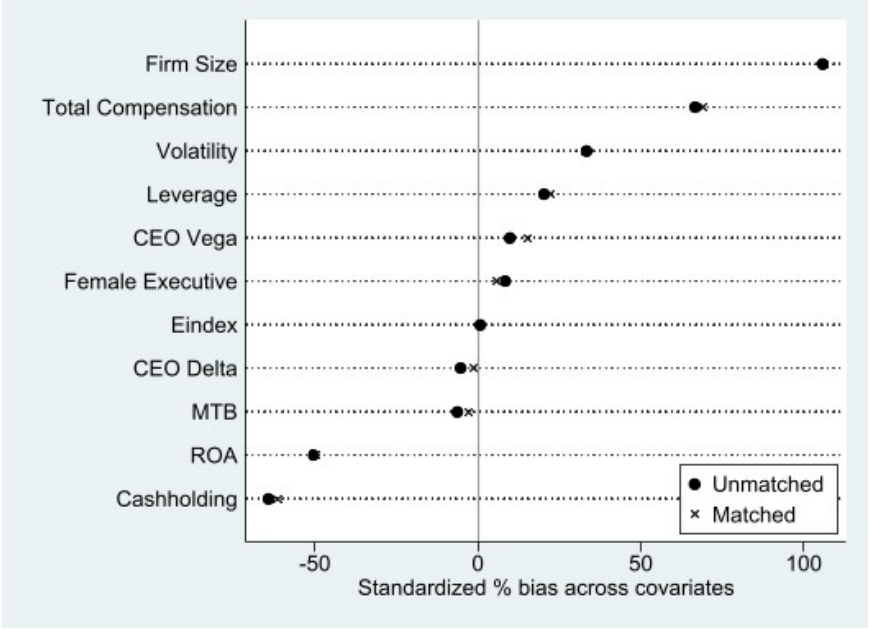


Figure 3. Placebo Test



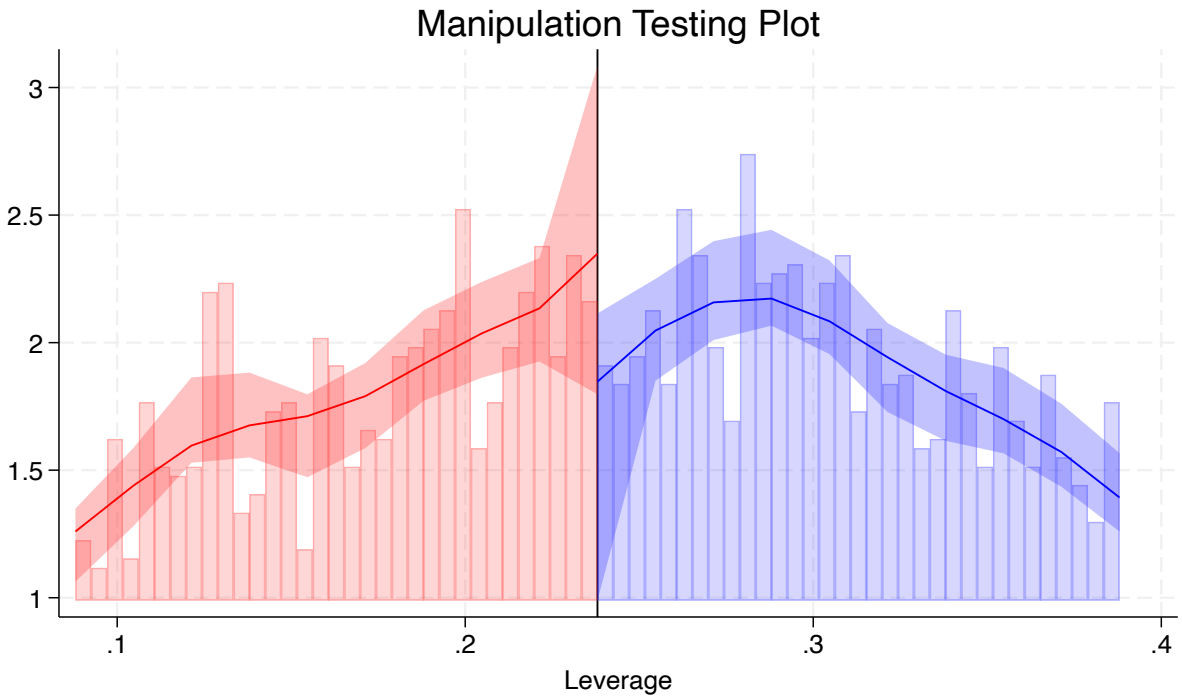
This figure shows the results for a placebo test where the treatment and control groups, as well as a pseudo-event adoption year, are randomly assigned. We repeated this process 1,000 times and generate a graph indicating the distribution of these coefficients using the pseudo-treatment groups and events.

Figure 4. PSM match



This figure describes the balance test of the propensity score matches. We first used a logit regression to estimate the probability of being a treatment firm. We then matched each treatment firm to the control firms using kernel matching technique.

Figure 5. Manipulation Test



This figure describes the manipulation test for leverage, using local polynomial density estimation around the threshold value of 0.238. The left (red) side and right (blue) side represent the estimated density on each side of threshold with the 95% confidence intervals. The bandwidth is 0.05 on both sides.

Table 1. Sample Selection and Distribution of ESG-contracting firms over years and industries

This table presents the sample selection procedure and distribution of sample firms with ESG contracts across 2012 to 2018 and across the Fama-French 48 industries. ESG contract indicates a firm granted an ESG-contingent compensation contract if its proxy statement indicates that one or more of its executives received compensation linked to ESG provisions. We remain 142 firm-year observations due to missing DEF 14A files. Following Bizjak et al. (2019), I exclude utility (SIC 4910-4940) and financial (SIC 6000-6999). ESG contract might include multiple ESG provisions.

Panel A. Sample Selection and Procedure

Procedure	**Obs.**
All S&P 500 firm-year observations from 2012 to 2018, which retrieved from DEF 14A.	14,798
Remains: Minus firm-years of unsuccessful match when merged with the ExecuComp, CRSP and other control variables.	6,511
Remains: Minus firm-years of unsuccessful match when merged with KLD and ASSET4 scores.	6,133
Final Sample	**6,133**

Panel B. ESG contracts over time

			ESG Provisions (there may be more than one provisions in one ESG-contingent compensation)					
Year	ESG Contract (Dummy = 0)	ESG Contract (Dummy = 1)	Employee	Product	Community	Environment	Human Right	Diversity
2012	754	117	107	6	2	22	0	21
2013	724	138	125	5	2	21	0	26
2014	707	152	139	5	3	31	0	25
2015	719	159	143	7	1	30	0	26
2016	733	166	148	9	3	34	0	33
2017	729	168	149	10	3	40	0	36
2018	550	175	157	10	5	44	0	36
Total	4,916	1,075	968	52	19	222	0	203

Panel C. ESG contracts across industries

FF 48 Industries	ESG Contract (Dummy = 0)	ESG Contract (Dummy = 1)	Employee	Product	Community	Environment	Human Right	Diversity
Petroleum and Natural Gas	87	194	192	1	5	130	0	9
Business Services	650	98	89	0	0	3	0	33
Chemicals	135	79	79	0	0	25	0	11
Transportation	167	65	57	0	2	0	0	9
Steel Works Etc	76	56	56	12	0	13	0	0
Electronic Equip.	374	48	45	3	0	7	0	14
Machinery	225	47	47	0	3	6	0	3
Food Products	135	42	34	7	0	0	0	23
Construction	131	42	42	0	0	0	0	0
Construction Materials	106	39	39	0	0	0	0	0
Non-Metallic and Industrial Metal Mining	7	33	33	0	0	14	0	3
Healthcare	97	30	26	4	0	0	0	1
Pharmaceutical Products	257	27	26	0	1	2	0	4
Consumer Goods	120	24	20	0	0	0	0	10
Communication	101	23	10	0	0	5	0	20
Restaurants, Hotels, Motels	147	20	20	0	0	0	0	1
Measuring and Control Equip.	149	19	18	2	3	0	0	8
Business Supplies	59	18	7	7	0	4	0	10
Wholesale	265	18	10	0	0	0	0	7
Precious Metals	4	15	15	0	1	9	0	0
Medical Equip.	207	14	14	0	1	0	0	2
Retail	388	14	7	0	0	0	0	7
Utilities	0	13	13	3	0	4	0	0
Shipbuilding, Railroad Equip.	15	11	11	0	0	0	0	0
Computers	197	11	8	0	0	0	0	3

Automobiles and Trucks	152	10	3	8	0	0	0	0
Personal Services	61	10	7	0	3	0	0	6
Beer & Liquor	20	9	9	0	0	0	0	7
Aircraft	57	7	0	0	0	0	0	7
Tobacco Products	21	5	0	0	0	0	0	5
Rubber and Plastic Products	38	5	5	0	0	0	0	0
Entertainment	51	4	4	0	0	0	0	0
Defense	29	3	3	3	0	0	0	0
Shipping Containers	32	3	3	0	0	0	0	0
Recreation	31	1	1	0	0	0	0	0
Coal	0	1	1	0	0	0	0	0
Agriculture	6	0	0	0	0	0	0	0
Candy & Soda	22	0	0	0	0	0	0	0
Printing and Publishing	32	0	0	0	0	0	0	0
Apparel	104	0	0	0	0	0	0	0
Textiles	27	0	0	0	0	0	0	0
Fabricated Products	10	0	0	0	0	0	0	0
Electrical Equip.	61	0	0	0	0	0	0	0
Other	63	17	14	2	0	0	0	0
Total	4,916	1,075	968	52	19	222	0	203

Table 2. Summary Statistics

Variable	N	Mean	SD	P25	Median	P75
(1) Symbolic ENV Score	5077	0.033	0.402	0.000	0.000	0.000
(2) Substantive ENV Score	5077	0.501	0.888	0.000	0.000	1.000
(3) ENV Dummy	5077	0.042	0.201	0.000	0.000	0.000
(4) Female Executive	5077	0.419	0.493	0.000	0.000	1.000
(5) Total Compensation	5077	7.911	0.756	7.425	7.915	8.400
(6) Firm Size	5077	8.105	1.536	7.000	7.955	9.052
(7) MTB	5077	4.230	36.384	1.704	2.756	4.524
(8) Leverage	5077	0.258	0.211	0.110	0.245	0.366
(9) ROA	5077	0.056	0.094	0.027	0.058	0.090
(10) Cashholding	5077	0.150	0.149	0.039	0.100	0.212
(11) Volatility	5077	0.082	0.040	0.054	0.074	0.104
(12) E-index	5077	4.059	0.915	4.000	4.000	5.000
(13) CEO Delta	5077	267.102	513.632	42.891	108.220	260.398
(14) CEO Vega	5077	55.331	88.379	1.291	19.691	66.132

Table 3. Results for Hypothesis 1

This table presents the relationship among environmental provision, symbolic and substantive environmental performance. ENV KLD Score is an indicator that equals to total environmental strength minus total environmental concern. Symbolic ENV Score is an indicator that measure the symbolic environmental score following Hawn and Ioannou (2016) and mapping to KLD score. Substantive ENV Score is an indicator that measure the immaterial environmental score Hawn and Ioannou (2016) and mapping to KLD score. SEs are clustered at the firm level. All variables are described in Appendix 2. Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Symbolic ENV Score	Substantive ENV Score	Symbolic ENV Score	Substantive ENV Score	ENV KLD Score	ENV KLD Score
ENV Dummy	**0.191****	0.131	**0.187****	0.117	0.156	**0.294****
	(0.090)	(0.091)	(0.090)	(0.091)	(0.132)	(0.120)
Symbolic ENV Score					**1.185*****	
					(0.050)	
Substantive ENV Score						**1.077*****
						(0.017)
Female Executive			0.039**	0.061*	0.054	0.033**
			(0.017)	(0.032)	(0.036)	(0.017)
Total Compensation			-0.005	0.007	0.027	-0.007
			(0.014)	(0.020)	(0.025)	(0.014)
Firm Size			-0.087***	-0.082**	-0.080*	-0.074***
			(0.024)	(0.040)	(0.046)	(0.023)
MTB			-0.000	0.000	0.000	-0.000
			(0.000)	(0.000)	(0.000)	(0.000)
Leverage			0.003	0.125	0.160	-0.020
			(0.054)	(0.121)	(0.139)	(0.046)
ROA			0.112	0.069	0.076	0.064
			(0.072)	(0.097)	(0.101)	(0.062)
Cashholding			-0.029	-0.017	-0.001	0.050
			(0.073)	(0.137)	(0.142)	(0.069)
Volatility			0.144	0.082	0.173	0.183
			(0.174)	(0.228)	(0.246)	(0.170)
E-index			-0.005	-0.027*	-0.028*	-0.008
			(0.011)	(0.017)	(0.017)	(0.011)
CEO Delta			0.000	-0.000	-0.000	0.000
			(0.000)	(0.000)	(0.000)	(0.000)
CEO Vega			-0.000	-0.000	-0.000	-0.000
			(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.028***	0.461***	0.766***	1.131***	1.020**	0.669***
	(0.004)	(0.003)	(0.206)	(0.341)	(0.400)	(0.205)
Observations	4,962	5,741	4,927	5,700	4,927	5,700
Adjusted R-squared	0.532	0.708	0.534	0.709	0.806	0.918
Year FE	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES
LR Test			0.979			
Ramsey Test			0.726			

Table 4. Results for Hypothesis 1 (Alternative measure)

Panel A. Alternative measure for symbolic performance

This table presents the alternative measure of symbolic environmental performance and environmental provision. Immaterial and material ENV score are following DesJardine et al. (2023) to define the immaterial and material score related to environment. Symbolic Refinitiv ENV and substantive Refinitiv ENV score are following Bothello et al. (2023) to identify Refinitiv ESG version 1 and define symbolic and substantive CSR. In Column (1) and (2), We do not include firm fixed effect because the immaterial and material score are based on SASB industrial level. SEs are clustered at the industry level in column (1) and (2). SEs are clustered at the firm level in column (3) and (4). All variables are described in Appendix 2. Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)
VARIABLES	Immaterial ENV Score	Material ENV Score	Symbolic Refinitiv ENV Score	Substantive Refinitiv ENV Score
ENV Dummy	**0.155***	0.010	**0.039***	-0.013
	(0.067)	(0.035)	(0.022)	(0.021)
Female Executive	-0.013	0.029	-0.007	0.016*
	(0.022)	(0.020)	(0.009)	(0.008)
Total Compensation	-0.023	0.041	0.006	-0.001
	(0.017)	(0.025)	(0.007)	(0.006)
Firm Size	0.073***	0.070	0.046***	0.047***
	(0.019)	(0.042)	(0.015)	(0.015)
MTB	-0.000	0.000**	-0.000	-0.000
	(0.001)	(0.000)	(0.000)	(0.000)
Leverage	-0.003	0.024	-0.015	0.002
	(0.050)	(0.069)	(0.027)	(0.025)
ROA	0.102	0.039	0.008	-0.044
	(0.207)	(0.104)	(0.029)	(0.040)
Cashholding	-0.189*	0.031	0.041	-0.017
	(0.081)	(0.101)	(0.050)	(0.043)
Volatility	-0.186	-0.647**	-0.179**	-0.138*
	(0.187)	(0.181)	(0.087)	(0.074)
E-index	-0.005	-0.009	-0.003	-0.008
	(0.019)	(0.012)	(0.006)	(0.005)
CEO Delta	0.000	0.000	-0.000	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)
CEO Vega	-0.000	0.000	0.000*	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-0.236	-0.703	-0.178	-0.054
	(0.175)	(0.414)	(0.136)	(0.123)
Observations	1,616	2,781	4,213	4,272
Adjusted R-squared	0.107	0.203	0.860	0.878
Industry FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Firm FE	NO	NO	YES	YES

Panel B. Alternative measure for industry fixed effects

This table presents the alternative measure of industry fixed effect by using Global Industry Classification Standard (GICS). SEs are clustered at the industry level in column (1) and (2). SEs are clustered at the firm level in column (3) and (4). All variables are described in Appendix 2. Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)
VARIABLES	Symbolic ENV Score	Substantive ENV Score
ENV Dummy	**0.186****	0.117
	(0.089)	(0.091)
Control variables	YES	YES
Observations	4964	5743
Adjusted R-squared	0.543	0.717
Year FE	YES	YES
Industry (GISC) FE	YES	YES
Firm FE	YES	YES

Table 5. DID Approach for Hypothesis 1

This table presents DiD approach for the environmental provision and symbolic environmental performance. *Symbolic ENV Score* is an indicator that measure the symbolic environmental score following Hawn and Ioannou (2016) and mapping to KLD score. *SAP* is the first adoption of State Climate Change Adoption Plans. We include state fixed effects, firm fixed effects, industry fixed effects and year fixed effects. SEs are clustered at the firm level. All variables are described in Appendix 2. Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)
VARIABLES	ENV Dummy	Symbolic ENV Score
SAP	**0.032***	**0.061***
	(0.017)	(0.033)
Female Executive	0.006	0.035**
	(0.005)	(0.016)
Total Compensation	-0.008	-0.005
	(0.006)	(0.014)
Firm Size	-0.005	-0.075***
	(0.015)	(0.025)
MTB	0.000	-0.000
	(0.000)	(0.000)
Leverage	0.033*	0.009
	(0.019)	(0.052)
ROA	-0.027	0.104
	(0.034)	(0.070)
Cashholding	0.015	-0.025
	(0.025)	(0.070)
Volatility	-0.026	0.165
	(0.080)	(0.169)
E-index	0.001	-0.002
	(0.004)	(0.011)
CEO Delta	-0.000	0.000
	(0.000)	(0.000)
CEO Vega	-0.000	-0.000
	(0.000)	(0.000)
Constant	0.107	0.625***
	(0.128)	(0.216)
Observations	5772	5,042
Adjusted R-squared	0.751	0.530
Year FE	YES	YES
Industry FE	YES	YES
Firm FE	YES	YES
State FE	YES	YES

Table 6. Parallel Trend Test for DID Approach

The table reports result of the parallel trend test assumes that the SAP takes place a few years before and after the actual event. *Pre2*, *Pre1*, *Current*, *Post1* and *Post2* are indicator variables that indicate two years before, one year before, the current year of, one year after, and two years after the SAP, respectively. All variables are described in Appendix 2. Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1.

	(1)
VARIABLES	Symbolic ENV Score
Pre2	-0.012
	(0.037)
Pre1	0.025
	(0.035)
Current	0.058
	(0.035)
Post1	**0.076****
	(0.038)
Post2	-0.020
	(0.037)
Observations	5,042
Adjusted R-squared	0.634
Control Variables	YES
Year FE	YES
Industry FE	YES
Firm FE	YES
State FE	YES

Table 7. Stacked DID Approach for Hypothesis 1

This table presents the results of stacked-cohort DiD regressions that compares the changes in symbolic environmental performance (*Symbolic ENV Score*) between firms that are headquartered in treated (SAP-adoption) states and firms that are headquartered in control (never SAP-adoption) states. All variables are described in Appendix 2. Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1.

	(1)
VARIABLES	Symbolic ENV Score
SAP	**0.077****
	(0.033)
Observations	4,129
Adjusted R-squared	0.655
Control Variables	YES
Year FE	YES
Industry FE	YES
Firm FE	YES
State FE	YES
Cohort FE	YES

Table 8. Instrument Variable Approach for Hypothesis 1

This table presents the instrument variable approach to rule out endogeneity. $ENV\ Dummy_{(peer)}$ is an indicator that equals to percentage of environmental provisions adoption for other peer firms in the same industry and same state. SEs are clustered at the firm level. All variables are described in Appendix 2. Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)
VARIABLES	ENV Dummy	Symbolic ENV Score
$ENV\ Dummy_{(peer)}$	**1.245*** **	
	(0.132)	
$\widehat{ENV\ Dummy}$		**0.401*** **
		(0.128)
Female Executive	0.003	0.028
	(0.004)	(0.020)
Total Compensation	0.002	0.010
	(0.004)	(0.018)
Firm Size	0.029**	-0.073**
	(0.013)	(0.030)
MTB	0.000	0.000
	(0.000)	(0.000)
Leverage	0.008	-0.033
	(0.013)	(0.068)
ROA	-0.049	0.168*
	(0.039)	(0.098)
Cashholding	0.008	-0.056
	(0.023)	(0.095)
Volatility	-0.102	0.250
	(0.073)	(0.208)
E-index	0.008*	-0.015
	(0.004)	(0.016)
CEO Delta	0.000	0.000
	(0.000)	(0.000)
CEO Vega	-0.000	-0.000
	(0.000)	(0.000)
Constant	-0.251**	
	(0.116)	
Observations	3,968	3,385
Adjusted R-squared/ Centered R-squared	0.846	0.001
Year FE	YES	YES
Industry FE	YES	YES
Firm FE	YES	YES
Stock-Yogo Test	**87.047**	

Table 9. PSM Approach for Hypothesis 1

This table presents the environmental provision and environmental performance through PSM approach. In column (1), I use the same control variables to predict independent variable (*ENV Dummy*). We also include firm fixed effects, industry fixed effects and year fixed effects in column (1). We then matched each treatment firm to the control firms using kernel matching technique. All variables are described in Appendix 2. Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1

	(1)	(1)
	Logit	OLS
VARIABLES	ENV Dummy	Symbolic ENV Score
ENV Dummy		**0.149****
		(0.074)
Female Executive	0.653	0.012
	(0.695)	(0.047)
Total Compensation	-0.313	-0.019
	(0.764)	(0.053)
Firm Size	1.980**	-0.251***
	(0.900)	(0.077)
MTB	0.150	0.000
	(0.135)	(0.000)
Leverage	13.104***	0.037
	(3.638)	(0.287)
ROA	1.945	0.134
	(2.033)	(0.203)
Cashholding	1.261	0.010
	(4.396)	(0.293)
Volatility	-6.107	-0.371
	(5.446)	(0.316)
E-index	-0.149	-0.023
	(0.588)	(0.025)
CEO Delta	-0.002	0.000
	(0.002)	(0.000)
CEO Vega	-0.011	0.000
	(0.007)	(0.001)
Constant		2.277***
		(0.707)
Observations	216	4,902
Adjusted R-squared		0.601
Year FE	YES	YES
Industry FE	YES	YES
Firm FE	YES	YES

Table 10. Results for Extensional Test (Diversity)

This table presents the environmental metric change within the environmental provision and symbolic environmental performance. ENV Change is an indicator variable that equals to 1 that context in environmental metric change and 0 otherwise. For instance, a firm measure environmental metric only uses CO2 emission in 2012 and use CO2 emission and SO2 emission to measure in 2013. SEs are clustered at the firm level. All variables are described in Appendix 2. Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1.

	(1)
VARIABLES	Symbolic ENV Score
ENV Change	**0.178****
	(0.085)
Female Executive	0.045***
	(0.017)
Total Compensation	-0.009
	(0.015)
Firm Size	-0.076***
	(0.025)
MTB	-0.000
	(0.000)
Leverage	0.013
	(0.053)
ROA	0.111
	(0.072)
Cashholding	-0.028
	(0.072)
Volatility	0.193
	(0.178)
E-index	-0.004
	(0.011)
CEO Delta	0.000
	(0.000)
CEO Vega	-0.000
	(0.000)
Constant	0.705***
	(0.204)
Observations	4,822
Adjusted R-squared	0.534
Year FE	YES
Industry FE	YES
Firm FE	YES

Table 11. Results for Extensional Test (Easiness)

This table presents the easiness of environmental provision and symbolic environmental performance. ENV provision weight is an indicator variable that equals to the percentage of environmental provisions in executive compensation. Easiness is an indicator variable that equals to 1 that the environmental provision weight changes less and equals than 0 and otherwise 0. SEs are clustered at the firm level. All variables are described in Appendix 2. Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)
VARIABLES	Symbolic ENV Score	Symbolic ENV Score
ENV Weight	**4.826*** **	
	(1.460)	
Easiness		**0.247*** **
		(0.095)
Female Executive	0.041**	0.039**
	(0.017)	(0.017)
Total Compensation	-0.005	-0.003
	(0.014)	(0.014)
Firm Size	-0.079***	-0.076***
	(0.024)	(0.025)
MTB	-0.000	-0.000
	(0.000)	(0.000)
Leverage	0.002	-0.002
	(0.052)	(0.052)
ROA	0.131*	0.109
	(0.072)	(0.069)
Cashholding	-0.047	-0.037
	(0.074)	(0.072)
Volatility	0.175	0.155
	(0.181)	(0.180)
E-index	-0.004	-0.005
	(0.011)	(0.011)
CEO Delta	0.000	0.000
	(0.000)	(0.000)
CEO Vega	-0.000	-0.000
	(0.000)	(0.000)
Constant	0.702***	0.674***
	(0.207)	(0.207)
Observations	4,856	4,856
Adjusted R-squared	0.543	0.542
Year FE	YES	YES
Industry FE	YES	YES
Firm FE	YES	YES

Table 12. Cross-Sectional Test

This table presents the result of cross-sectional test through three dimensions (intangible, financial distress and carbon intensity industries). Low intangible is an indicator that that equals to 1 if intangible asset of firm is less than median. We follow Altman (1968) to use Z-Score to identify financial distress and financial soundness companies, where financially distressed firms have Z-Score below 1.81 and financially healthy firms have Z-Score above 2.67. We follow Ehlers et al. (2022) to identify carbon intensity industry and non-carbon intensity industry. SEs are clustered at the firm level. All variables are described in Appendix 2. Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)	(5)	(6)
	Low Intangible	High Intangible	Financial Distress	Financial Soundness	High Carbon Intensity	Low Carbon Intensity
VARIABLES	Symbolic ENV Score	Symbolic ENV Score	Symbolic ENV Score	Symbolic ENV Score	Symbolic ENV Score	Symbolic ENV Score
ENV Dummy	**0.341*****	0.098	**0.228****	-0.018	**0.167***	0.157
	(0.120)	(0.139)	(0.107)	(0.183)	(0.094)	(0.163)
Female Executive	0.010	0.053*	0.020	0.061**	0.018	0.052**
	(0.018)	(0.027)	(0.034)	(0.028)	(0.023)	(0.024)
Total Compensation	0.011	-0.015	0.002	-0.017	0.011	-0.013
	(0.020)	(0.021)	(0.037)	(0.014)	(0.034)	(0.014)
Firm Size	-0.063*	-0.108**	-0.086	-0.042	-0.112**	-0.055**
	(0.036)	(0.042)	(0.056)	(0.032)	(0.050)	(0.027)
MTB	-0.000	0.000	-0.000**	-0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Leverage	-0.041	0.035	-0.116	0.101	-0.049	0.015
	(0.055)	(0.119)	(0.145)	(0.084)	(0.138)	(0.053)
ROA	0.115	-0.018	0.072	0.089	0.123	0.060
	(0.079)	(0.178)	(0.134)	(0.107)	(0.135)	(0.067)
Cashholding	0.043	-0.068	-0.020	0.015	-0.019	-0.020
	(0.088)	(0.140)	(0.232)	(0.076)	(0.148)	(0.084)
Volatility	0.288	0.017	0.208	0.008	0.251	0.131
	(0.215)	(0.300)	(0.294)	(0.281)	(0.291)	(0.202)
E-index	-0.009	0.014	0.008	-0.011	0.011	-0.010
	(0.013)	(0.020)	(0.027)	(0.012)	(0.018)	(0.014)
CEO Delta	-0.000	0.000*	0.000	-0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CEO Vega	-0.000	-0.000	-0.000	0.000	-0.001	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.349	1.087***	0.661	0.517*	0.704	0.651***
	(0.259)	(0.382)	(0.501)	(0.280)	(0.435)	(0.233)
Observations	2,331	2,518	1,319	2,429	1,972	2,909
Adjusted R-squared	0.425	0.565	0.427	0.632	0.437	0.569
Year FE	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES
Coefficient Difference (P-value)	0.243 (0.050)		0.246 (0.060)		0.007 (0.440)	

Table 13. Implication Test

This table presents the relationship among firm value, symbolic and substantive environmental performance. The dependent variable is the Tobin's Q, measuring the value of the firm. We only lagged for five years because our sample period is six years (2012 to 2018). Symbolic ENV Score is an indicator that measure the symbolic environmental score following Hawn and Ioannou (2016) and mapping to KLD score. Substantive ENV Score is an indicator that measure the immaterial environmental score Hawn and Ioannou (2016) and mapping to KLD score. SEs are clustered at the firm level. All variables are described in Appendix 2. Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Tobin's Q									
VARIABLES	T+1	T+2	T+3	T+4	T+5	T+1	T+2	T+3	T+4	T+5
Symbolic ENV Score	0.010	0.025	0.053	0.005	0.034					
	(0.029)	(0.032)	(0.051)	(0.056)	(0.058)					
Substantive ENV Score						-0.008	-0.022	-0.013	0.028	**0.084***
						(0.020)	(0.025)	(0.025)	(0.025)	(0.046)
Female Executive	0.003	-0.046	0.070	0.028	-0.128	0.016	-0.035	0.060	0.033	-0.120
	(0.047)	(0.082)	(0.093)	(0.076)	(0.112)	(0.045)	(0.077)	(0.086)	(0.072)	(0.104)
Total Compensation	0.160***	0.006	0.135	-0.064	-0.010	0.143***	0.014	0.118	-0.021	-0.042
	(0.045)	(0.075)	(0.089)	(0.092)	(0.125)	(0.039)	(0.067)	(0.077)	(0.082)	(0.114)
Firm Size	-0.784***	-0.710***	-0.716***	-0.364	0.776	-0.753***	-0.642***	-0.584**	-0.237	0.630
	(0.118)	(0.166)	(0.249)	(0.303)	(0.871)	(0.113)	(0.159)	(0.237)	(0.265)	(0.828)
MTB	-0.000	0.001	-0.001	0.000	0.001	-0.000	0.001	-0.001	0.000	0.001
	(0.001)	(0.001)	(0.000)	(0.000)	(0.002)	(0.001)	(0.001)	(0.001)	(0.000)	(0.002)
Leverage	1.368***	2.145***	1.462**	0.451	-1.821	1.341***	1.887***	1.349**	0.089	-1.649
	(0.437)	(0.659)	(0.679)	(0.897)	(2.230)	(0.420)	(0.620)	(0.622)	(0.777)	(2.166)
ROA	0.765**	0.529	0.161	-0.688	2.258	0.775***	0.432	0.372	-0.750	1.869
	(0.299)	(0.351)	(0.651)	(1.075)	(1.609)	(0.285)	(0.337)	(0.633)	(0.956)	(1.372)
Cashholding	1.232***	0.888**	0.308	0.046	0.497	1.247***	0.986**	0.466	0.086	0.365
	(0.416)	(0.418)	(0.403)	(0.465)	(0.986)	(0.378)	(0.401)	(0.363)	(0.425)	(0.887)
Volatility	-0.546	-0.357	0.588	-2.404	1.136	-0.714	-0.221	0.622	-2.043	0.560
	(0.835)	(0.597)	(0.951)	(1.883)	(1.559)	(0.772)	(0.559)	(0.870)	(1.513)	(1.385)

E-index	-0.034	0.065	-0.139*	-0.086	-0.073	-0.041	0.049	-0.151**	-0.073*	-0.060
	(0.049)	(0.060)	(0.074)	(0.062)	(0.104)	(0.047)	(0.057)	(0.067)	(0.044)	(0.097)
CEO Delta	0.001***	0.000*	-0.000	0.000	-0.001*	0.001***	0.000*	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CEO Vega	-0.002***	-0.001**	0.001*	-0.000	-0.001	-0.002***	-0.001*	0.001**	0.000	-0.002
	(0.001)	(0.000)	(0.000)	(0.001)	(0.003)	(0.001)	(0.000)	(0.000)	(0.001)	(0.002)
Constant	6.614***	6.793***	6.826***	5.976**	-3.484	6.502***	6.240***	5.911***	4.556**	-2.110
	(0.959)	(1.264)	(1.949)	(2.578)	(6.378)	(0.891)	(1.201)	(1.828)	(2.254)	(6.052)
Observations	4239	3271	2440	1603	908	4587	3571	2655	1800	988
Adjusted R-squared	0.798	0.798	0.794	0.793	0.771	0.805	0.805	0.807	0.822	0.781
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Appendix

Appendix 1: Studies on the relation between ESG contracts and ESG performance

Authors	Country	Data	observations	Theoretical Framework	Founding	Dependence variable	Coefficient
Russo & Harrison, 2005	US	1999	169	Congruence theory	Positive for plant managers	TRI	-1.03
Berrone & Gomez-Mejia, 2009	US	1997-2003	469	Institutional theory and agency theory	No significant between environmental pay policy and environmental performance	TRI and HTP	-
Maas, 2018	US	2008-2012	1846	Agency theory	No significant between environmental pay policy and environmental performance (only quantitative and hard targets is positive)	KLD	0.11 (quantitative and hard target)
Flammer et al., 2019	US	2004-2013	4533	Stakeholder theory	Positive to ESG performance	KLD	0.208 (ESG performance)
Ikram et al., 2023	US	2009-2013	2261	Shareholder, stakeholder and institutional theories	Positive to ESG performance (both subjective and objective ESG contracts)	KLD	1.2 (objective) 0.67 (subjective)
Haque & Ntim, 2020	UK	2002-2016	4379	Neo-institutional theory	Positive to symbolic carbon performance	Refinitiv	1.265
Cohen et al., 2023	International	2011-2020	22,603	Agency theory and stakeholder theory	Only significant and Positive to ESG KLD and Sustainalytics	Refinitiv, Sustainalytics and KLD	0.233 (Sustainalytics) 1.004 (KLD)
Homroy et al., 2023	Swedish	2020	822	Shareholder theory	Positive to ESG performance	Refinitiv	7.5645 (ESG performance) 19.0256 (E score) 9.9775 (S score)
Derchi et al., 2021	US	2002-2013	10336	Agency theory	Positive to ESG performance after 3rd year	KLD	0.07
Cavaco et al., 2020	OECD	2004-2018	3905	Agency theory	Positive to ESG performance	Vigeo Eiris	1.008 (HR) 1.218 (ENV) 2.095 (CS) 1.951 (CIN) 1.143 (HRts)
Bebchuk &Tallarita, 2022	US	2020	97	Agency theory	Conceptual	-	-
Walker, 2022	US	2019	19	Shareholder theory	Conceptual	-	-

Appendix 2: Variables definitions

Variable	Definition	Source
ESG performance measures		
EMP KLD Score	Overall employee score as follow: Total employee strength minus total employee concern.	MSCI ESG
PRO KLD Score	Overall product score as follow: Total product strength minus total product concern.	MSCI ESG
COM KLD Score	Overall community score as follow: Total community strength minus total community concern.	MSCI ESG
ENV KLD Score	Overall environmental score as follow: Total environmental strength minus total environmental concern.	MSCI ESG
HUM KLD Score	Overall human right score as follow: Total human right strength minus total human right concern.	MSCI ESG
DIV KLD Score	Overall diversity score as follow: Total diversity strength minus total diversity concern.	MSCI ESG
Symbolic ENV Score	Indicator variables that measure symbolic environmental score and mapping to KLD score.	Bothello et al. (2023)
Substantive ENV Score	Indicator variables that measure substantial environmental score and mapping to KLD score.	Bothello et al. (2023)
Immaterial ENV Score	Indicator variables that measure immaterial environmental score based on SASB industry.	DesJardine et al. (2023)
Material ENV Score	Indicator variables that measure material environmental score based on SASB industry.	DesJardine et al. (2023)
Symbolic Refinitiv ENV Score	Indicator variables that measure symbolic environmental score.	Bothello et al. (2023)
Substantive Refinitiv ENV Score	Indicator variables that measure substantial environmental score.	Bothello et al. (2023)
Control variables		
Firm Size	The natural logarithm of total assets (at).	CRSP
MTB	The ratio of the market value to book value (csho * prcc_f / ceq).	CRSP
ROA	The ratio of the income before extraordinary items scaled by total assets (ib / at).	CRSP
Cashholding	The ratio of Cash and short-term investments scaled by total assets (che / at).	CRSP
Volatility	The standard deviation of monthly stock returns of the fiscal year.	CRSP
Leverage	The ratio of total debt scaled by total assets (dlc + dltt / at).	CRSP
Female Executive	Indicator variables that equal to 1 if there is a female executive.	Compustat
Total Compensation	Indicator variables that measure the total compensation of executives.	Compustat
E-index	An entrenchment index based on six provisions. A higher index indicates better corporate governance.	Bebchuk et al. (2009)
CEO Delta	Dollar changes in the value of CEO's annual equity-based compensation for a 1% change in the stock price (in $000 s).	Coles et al. (2006)
CEO Vega	Dollar changes in the value of CEO's annual equity-based compensation associated with a 0.01 change in the annualized standard deviation of the firm's returns (in $000 s).	Coles et al. (2006)
ESG contracting variables		
EMP Dummy	Indicator variable that takes the value of one if executive compensation is tied to employee benefit, and zero otherwise.	DEF 14A
PRO Dummy	Indicator variable that takes the value of one if executive compensation is tied to product innovation, and zero otherwise.	DEF 14A

COM Dummy	Indicator variable that takes the value of one if executive compensation is tied to community engagement, and zero otherwise.	DEF 14A
ENV Dummy	Indicator variable that takes the value of one if executive compensation is tied to environment, and zero otherwise.	DEF 14A
HUM Dummy	Indicator variable that takes the value of one if executive compensation is tied to improve human right, and zero otherwise.	DEF 14A
DIV Dummy	Indicator variable that takes the value of one if executive compensation is tied to improve diversity and inclusion, and zero otherwise.	DEF 14A
Easiness	Indicator variable that takes the value of 1 if the weight of environmental metric changes less and equals to 0 in firm and otherwise 0.	DEF 14A
ENV Change	Indicator variable that takes the value of 1 if the context of environmental metric changes and otherwise 0.	DEF 14A
ENV Weight	Indicator variable that measures the weight of environmental metric in executive compensation.	DEF 14A

Appendix 3: Results for Hypothesis 1 (other provisions).

This table presents the other provision and subsequent ESG performance. *EMP KLD Score* is an indicator that equals to total employee strength minus total employee concern. *PRO KLD Score* is an indicator that equals to total product strength minus total product concern. *COM KLD* Score is an indicator that equals to total community strength minus total community concern. *DIV KLD Score* is an indicator that equals to total diversity strength minus total diversity concern. Human right provision is omitted due to insufficient measure in our sample. SEs are clustered at the firm level. All variables are described in Appendix 2. Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	ENV KLD Score	EMP KLD Score	PRO KLD Score	COM KLD Score	DIV KLD Score
ENV Dummy	**0.410*** **				
	(0.149)				
EMP Dummy		-0.017			
		(0.096)			
PRO Dummy			**-0.166***		
			(0.093)		
COM Dummy				-0.020	
				(0.110)	
DIV Dummy					-0.156
					(0.127)
Female Executive	0.098**	0.033	0.004	-0.024	0.050
	(0.039)	(0.049)	(0.038)	(0.028)	(0.043)
Total Compensation	0.001	-0.027	0.064**	-0.043*	0.031
	(0.025)	(0.043)	(0.029)	(0.023)	(0.034)
Firm Size	-0.164***	0.052	0.017	0.037	0.295***
	(0.050)	(0.070)	(0.053)	(0.041)	(0.062)
MTB	0.000	-0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Leverage	0.118	-0.063	0.076	-0.045	-0.231
	(0.139)	(0.131)	(0.105)	(0.090)	(0.143)
ROA	0.141	0.084	-0.102	-0.148	-0.227
	(0.125)	(0.148)	(0.123)	(0.107)	(0.153)
Cashholding	0.020	-0.871***	0.127	0.216*	0.212
	(0.147)	(0.220)	(0.134)	(0.128)	(0.182)
Volatility	0.256	-0.023	0.042	0.586*	0.221
	(0.289)	(0.420)	(0.323)	(0.314)	(0.341)
E-index	-0.035*	0.074**	0.038	0.011	0.000
	(0.021)	(0.033)	(0.025)	(0.019)	(0.026)
CEO Delta	-0.000	0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CEO Vega	-0.000	-0.000	0.000	0.000	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	1.880***	0.263	-0.760*	0.065	-2.590***
	(0.425)	(0.641)	(0.454)	(0.397)	(0.536)
Observations	5,772	5,704	3,710	3,000	4,897
Adjusted R-squared	0.698	0.577	0.487	0.312	0.519

Year FE	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES

Appendix 4: Timelines of first adoption of State Agency Plans

Code	Name	First Adopt
VT	Vermont	2005
NH	New Hampshire	2006
NJ	New Jersey	2007
VA	Virginia	2008
OR	Oregon	2008
FL	Florida	2008
MD	Maryland	2008
IL	Illinois	2009
AZ	Arizona	2009
CA	California	2009
NV	Nevada	2009
MI	Michigan	2009
IA	Iowa	2009
AK	Alaska	2010
NY	New York	2010
HI	Hawaii	2010
KY	Kentucky	2010
MN	Minnesota	2010
PA	Pennsylvania	2011
MA	Massachusetts	2011
WA	Washington	2011
CO	Colorado	2011
LA	Louisiana	2012
NC	North Carolina	2012
RI	Rhode Island	2012
CT	Connecticut	2013
ME	Maine	2015
DE	Delaware	2015
NM	New Mexico	2016
IN	Indiana	2016
DC	District of Columbia	2016
WI	Wisconsin	2016
TX	Texas	2017
MT	Montana	2020

Appendix 5: Symbolic and Substantial environmental score for KLD and Refinitiv Version 2 (Mapping process) (Hawn & Ioannou, 2016; Bothello et al., 2023)

Panel A. Mapping to KLD

We construct substantive and symbolic environmental score using the following procedures: First, we collect all environmental indicators and their associated indices from MSCI KLD. Then, we follow Hawn & Ioannou (2016) and Bothello et al. (2023) to identify Refinitiv ESG Version 1 (Asset4) Code and define substantive and symbolic environmental score. Finally, we map Refinitiv Version 1 and KLD based on the description of each index. For example, ENPRD046 (Does the company make use of renewable energy?) corresponds to one strength category in KLD: ENV-STR-M (ENVIRONMENTAL OPPORTUNITIES – RENEWABLE ENERGY). Another example is ENRRDP052 (Does the company report about environmentally friendly or green sites or offices?) correspond to KLD: ENV-STR-L (GREEN BUILDINGS).

Refinitiv		**KLD**			
Substantive Score					
ENERDP0011	Does the company have a policy to reduce emissions?	ENV-STR-D	CARBON EMISSIONS	ENV-CON-K	WATER STRESS
ENPIO08S	Does the company develop products or technologies that are used for water treatment, purification, or that improve water-use efficiency?	ENV-STR-A	CLEAN TECH	ENV-CON-F	ENERGY AND CLIMATE CHANGE
ENRRDP0011	Does the company have a policy to improve its water efficiency?	ENV-STR-H	NATURAL RESOURCE USE - WATER STRESS	ENV-CON-B	REGULATORY COMPLIANCE
ENRRDP0012	Does the company have a policy to improve its energy efficiency?	ENV-STR-O	CLIMATE CHANGE – ENERGY EFFICIENCY	ENV-CON-J	SUPPLY CHAIN MANAGEMENT
ENRRDP046	Does the company make use of renewable energy?	ENV-STR-M	ENVIRONMENTAL OPPORTUNITIES – RENEWABLE ENERGY		
ENRRDP058	Does the company use environmental criteria (ISO 14000, energy consumption, etc.) in the selection process of its suppliers or sourcing partners?	ENV-STR-G	ENVIRONMENTAL MANAGEMENT SYSTEMS		
Refinitiv		**KLD**			
Symbolic Score					
ENERDP031	Does the company report on initiatives to recycle, reduce, reuse, or substitute ozone-depleting (CFC-11 equivalents, chlorofluorocarbon) substances?	ENV-STR-P	PRODUCT CARBON FOOTPRINT	ENV-CON-D	TOXIC EMISSIONS AND WASTE
ENERDP036	Does the company report on initiatives to reduce, substitute, or phase out volatile organic compounds (VOC)?	ENV-STR-B ENV-STR-C ENV-STR-N	WASTE MANAGEMENT	ENV-CON-G	IMPACT OF PRODUCTS & SERVICES

ENERDP081	Does the company report on initiatives to reduce the environmental impact of transportation of its products or its staff?	ENV-STR-L	GREEN BUILDINGS	ENV-CON-I	OPERATIONAL WASTE
ENERO05S	Does the company show an initiative to reduce, reuse, recycle, substitute, phase out, or compensate CO2 equivalents in the production process?				
ENERO08S	Does the company report on initiatives to reduce, reuse, recycle, substitute, or phase out SOx (sulphur oxides) or NOx (nitrogen oxides) emissions?				
ENERO14S	Does the company report on initiatives to recycle, reduce, reuse, substitute, treat, or phase out total waste?				
ENRRDP052	Does the company report about environmentally friendly or green sites or offices?				
ENRRO03S	Does the company report on initiatives to reduce, reuse, substitute, or phase out toxic chemicals or substances?				

Panel B. Mapping to Refinitiv Version 2

We construct substantive and symbolic CSR using the following procedures: First, we collect all CSR indicators and their associated indices from Refinitiv ESG Version 2 dataset. Then, we follow Bothello et al. (2023) to identify Refinitiv ESG Version 1 (Asset4) Code and define substantive and symbolic CSR. Finally, we map Refinitiv Version 1 and Version 2 based on the description of each index. The Refinitiv ESG Version 2 dataset provides more detailed CSR indices, making it possible for a single Asset4 code to correspond to multiple fields in the Refinitv ESG Version 2 dataset. For example, ENPRD046 (Does the company make use of renewable energy) corresponds to two fields: one is "RenewableCleanEnergyProducts", and the other is "RenewableEnergyUse". Another example is SOHRD01S (Does the company have a policy to guarantee the freedom of association universally applied independent of local laws? and Does the company have a policy for the exclusion of child, forced, or compulsory labor?), which maps to "PolicyForcedLabor" and "PolicyFreedomOfAssociation" in the Refinitiv ESG Version 2 dataset.

Substantive Score		**Field Name**
ENRRDP058	Does the company use environmental criteria (ISO 14000, energy consumption, etc.) in the selection process of its suppliers or sourcing partners?	EnvironmentalSupplyChainManagement
ENRRDP058	Does the company use environmental criteria (ISO 14000, energy consumption, etc.) in the selection process of its suppliers or sourcing partners?	PolicyEnvironmentalSupplyChain
ENRRDP058	Does the company use environmental criteria (ISO 14000, energy consumption, etc.) in the selection process of its suppliers or sourcing partners?	EnvironmentalSupplyChainMonitoring
ENRRDP058	Does the company use environmental criteria (ISO 14000, energy consumption, etc.) in the selection process of its suppliers or sourcing partners?	EnvironmentalSupplyChainPartnershipTermination
ENERDP0011	Does the company have a policy to reduce emissions?	PolicyEmissions
ENRRDP0012	Does the company have a policy to improve its energy efficiency?	PolicyEnergyEfficiency

ENRRDP0012	Does the company have a policy to improve its energy efficiency?	TargetsEnergyEfficiency
ENRRDP0011	Does the company have a policy to improve its water efficiency?	PolicyWaterEfficiency
ENRRDP0011	Does the company have a policy to improve its water efficiency?	TargetsWaterEfficiency
ENRRDP046	Does the company make use of renewable energy?	RenewableCleanEnergyProducts
ENRRDP046	Does the company make use of renewable energy?	RenewableEnergyUse
ENPIO08S	Does the company develop products or technologies that are used for water treatment, purification, or that improve water-use efficiency?	WaterTechnologies

Symbolic Score		**Field Name**
ENERDP031	Does the company report on initiatives to recycle, reduce, reuse, or substitute ozone-depleting (CFC-11 equivalents, chlorofluorocarbon) substances?	OzoneDepletingSubstances
ENERDP031	Does the company report on initiatives to recycle, reduce, reuse, or substitute ozone-depleting (CFC-11 equivalents, chlorofluorocarbon) substances?	OzoneDepletingSubstancesToRevenues
ENERDP036	Does the company report on initiatives to reduce, substitute, or phase out volatile organic compounds (VOC)?	OrganicProductsInitiatives
ENERDP036	Does the company report on initiatives to reduce, substitute, or phase out volatile organic compounds (VOC)?	VocEmissions
ENERDP036	Does the company report on initiatives to reduce, substitute, or phase out volatile organic compounds (VOC)?	VocEmissionsReduction
ENERDP036	Does the company report on initiatives to reduce, substitute, or phase out volatile organic compounds (VOC)?	VocEmissionsToRevenues
ENERDP081	Does the company report on initiatives to reduce the environmental impact of transportation of its products or its staff?	StaffTransportationImpactReduction
ENERO05S	Does the company show an initiative to reduce, reuse, recycle, substitute, phase out, or compensate CO2 equivalents in the production process?	DirectScope1CO2ChangeYOYPercent
ENERO08S	Does the company report on initiatives to reduce, reuse, recycle, substitute, or phase out SOx (sulphur oxides) or NOx (nitrogen oxides) emissions?	IndirectScope2CO2ChangeYOYPercent
ENERO08S	Does the company report on initiatives to reduce, reuse, recycle, substitute, or phase out SOx (sulphur oxides) or NOx (nitrogen oxides) emissions?	IndirectScope3CO2ChangeYOYPercent
ENERO08S	Does the company report on initiatives to reduce, reuse, recycle, substitute, or phase out SOx (sulphur oxides) or NOx (nitrogen oxides) emissions?	NOxEmissions
ENERO08S	Does the company report on initiatives to reduce, reuse, recycle, substitute, or phase out SOx (sulphur oxides) or NOx (nitrogen oxides) emissions?	NOxEmissionsToRevenues
ENERO08S	Does the company report on initiatives to reduce, reuse, recycle, substitute, or phase out SOx (sulphur oxides) or NOx (nitrogen oxides) emissions?	NOxSOxEmissionsReduction

ENERO08S	Does the company report on initiatives to reduce, reuse, recycle, substitute, or phase out SOx (sulphur oxides) or NOx (nitrogen oxides) emissions?	SOxEmissions
ENERO08S	Does the company report on initiatives to reduce, reuse, recycle, substitute, or phase out SOx (sulphur oxides) or NOx (nitrogen oxides) emissions?	SOxEmissionsToRevenues
ENERO14S	Does the company report on initiatives to recycle, reduce, reuse, substitute, treat, or phase out total waste?	EWasteReduction
ENERO14S	Does the company report on initiatives to recycle, reduce, reuse, substitute, treat, or phase out total waste?	WasteReductionInitiatives
ENRRDP052	Does the company report about environmentally friendly or green sites or offices?	GreenBuildings
ENRRDP052	Does the company report about environmentally friendly or green sites or offices?	LandEnvironmentalImpactReduction
ENRRO03S	Does the company report on initiatives to reduce, reuse, substitute, or phase out toxic chemicals or substances?	Agrochemical5PercentRevenue
ENRRO03S	Does the company report on initiatives to reduce, reuse, substitute, or phase out toxic chemicals or substances?	AgrochemicalProducts
ENRRO03S	Does the company report on initiatives to reduce, reuse, substitute, or phase out toxic chemicals or substances?	ToxicChemicalsReduction

Appendix 6: Immaterial and Material environmental score (DesJardine et al., 2023)

First, we identify the material standards from 77 industry-specific SASB. https://www.sasb.org/standards-overview/download-current-standards/.

Second, we identify the material sustainability topics in each industry by aligning the descriptive SASB definitions of materiality with the descriptive definitions of the KLD subcategories. For instance, SASB describes "Energy Management", a material sustainability topic in the Multiline and Specialty Retailers & Distributors, thus:" Companies in this industry require significant amounts of energy for their retail facilities and warehouses. Sustainability factors—such as the increasing number of GHG-emissions regulations, incentives for energy efficiency and renewable energy, and risks associated with nuclear energy and its increasingly limited license to operate—are leading to price increases in conventional electricity sources while making alternative sources more cost-competitive. Fossil fuel–based energy production and consumption contribute to significant environmental impacts, including climate change and pollution. It is becoming increasingly important for companies to manage their overall energy efficiency, and their access to alternative energy sources. Efficiency in this area can have financial implications through direct cost savings, which are particularly beneficial in this low-margin industry." Following this definition, we mapped Energy Management to KLD subcategories: Clean Energy (ENV_str_D).

Finally, SASB provided us with a mapping tool between Sustainable Industry Classification System (SICS) and S&P 1500 firms. This allowed us to manually determine exactly which SICS our sample firms belong to and therefore which sustainability issues are material for these firms.

Appendix 7: McCrary Test

This table presents the results of a formal test of the discontinuity in the density of firm leverage around the threshold to examine whether firms strategically manipulated leverage to influence their exposure to SAP adoption. Results are examined by selecting both fixed and optimal bandwidth. Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1.

Bandwidth	Threshold	Bandwidth	Discontinuity Estimate	Standard Error	95% CI lower	95% CI upper
Fixed	0.238	0.05	-0.8897**	0.440	-1.7512	-0.0282
	0.238	0.06	-0.7958**	0.3983	-1.5764	-0.0153
	0.238	0.07	-0.6507*	0.3692	-1.3743	0.0729
Optimal	0.238	0.056(Left) 0.07(Right)	-0.7549*	0.3961	-1.5312	0.0214

Appendix 8: Matching Balance Results

The table reports the mean-value and t-test results before and after matching. The measurements of all matching variables including *Female Executive*, *Total Compensation*, *Firm Size*, *MTB*, *Leverage*, *ROA*, *Cashholding*, *Volatility, E-index, CEO Delta* and *CEO Vega* are reported in Appendix A. We perform the propensity score matching (PSM) by using the kernel method.

		Mean		%Reduce		t-test		
Variable	Unmatched/Matched	Treated	Control	%bias	|bias|	t	p>t	V(T)/ V(C)
Female Executive	U	0.460	0.418	8.500		1.22	0.221	-
	M	0.460	0.431	5.800	31.100	0.60	0.546	-
Total Compensation	U	8.341	7.888	66.700		8.72	0.000	0.64*
	M	8.341	7.870	69.200	-3.800	7.19	0.000	0.64*
Firm Size	U	9.557	8.025	105.700		14.77	0.000	0.89
	M	9.557	8.018	106.200	-0.400	11.06	0.000	0.90
MTB	U	2.630	4.284	-6.200		-0.65	0.514	0.02*
	M	2.630	3.435	-3.000	51.300	-0.58	0.561	0.07*
Leverage	U	0.292	0.256	20.300		2.50	0.012	0.45*
	M	0.292	0.252	22.200	-9.800	2.37	0.018	0.49*
ROA	U	-0.002	0.059	-50.400		-9.47	0.000	2.66*
	M	-0.002	0.058	-49.600	1.700	-5.24	0.000	3.09*
Cashholding	U	0.076	0.153	-64.300		-7.46	0.000	0.27*
	M	0.076	0.150	-61.500	4.300	-6.43	0.000	0.27*
Volatility	U	0.099	0.082	33.300		6.30	0.000	2.72*
	M	0.099	0.082	33.100	0.700	3.45	0.001	2.86*
E-index	U	4.065	4.059	0.800		0.10	0.922	0.57*
	M	4.065	4.059	0.700	11.000	0.07	0.944	0.57*
CEO Delta	U	239.06	265.29	-5.200		-0.74	0.461	0.91
	M	239.06	245.18	-1.200	76.700	-0.13	0.896	1.04
CEO Vega	U	63.154	53.609	9.900		1.59	0.111	1.58*
	M	63.154	48.534	15.200	-53.200	1.62	0.106	1.86*

** If variance ratio outside [0.76; 1.31] for U and [0.76; 1.31] for M*