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Implicit versus Explicit Contracting in Executive Compensation for Environmental and Social Performance

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Abstract

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Keywords: Executive compensation, contracting, ESG, CSR, emissions

JEL Classification: G30, J33, M12

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Abstract

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1. Introduction

For decades, an article of faith has asserted that linking executive pay to financial performance reduces conflicts of interest between shareholders and management (e.g., Holmström, 1979; Baker, Jensen and Murphy, 1988; Jensen and Murphy, 1990). Indeed, the vast majority of CEOs of public firms have part of their compensation tied to financial performance measures (De Angelis and Grinstein, 2015). Recently, firms have started linking the compensation of executives not only to financial targets but also to environmental ("E") and social ("S") targets, which we refer to as ES Pay. ES Pay can theoretically align managers' interests with those of ES-conscious stakeholders and complement the interest-alignment effect of pay-for-performance schemes.

In contrast to financial performance, many E and S targets are more general, vague, and harder to measure. These common features of ES targets raise the question of how ES Pay schemes should be structured so that they improve firms' ES performance. Inspired by contract theory (Baker, Gibbons and Murphy, 1994; Pearce and Stacchetti, 1998), we hypothesize that the effectiveness of implicit and explicit contracting depends on how difficult it is to objectively measure the performance for an ES target. When objective performance measures are available for a specific target, such as greenhouse gas (GHG) emission reduction targets, explicit contracting is likely more effective than implicit contracting in improving the outcome. However, when objective performance measures are not readily available for a target or when performance measurement is not feasible, such as for community involvement or talent management targets, we hypothesize that both implicit and explicit contracting can be effective.

The difference between explicit and implicit contracting for ES performance might also help

us better understand the discussion that emerged between proponents of ES Pay and those who claim it is ineffective at improving ES performance, because unlike financial targets, ES targets are often vague and easily gamed. Although explicit contracts clearly link executive pay to observable, quantitative ES performance measures, the subjective judgment in implicit contracts makes them opaque and susceptible to misjudgment—or, as expressed in the quote below, "subjective, fluffy and easily gamed." The following quotes illustrate these opposing views:

> [...] we want to ensure that our investee companies align their executive remuneration policies with ESG KPIs and we will vote against those that don't. (Matt Christensen, head of sustainable & impact investing at Allianz GI; Financial Times, February 2022)

> We are sceptical of ESG metrics being used in compensation—oftentimes they are very subjective, fluffy and easily gamed. (Ben Colton, head of stewardship at State Street Global Advisors; Financial Times, August 2023)

While the idea that incentivizing manager to pay closer attention to E and S issues through incentive contracts is not new, both our conceptual framework and empirical results yield significant insights relative to the existing literature. First, our design allow us to investigate a more precise setting that accounts for both explicit and implicit contracts, while the structural design of ES Pay is often overlooked by the prior literature. Implicit and explicit schemes are markedly different and their effectiveness depends on the circumstances in which they are applied. Due to lack of precise data, past studies, by necessity have used either very limited hand-collected data for a relatively short time period (e.g., Flammer, Hong and Minor, 2019) or they relied on ISS data that misses

many cases of ES Pay. Though a few existing papers differentiate quantitative, objective targets from qualitative, subjective targets (e.g. Maas, 2018; Ikram, Li and Minor, 2019), their analysis is limited to S&P 500 firms in early years due to the lack of data. In this paper, we explore how effective explicit and implicit ES Pay schemes are in improving firms' ES performance using the universe of U.S. firms from 2006 to 2021. In addition, we zoom into specific targets to understand whether the existence of objective performance measures influences the effectiveness of implicit versus explicit contracts, in line with theoretical suggestions.

To test our hypotheses, we compile a novel and comprehensive dataset on ES Pay schemes of most publicly listed U.S. firms from 2006 to 2021, covering 95% of the total market capitalization. The data source for the existence and design of ES Pay schemes is the Compensation Discussion and Analysis (CD&A) section of firms' proxy statements, because comprehensive and reliable information on these aspects is not readily available in commercial databases. We automatically download firms' proxy statements and extract the CD&A sections, resulting in a sample of 52,690 proxy statements. In the next step, we employ machine learning (ML) techniques to classify the CD&A sections into those that likely have ES Pay and those that do not. Our ML algorithm achieves a Type II error rate below 5%. For firm-year observations where ES Pay is likely present, we read the relevant CD&A sections manually and collect information on the precise structure of ES targets in CEO's compensation contracts. This step involves reading of 30,314 CD&A sections from 2,808 unique firms.

Our dataset reveals that the prevalence of ES Pay increased from 6.5% in 2006 to 25.7% in 2021 for all public firms, and from 20.4% to 62.9% for S&P 500 firms. E-related targets, in particular,

became more common over time, with an increase from 1.0% in 2006 to 12.4% in 2021. S-related targets are generally more common than E targets, with their prevalence increasing from 6.5% in 2005 to 25.6% in 2021. When we zoom in on the targets, we find that the most common S targets are related to talent management (52.6% of all firm-years with ES Pay), employee safety (44.3%), customers (44.0%), diversity (19.4%), and community engagement (4.4%). Common E targets are related to emissions (3.6%), green technologies (2.3%), and waste management (1.9%).

In the subsample of firms with ES Pay in the 2021, we find that over 70% of the firms met or exceeded all of their ES targets. This finding is consistent with the high achievement rate documented in Badawi and Bartlett (2024). For this subsample, ES Pay contributes on average $407,000 (or 4.3%) to the CEO's total annual compensation. For the full sample, we use an approximation for the ES Pay amount that is based on the CEO's bonus and the predetermined weights assigned to ES targets and estimate that ES Pay contributes approximately $585,000 (or 7.0%) to the CEO's total annual compensation.

Analyzing the contractual structure of the ES Pay schemes reveals that 46.4% of all schemes include at least one quantitative target (e.g., reduce GHG emissions by a certain amount), whereas the remaining 53.6% only use qualitative targets (e.g., enhance community involvement). Approximately three-quarters of all schemes link the achievement of a target to bonus payments via fixed formulas, whereas for the remaining quarter, this link depends on the board's discretion and their subjective judgment.[1] We classify a firm's ES Pay scheme as explicit if at least one quantitative

[1] An example of a quantitative target with a fixed link is Xcel Energy, which grants the CEO performance shares based on the CO_2 emission reduction. By contrast, Apple uses the qualitative target of advancing its environmental values and lets the compensation committee decide how the target achievement affects compensation.

target is used and the target is linked to executive pay via fixed formulas. Schemes with only qualitative targets or those for which the link between target achievement and compensation is based on the board's discretion are classified as implicit schemes. Among all ES Pay schemes, 40.7% use explicit contracting, whereas the remaining 59.3% apply only implicit contracting. Over time, the use of explicit contracting increased, from 30.1% in 2006 to 43.5% in 2021.

Interestingly, ESG scores, which are a standard measure of ES performance provided by several vendors, are rarely mentioned as targets in executive pay contracts. In our sample, less than 1% of ES Pay schemes include them as targets. Nevertheless, given the widespread use of these aggregate measures of ES performance, examining the impact of ES Pay on them is important. We use both individual vendors' ES scores and a combined ES score aggregated from KLD, MSCI, S&P Global, and Sustainalytics. Using firm fixed effects regression models, we find the combined ES score is approximately 0.07 units higher in firms with ES Pay (a difference of around 8.6% of the score's standard deviation). This difference is driven by explicit ES Pay schemes, which are associated with a 0.167 units higher index score. For implicit ES Pay schemes, we find no significant differences compared with firms without ES Pay schemes.

Although firm fixed effects models are able to control for time-constant omitted variables, they are prone to concerns about reverse causality. When we investigate the time patterns in the five-year window around firms' first introduction of ES Pay schemes, we find the difference in ES performance starts to emerge gradually after the introduction, with no evidence of a pre-trend. While this result does not decisively rule out reverse causality, it helps reduce such concerns under the assumption that it is difficult for firms to implement ES Pay schemes precisely at the moment

of anticipated ES performance improvements. Nevertheless, we fully acknowledge that, despite relying on theoretical predictions, employing a comprehensive fixed-effect structure, and analyzing the time dynamics of the effects in detail, our study shares a limitation common to many compensation studies: the inability to definitively establish causal inferences (e.g., Gabaix and Landier, 2008; Edmans, Gabaix and Jenter, 2017).

For several legitimate reasons, using ESG scores as a measure of ES performance is met with criticism concerning what and how they measure.[2] Therefore, using more direct measures of E and S performance is important. Further, employing such measures allows us to examine how the measurability of ES performance affects the effectiveness of explicit and implicit contracting. To this end, we analyze the individual targets related to E or S mentioned in the ES Pay schemes. We categorize these targets into eight general groups: community engagement, customers, diversity, E reporting, emissions, employee safety, S reporting, and talent management.

For some targets, such as emissions, performance measures are clearly more precise than for others that are more vague by nature, such as S reporting.[3] Following this logic, we classify targets into two categories based on their measurability. Those targets related to emissions, customers, employee safety, and diversity are considered to be more easily measurable because firms can rely on objective and quantifiable performance measures.[4] By contrast, targets related to talent

[2]ES index scores can be, for instance, affected by ex-post data modifications (Berg, Fabisik and Sautner, 2021) and the applied rating methodologies (Berg, Kölbel and Rigobon, 2022).

[3]For instance, firms typically use precise targets such as "reduce GHG emissions by 10%" for emissions, whereas they would state "enhance disclosure on corporate social responsibility strategy" for S reporting.

[4]These performance measures are, for instance, Scope 1 or 2 emissions, net promoter scores, customer satisfaction scores, customer retention rates, on-time delivery rates, employee incident rates, employee sick days, management gender/ethnicity composition, or workforce gender/ethnicity composition.

management, community engagement, and E/S reporting are classified as being more difficult to measure because objective and quantifiable performance measures are not easily available. We find that for precisely measurable targets, a significantly larger portion of the ES contracts are explicit. For example, 65% of emissions targets rely on explicit contracting. By contrast, for difficult-to-measure targets such as E and S reporting, less than 5% of the ES contracts are explicit. On average, the explicit contracting share is 41.3% for targets in the easy-to-measure group and 13.2% in the difficult-to-measure group, which is consistent with our expectations.

To assess ES performance at the individual target level, we use the GHG emission intensity for emissions, the share of female and non-white board members for diversity, and the incident rate for employee safety. For customer-related targets, which are the the fourth target in the easy-to-measure group, we rely on the corresponding ESG index subscores (i.e., customer relationship management score from S&P). The subscores of ESG indices are likely more reliable indicators of a firm's E and S performance than the aggregate indices because they relate more closely to specific targets. We follow the same approach for all targets in the difficult-to-measure group, for which there are by definition no precises performance measures available. Because of the imprecise nature of ESG index scores, the results for the difficult-to-measure targets group have to be interpreted with some caution as we cannot rule out potential biases due to measurement error.

We find explicit ES Pay schemes are effective in improving ES performance for targets with precise performance measures, whereas implicit schemes are ineffective for these targets. For instance, firms with specific emissions targets exhibit a 20% lower GHG emission intensity, whereas firms with implicit emissions targets show no improvement. When precise performance measures

are less easily obtained, both explicit and implicit ES Pay schemes are associated with better ES performance. For example, the talent score is 8.5% higher in firms with talent targets than in firms without talent-related targets. When comparing explicit and implicit contracting for difficult-to-measure targets, implicit ES Pay schemes tend be more somewhat more effective than explicit schemes for difficult-to-measure targets, although the difference is not statistically significant. An example of this (insignificant) difference is the S-reporting score, which is 19.0% higher in firms with implicit targets and 11.0% higher in firms with explicit targets compared to firms without S reporting targets.

In summary, we find that the frequency and effectiveness of both explicit and implicit contracting are closely related to the precision with which ES performance can be measured for a given target. Both implicit and explicit contracting can potentially improve ES performance. For easy-to-measure targets, only explicit contracting with specific, quantitative targets and direct links between ES performance and executive compensation is associated with better ES performance. However, although implicit contracting is ineffective when performance can be measured relatively precisely, it can be effective for hard-to-measure targets. This finding implies that the optimal contracting is target specific and depend on how difficult its performance measurement is. Targets in ES Pay schemes should be stated precisely and linked directly to executive compensation when precise performance measurement is possible, such as for emissions or incident rates.

Despite their effectiveness, firms' actual usage of explicit ES Pay schemes is still limited for targets that can be precisely measured. For instance, among all firms, less than 1% use any explicit emission-related targets during our sample period. Among the top 50 GHG emitting firms, only

7.5% use explicit targets that incentivize managers to reduce emissions. Although there has been some increase in recent years, still only around 2% of firms incorporated explicit emission-related targets in 2021. Against the backdrop of growing concerns about the potentially devastating impact of climate change (e.g., Krueger, Sautner and Starks, 2020; Sautner et al., 2023; IPCC, 2023) and the positive impact that explicit climate-related targets can have on firms' actual reductions in emissions, it is worrying to see how rarely those targets are used.

Turning to the third issue, which examines the relationship between ES Pay, its contractual structure, and the overall level of executive pay, we find that CEO pay is approximately 2.9% higher for firms with ES Pay than for those without it. However, when considering the type of contracting, we find the compensation difference is exclusively driven by firms that use implicit ES Pay schemes for hard-to-measure targets, which are associated with 6.4% higher compensation. This higher compensation is not related to differences in financial or ES performance, and we find no differences in executive compensation between firms with other types of ES Pay and firms without ES Pay. This analysis helps shed light on a concern frequently expressed in the popular press and by practitioners—namely, that ES Pay could be used to inflate executive compensation.[5] Although this concern seems justified for some implicit ES Pay schemes, it is unwarranted for those using explicit contracting.

The fourth issue we investigate is the relationship between ES Pay and financial performance. Theoretically, financial performance could suffer if CEOs pay less attention to financial targets

[5]This suspicion was, for instance, expressed by Tom Gosling, a board advisor: "One of my big fears about this sort of stampede towards including ESG targets in executive pay is that it's likely just to lead to more pay and not more ESG. And we need to recognize that as a potentially big unintended consequence" (GreenBiz, February 2022).

when ES targets are in place, or it could improve if ES Pay directs their attention to positive-NPV ES projects. We do not detect any negative or positive impact of ES Pay on financial performance, which we measure by return on assets and stock returns, regardless of the contracting structure. This result indicates that firms' financial performance does not necessarily suffer when CEOs place more emphasis on ES-related issues.

Our findings extend the existing literature along several dimensions. First, we complement the previous literature that explores the inclusion of ES-related targets in executive compensation. Flammer, Hong and Minor (2019) find CSR targets improve long-term orientation, firm value, and green innovations and reduce emissions. Cohen et al. (2023) report the inclusion of ESG metrics in executive compensation improves firms' ESG performance.[6] Bebchuk and Tallarita (2022) argue the intransparency of ES targets makes them prone to manipulation and subjective interpretation. Our primary contribution to this literature is to show that simply examining the binary decision of whether ES targets are included in executive pay contracts masks the significant difference between explicit and implicit contracting. As theory predicts, the structural form can make a big difference for ES Pay—only explicit contracting is effective for easy-to-measure targets, whereas implicit contracting can be preferable when performance measures are imprecise.

[6]Flammer, Hong and Minor rely on self-collected data for a sample of S&P500 firms from 2004 to 2013, while Cohen et al. use the ISS Executive Compensation Analytic (ECA) dataset for a global sample of publicly listed firms. Other related studies are Hong, Li and Minor (2016), Maas (2018) and Ikram, Li and Minor (2019), who focus on CSR targets in S&P 500 firms; Tsang et al. (2021), who use survey-based data from Refinitiv (previously ASSET4) for a global sample and find a positive association between CSR incentives and innovation; Homroy, Mavruk and Nguyen (2023), who use granular information on compensation contracts of Swedish CEOs and document improvements in ESG scores for some firms with ESG-linked pay; Hazarika et al. (2023), who analyze ESG-linked pay for a global sample and find a positive effect on ESG and financial performance; Li (2024) who finds that climate-linked pay is associated with firms outsourcing their GHG emissions.

Second, we contribute to the literature on the role of investors, consumers, and employees in improving firms' ESG performance (e.g., Chen, Dong and Lin, 2020; Dai, Liang and Ng, 2021; Hart and Zingales, 2022; Starks, 2023) by focusing on firm executives. Our findings indicate that both implicit and explicit ES Pay schemes can help improve firms' ES performance, depending on target measurability. This observation suggests ES Pay is a potential mechanism to close the incentive gap and provide direct incentives for managers to improve ES performance.

Lastly, our study is related to the literature on contracting with executives. For instance, Gillan, Hartzell and Parrino (2009) find most CEO-firm agreements are explicit, and De Angelis and Grinstein (2015) report 90% of S&P 500 firms grant some type of financial performance-based rewards. Theoretically, linking executive compensation to financial performance can help align the interests of firm owners and managers and reduce agency conflicts (e.g., Baker, Jensen and Murphy, 1988; Holmström, 1979). Among others, Murphy (1985), Jensen and Murphy (1990), Aggarwal and Samwick (2003), and Frydman and Saks (2010) explore the role of pay-for-performance for top managers empirically and highlight the importance of financial incentives. We contribute to this literature by showing that ES Pay, if designed correctly, can complement pay-for-performance schemes and improve firms' ES performance without hurting financial performance.

2. Theory and data

This section first describes contract theory and then the data that are used in this study. An overview of the definitions and sources of all key variables is provided in Appendix A.

2.1. Theory

The central problem in agency theory lies in the asymmetric information and conflict of interests between the principal and the agent. In a classic principle-agent model when the firm's objective (the worker's contribution to firm value) is observable and contractible, but the worker's effort is not observable or contractible, the optimal contract is second-best due to moral hazard problem. Holmström (1979) identified conditions under which a second-best contract can be improved by including additional performance measures that provide information about the worker's effort.

However, the assumption that the firm's objective is contractible often fails in practice, especially when considering environmental and social performance. Certain aspects of ES performance can be vague and hard to measure objectively. To fill this gap, Baker, Gibbons and Murphy (1994) examined optimal contracts when the worker's contribution to the firm value is too complex to measure objectively. They integrated and extended two benchmark models: the explicit contract and the implicit contract. The benchmark model of explicit contract is from Baker (1992). The explicit contract is based on an imperfect objective measure of the worker's contribution. The benchmark model of implicit contract is from Bull (1987). It evaluates the worker's performance through supervisor's subjective assessment. Though implicit contract is not legally enforceable, it can be self-enforcing due to firm's reputation concern. Firm weighs the short-term temptation to renege on the worker against the present value of future benefits from long-term cooperation.

When the objective measure is sufficiently close to perfect, explicit contract alone provides first-best outcome. When the objective measure is a noisy measure of the worker's true effort,

explicit and implicit contracts can be substitutes or complements depending on the context. When the best feasible explicit contract yields positive expected profit, explicit and implicit contracts are substitutes, the optimal implicit contract bonus increases and explicit contract bonus decreases, as the objective performance measure becomes more distortionary. When the best feasible explicit contract yields negative expected profit, the optimal implicit contract bonus decreases as the objective performance measure becomes more distortionary, while the effect on explicit bonus is ambiguous. When the discount rate and outside option are sufficiently high that no implicit contract is feasible on its own, and when the distortion of objective measure is sufficiently high that no explicit contract is feasible on its own, an appropriate combination of explicit and implicit contract can generate positive profit.

Building on these insights, the optimal contract depends on the measurability of the performance targets. In the context of ES Pay, when the available objective performance measure accurately reflects the CEO's contribution to the ES objective, an explicit contract based on this measure is preferred. However, if the objective measure serves as an imperfect proxy for the CEO's actual contribution, implicit contract or a combination of explicit and implicit contracts may be preferred to better align incentives and mitigate distortions.

Relatedly, Chaigneau and Sahuguet (2025) study optimal contracting that incentivizes managers to create both financial and social value. They document the potential for "gaming behavior" when the misalignment between measured ES targets and actual ES impact is high. To mitigate the inefficiencies from gaming, compensation should be less sensitive to ES targets as the measurement bias increases. Using multiple ES metrics can mitigate gaming if their biases are independent,

while adding highly correlated or low-quality metrics may worsen the problem.

2.2. ES Pay data

Our data source for ES Pay data is the CD&A section of firms' proxy statements. Starting from the fiscal year 2006, firms are mandated to provide a narrative discussion of their compensation policies for (at least) the five executives with the highest pay. Typically, the CD&A section includes a breakdown of executive compensation into base salary, annual incentives, long-term incentives, and a disclosure of the performance metrics used to determine each pay component. Our data collection process consists of two steps. First, we automatically download the proxy statements of publicly listed U.S. firms and apply textual analysis and ML to identify firms that use ES Pay. We then read the relevant CD&A sections and manually collect data on the existence and design of ES Pay schemes.[7]

To the best of our knowledge, detailed information on the design of ES Pay schemes is not readily available in any commercial database. The ISS ECA database provides information on the performance metrics used in executive compensation, including metric name, weight, and target values. However, approximately half of the metric weights and three-quarters of the target values are missing for ES targets between 2011 and 2021. Before 2011, their sample coverage is limited—for instance, only 376 U.S. firms have non-missing data on financial performance metrics and only one firm has non-missing data on ES metrics. Although not the focus of our study, we also find ISS seems to underestimate the prevalence of ES Pay schemes by nearly factor two when we compare

[7]We do not use ML techniques to collect information on the design of ES Pay schemes, because the accuracy is not high enough (accuracy rates are less than 90%). One potential reason for this relatively low accuracy is that the reporting of information about ES Pay schemes is not standardized and varies substantially across firms.

the overlapping sample of our hand-collected data and ISS ECA in Appendix C. Thus, although ISS might be a valuable data source for other purposes, the hand collection of detailed information on the structure of executive pay contracts and, in particular, the included ES targets is imperative for our study.[8]

2.2.1. Data download

We automatically download all proxy statements with fiscal year end between December 15, 2006, and May 31, 2022, from EDGAR. The SEC requires a firm to include a CD&A section in its proxy statement if its fiscal year ends on or after December 15, 2006, unless it qualifies as a smaller reporting company (SRC).[9] In total, we are able to retrieve proxy statements for 64,940 firm-years. We exclude observations that cannot be matched with Compustat North America and those for which we fail to locate the CD&A or executive compensation section. For duplicate statements from the same firm in the same year, we keep the one with the later filing date. Our final sample consists of 52,690 firm-year observations from 7,045 unique firms. Appendix B summarizes our sample construction.

2.2.2. Automatic preprocessing

To accelerate the ES Pay data collection process, we use a three-step approach to process the data. First, we read the CD&A section of all S&P 500 firms from 2006 to 2021, as well as 300

[8]Refinitiv and Sustainalytics also provide data points that could be used to approximate whether firms have ES Pay, but they do not provide any information on the design of ES Pay schemes.

[9]A firm qualifies as a SRC if it has a public float of less than $75 million or annual revenues of less than $50 million and no public float. Starting from September 10, 2018, the threshold was raised to a public float of less than $250 million or annual revenues of less than $100 million and a public float of less than $700 million. We use the entire executive compensation section for firms without a CD&A section.

randomly selected S&P 400 mid-cap or S&P 600 small-cap firms, and 300 randomly selected non-S&P 1500 firms. This initial sample consists of 1,386 unique firms and 16,569 firm-year observations. For each CD&A section, we manually classify whether the firm incorporates E and/or S targets into its executive compensation plan.

Second, we use this subset as our training and testing sample. We feed an XGBoost model with textual information from the CD&A sections, including word frequency, co-occurrence, and length, to predict which sections include E or S targets. Internet Appendix IA.1 and IA.2 provide more details on the implementation of this classification approach. For firms where the model predicts E or S targets are not included in any sample year, we assume they have no ES Pay. Our testing sample reveals this process has a low error rate. Only 2.55% of the firm-year observations for which the model never predicts E or S targets actually have such targets according to our manual reading.

Third, we read all CD&A sections of firms for which the model predicts the presence of E or S targets in any sample year. The final sample for this last step, which requires manual reading and classification, consists of 30,314 CD&A sections from 2,808 unique firms, covering over 90% of the US market capitalization. Our final sample of firms with and without ES Pay consists of 7,045 unique firms and 52,690 firm-year observations from 2006 to 2021.

2.2.3. Manual classification

In the manual classification, we first check if the CD& A section mentions any E or S targets. We classify targets related to emissions, waste management, green technology, and sustainability/climate reporting as E targets. Similarly, we classify targets related to diversity, employee

safety, talent management, customers, suppliers, community engagement, or CSR reporting as S targets. We set the dummy variables for E and S Pay to one if the firm uses any targets related to E or S, respectively. The combined variable, ES Pay, is set to one if the firm incorporates E targets, S targets, or both. If a firm uses different compensation scheme for its executives, which is not common, we focus on the CEO or, if the CEO cannot be identified, the highest-paid executive.

In addition to the ES Pay dummy, we collect information on the design of the ES Pay scheme. The first step is to classify targets as either qualitative or quantitative. A target is considered quantitative if the criteria for its achievement are measurable. Examples include reducing carbon dioxide emission by 55% by 2023 compared with 2005 levels (Xcel Energy, 2021) or increasing the share of women in executive-level roles to 37.3% (The Hartford, 2021). By contrast, a target is considered qualitative if its achievement is not based on a measurable criterion. Examples include targets to increase ESG disclosure (American Express, 2021) or to evaluate diversity and inclusion efforts (Apple, 2021).

Next, we investigate the link between target achievement and executive compensation. Firms using a fixed link specify the exact relationship between the target achievement and executive pay by assigning a pre-determined weight to ES targets. For example, in 2021 Xcel Energy indicated 30% of its long-term incentive pay is based on carbon emissions reductions and that the executives will receive 100% of the target payout, which corresponds to $1.89 million, if a 55% reduction in carbon dioxide emissions is reached. Similarly, Astec Industries stated that 15% of the annual cash bonus is based on a safety target of less then 1.26 work-related injuries per 100 full-time workers.

The alternative to the fixed-link approach is to avoid specifying the exact relationship between

target achievement and executive pay. In this case, compensation is determined, either partially or fully, at the discretion of the board or compensation committee. For example, in 2021, Apple used an ESG modifier to adjust the annual cash incentives, stating that the "compensation committee may choose to apply the ESG Modifier to adjust the payout amount upwards or downwards by up to 10% or determine not to make any adjustments." Similarly, Emerson Electric bases pay solely on the compensation committee's "informed judgment."

Lastly, we classify each ES Pay scheme as either explicit or implicit. A scheme is classified as explicit if it includes at least one quantitative target and uses a fixed link between target achievement and executive compensation. Conversely, a scheme is classified as implicit if it only includes qualitative targets or does not use fixed links. In addition to the firm-level classification, we apply the same approach at the individual target level, classifying each target as either explicit or implicit. To further illustrate our classification of ES pay schemes, we present screenshots for the cases used in this section and describe additional examples in Appendix D.

2.3. ES index data

We obtain index scores related to firms' E and S performance from four rating providers: KLD, MSCI, S&P Global (previously RobecoSAM), and Sustainalytics. Please note we do not use ES scores from Refinitiv, because their calculation includes data points related to ES Pay, which could lead to a mechanical relationship in our analysis. Sustainalytics also has one indicator related to ES Pay, but it is used to construct the G category score (G_2_6: Executive Compensation Tied to ESG Performance), which is not relevant for our analysis.

KLD only provides dummy indicators for strengths and concerns under categories related

to ESG. Therefore, we first aggregate them into category scores by subtracting concerns from strengths, where the strengths (concerns) are scaled by the maximum number of strengths (concerns) following Lins, Servaes and Tamayo (2017). The KLD E score is defined as the environment category score, the KLD S score is the average of the five category scores related to social aspects (employee relations, diversity, human rights, community, product), and the KLD ES score is the average of the E and S scores. The MSCI ES score is the weighted average of the MSCI environmental and social pillar scores. The weighting factor is provided by MSCI and reflects the relative importance of E and S for a specific firm, considering factors such as its industry. The S&P ES score is the weighted average of the S&P E and S scores based on the weighting factor provided by S&P, again taking into account the relative importance of E and S. The Sustainalytics ES score is the average of the Sustainalytics environment and social scores.

The coverage of the ES scores of different rating providers varies over time and across firms. The KLD score offers the broadest coverage in earlier years, but it is only available until 2019. The MSCI score is available from 2007, and the S&P score is available from 2013. The Sustainalytics score is available from 2009 to 2019, after which they stopped updating it and switched to a new methodology for ESG risk scores. To enhance coverage, we create a combined ES score by averaging all available ES scores from the four rating providers for each firm-year observation.[10] To account for differences in levels and variations of these ES scores, we first standardize each score by subtracting its mean and dividing it by its standard deviation. This combined ES score is available for 62.7% of the ES Pay sample.

[10]Our results are robust if we include the Refinitiv score in the combined ES score.

2.4. Emissions, diversity, and incident rates data

Data on GHG emission are obtained from Trucost. Trucost collects self-disclosed emission data from multiple sources, including annual reports, sustainability reports, filings with the U.S. Environmental Protection Agency (EPA), and from other third-party datasets such as the Carbon Disclosure Project. In cases where self-disclosed emission data are not available, Trucost estimates emissions based on their proprietary model, which calculates the environmental impact per unit of revenue for each type of business activity and then estimates firms' emissions based on their revenue composition. Because these estimated emissions do not necessarily reflect the actual emissions of a specific firm, we only rely on self-disclosed emissions and ignore estimated emissions (see Aswani, Raghunandan and Rajgopal, 2024, for a comprehensive discussion on the differences between self-disclosed and estimted emissions). We follow Aswani, Raghunandan and Rajgopal and classify emission data as estimated if Trucost mentions "estimate" in the description of the data source. We are able to match 48.0% of the firm-year observations in our ES Pay sample to Trucost emission data, with approximately one-quarter of the data being self-disclosed.[11]

The diversity measure is based on the gender and ethnicity diversity of board. We focus on board diversity instead of workforce diversity, because comprehensive data on the latter are not available. The board diversity measure is computed as the share of female directors plus the share of non-white directors on the board. For gender, we rely on the male/female classification of ISS. For ethnicity, we classify a director as non-white if his/her ethnicity is not "Caucasian/White"

[11]We do not use emission data from the EPA, because we could only match 3.0% of our sample to data from the Greenhouse Gas Reporting Program. Although we could match 14.8% of our sample to EPA's Toxics Release Inventory database, we also do not consider these datam because the inclusion of toxic-related targets is rare (only 0.8% of firms incorporate E targets related toxic chemicals).

according to ISS. We consider both executive and non-executive directors for its calculation. The data for this measure comes from the ISS director dataset, which covers 34.2% of our ES Pay sample (mainly S&P 1500 firms)

The employee safety measure is based on the establishment-specific injury and illness data from the Occupational Safety and Health Administration (OSHA), which started providing data from 2016. We match these data to our sample using the Employer Identification Number (EIN). The incident rate is defined as the sum of injuries and illnesses that result in days away from work or transfers and other recordable cases in a given year, divided by the number of hours worked by all employees multiplied by 200,000 (Caskey and Ozel, 2017).[12] Because the mandatory reporting of these data only applies to larger establishments in high-hazard industries, the incident rate measure has a limited coverage of 4.7% for our ES Pay sample.[13]

2.5. Other data

Firm-level accounting and financial data comes from Compustat North America, stock market information from CRSP, executive compensation data from Execucomp, and institutional ownership data from Thomson Reuters 13F.

[12]The 200,000 figure represents the number of hours that 100 employees who work 40 hours per week and 50 weeks per year would work.

[13]An establishment is required to submit work-related injuries and illnesses information to OSHA if it had 250 or more employees at any time during the previous calendar year or if it had 20 or more employees but fewer than 250 employees at any time during the previous calendar year and belongs to high-hazard industries.

3. ES Pay Overview

This section provides a descriptive overview on ES Pay. We start by discussing the prevalence of ES Pay, followed by the ES Pay contracting structure, targets in ES Pay schemes, and the heterogeneity of ES Pay across industries. In Table 1, we present general summary statistics for ES Pay and other variables that are used in our empirical tests.

3.1. Prevalence of ES Pay

Over the entire sample period, 15.3% of all firm-year observations include ES Pay (see Table 2). Over time, the inclusion of ES targets became more common. While only 6.5% of all public firms used ES Pay in 2006, this number grew to 25.7% in 2021. When we distinguish between E and S targets, 11.5% of the firm-years include only S targets, 0.07% only E targets, and 3.8% both E and S targets. Especially at the beginning of the sample period, incorporating E targets was uncommon for firms, but their prevalence grew over time from 1.0% to 12.3%. This surge aligns with the increasing attention to climate change and its associated risks over time. The prevalence of S pay started at 6.5% and grew to 25.6%. Figure 1 provides a graphical illustration of these time trends and Figure 2 displays the distribution of E and S pay.[14]

3.2. ES Pay contracting structure

In Table 3, we investigate the contracting structure of ES Pay (see section 2.2.3 for more details on our classification of contracting). We find that among all ES Pay schemes, 27.4% use only

[14]Please note the lines for ES Pay and S Pay largely overlap in Figure 2 because firms rarely only include E targets, as discussed before.

quantitative targets, 53.6% only qualitative targets, and 19.0% both quantitative and qualitative targets. Thus, 46.4% of ES Pay schemes include any quantitative targets and 72.6% include any qualitative targets. Over time, the use of quantitative targets increases from 36.5% (26.0% + 10.5%) in 2006 to 49% in 2021, while the use of qualitative targets grew from 74.0% to 79.0%. Regarding the link between ES target achievement and compensation, we find 73% of ES Pay schemes use fixed links for at least one target, and the remaining 27% rely on discretion. The use of fixed links increased from 62.6% in 2006 to 77.6% in 2021, while the share of firms that rely on discretion decreased from 37.4% to 22.4%.

Schemes with quantitative targets and fixed links, which we classify as those with explicit contracting, account for 40.7% of all ES Pay schemes. Implicit ES Pay schemes account for the remaining 59.3% and include schemes with only qualitative targets and fixed links (32.3% of all ES Pay schemes), only qualitative targets without fixed links (21.3%), and quantitative targets without fixed links (5.6%). Figure 2(b) provides an illustration of the correlations between quantitative/qualitative targets and fixed/non-fixed links. The share of explicit contracting increased from 30.1% in 2006 to 43.5% in 2021, which is graphically illustrated by Figure 1(b). Thus, we observe some movement toward measurable, quantitative targets with clear links between target achievement and compensation.

Interestingly, we find that most of the firms do not change the contracting structure from implicit to explicit contracting or vice versa. Among all firms which have adopted ES Pay, 21.9% only use explicit contracting, 51.8% only use implicit contracting, and the remaining 26.2% have changed their contracting structure during our sample period. Among those firms that have

changed their structure, 81.3% of the firms adopted implicit schemes first and changed to explicit schemes later, 34.0% of the firms changed more than once.

3.3. ES Pay targets

In Table 4, we explore the targets that are included in ES Pay schemes. Virtually all ES Pay schemes include S targets, whereas only about one quarter also have E targets. The most common S targets are related to talent management, which are included in 52.6% of all ES Pay schemes, followed by targets related to employee safety (44.3%), customer-related targets (44.0%), diversity targets (19.4%), targets related to community (4.6%), suppliers (2.0%), and S reporting (1.5%). The most common E targets are related to emissions (3.6%), followed by green technology (2.3%), waste management and recycling (1.9%), and E reporting (1.7%). Regarding the development of different targets over time, we observe significant growth in the usage of emission-related targets (from 0.9% in 2006 to 12.9% in 2021), waste-related targets (from 0% to 6.2%), and diversity targets (from 14.6% to 45.1%). On the other hand, targets related to safety and customers became less common over time (from 47.5% to 36.0% and 50.7% to 35.1%, respectively).

When we focus on the contracting type of different targets in Table 5, we do not observe substantial differences between E and S targets (36.0% of explicit contracting vs. 40.1%). However, for individual targets, heterogeneity exists in their contracting structure. Emission-related targets exhibit the highest share of explicit contracting with 65.0%, followed by targets related to green technologies with 52.9%. The targets with the lowest prevalence of explicit contracting are E and S reporting with less than 5%, followed by community-related targets with 16.6%. Figure 3 provides an illustration of the most common targets and their contracting types.

3.4. ES Pay magnitude

We present the magnitude of ES Pay, both in absolute amounts and relative terms, in Table 6. Because we can only identify the weight assigned to ES targets for firms using fixed links, the sample for this analysis includes those schemes.[15] In Panel A, the estimated ES Pay amount is calculated as the weights assigned to ES targets multiplied by the actual compensation received by the CEO. This approach assumes the same level of achievement across all targets in CEO's compensation schemes. We find ES Pay accounts for around $585,000 on average, which represents 7% of the total compensation.[16]

To account for the actual achievements of ES targets, we collect additional data on target achievements for all firms with ES Pay in fiscal year 2021. Among these 941 firms, 75.4% disclosed their ES targets achievements in their proxy statements. Of those disclosed, 72.7% met or exceeded all of their ES targets, and 85.9% met or exceeded at least one of their ES targets. Comparing explicit and implicit schemes, firms adopting explicit schemes are more transparent. Over 90% of the firms with explicit schemes disclose information on target achievement, while 63.5% of the firms with implicit schemes disclose their achievements. ES targets in implicit schemes appear to be more easily achievable than targets in explicit schemes. 84.9% of the firms with implicit schemes meet or exceed all targets, while the proportion drops to 61.6% for firms with explicit schemes.

[15] Generalizing this magnitude to the full sample is not straightforward, because firms using fixed links might take ES issues more seriously and tie a larger proportion of compensation to ES targets.

[16] Please note we use the weight of the category that includes ES targets if the exact weight for ES targets is undisclosed. Hence, these numbers should be interpreted as upper bounds. If we only consider ES Pay schemes with exact weights for ES targets (2,129 observations), ES Pay accounts for around $397,000 or 5.2% of total CEO compensation.

The actual compensation attributed to the achievement of ES targets is calculated based on the exact weight and the actual achievement of each ES target.[17] Under this approach, we can calculate the actual ES Pay amount for 277 firms. The average value is $407,000, which represents 4.3% of the total compensation. In Panel C, we compare the estimated and actual ES Pay amounts within the overlapping sample of these two approaches. The estimated amount of ES Pay represents 6.5% of the total compensation, while the actual amount represents 4.4%.

3.5. ES Pay heterogeneity

Lastly, we examine the heterogeneity of ES Pay schemes as their structure across firms. On the firm level, we examine two sets of factors: firm fundamentals (size, ROA, Tobin's Q, book leverage, dividends, firm age, and return volatility), and other factors (climate change exposure and percentage of institutional ownership). The results are shown in Appendix E. When we do not include firm fixed effects and exploit cross-firm heterogeneity in column (1), we find evidence that firm size, return volatility, institutional ownership, and climate change exposure are positively correlated with the adoption of ES Pay. However, all of these effects except for climate change exposure disappear when we only exploit within-firm variation in column (2). Similarly, we find no clear patterns on which firm-level factors predict the structure of ES Pay in columns (3) and (4). It is possible that the factors driving the design decision are difficult to measure empirically and are more related to soft factors such as corporate culture (Li et al., 2021).

[17]For example, in Xcel Energy's annual incentive plan of 2021, 20% weight is tied to "Customer Satisfaction (J.D. Power residential survey)" target, and its achievement corresponds to 66.67% of the target payout. The actual compensation attributed to this customer target is calculated as the total amount of annual incentive awards ($992,149), scaled by the total weighted payout percentage of operational metrics (94.93%), times the weighted payout percentage of this target (20%×66.67%=13.33%). Namely, $992,149/94.93%×13.33%=$139,317.

As the next step, we explore the heterogeneity of ES Pay schemes and their designs across industries in Appendix F. Panel A presents the prevalence of ES Pay for Fama-French 12 industries, ranked in descending order. We find utilities sector has the highest ES Pay share (73.7%), followed by energy (43.6%), and chemicals (27.3%). The industries with the lowest share of ES Pay are healthcare (8.2%), wholesale and retail (8.3%), and consumer non-durables (9.4%). Interestingly, we also find the share of explicit contracting is highest in those industries that have the highest prevalence of ES Pay. Using the more detailed Fama-French 49-industry classification in Panel B, we find consistent evidence that firms in "brown" industries are more likely to adopt ES Pay. This difference may be attributed to the greater scrutiny and regulatory pressure faced by firms in brown industries.

Regarding the ES targets of firms in different industries, we find firms tend to select those targets that seem more relevant to their business operations and industry characteristics. For example, emission targets are most popular in the utilities and energy industry. However, despite having the highest share among all industries, emission-related targets are still rare in these polluting industries: only 7.3% of firms with ES Pay use them in the utilities industry and 7.2% in the energy industry. Employee safety targets are common in manufacturing industries, where more than 60% of the firms with ES Pay use them, whereas such targets are rarely mentioned in the telecommunications and financial industries (less than 10%).

Although we observe substantial heterogeneity in the adoption of ES Pay schemes, the question of why some firms introduce such schemes while other do not is challenging to answer. Although many firms are silent about their motivations, some state in their CD&A sections that they include

ES targets in their executive compensation to recognize the importance of ESG on their long-term value and to demonstrate their commitment to ESG.[18] Although the compensation committee is responsible for designing and implementing compensation programs, determining who initially proposes ES Pay is challenging. The committee often relies on input from management and compensation consultants, and may face pressure from investors and activists. These discussions are private and typically not disclosed in firms' proxy statements.

4. Results

In this section, we first explain our empirical methodology. We then investigate the relationship between ES pay and ES performance, executive compensation, and financial performance.

4.1. Methodology

To examine the relationship between ES Pay and relevant outcome variables (ES performance, executive compensation, and financial performance) at the firm-level, we estimate the following firm fixed effects regression models:

$$Outcome_{it} = \beta_0 + \beta_1 \cdot ES\ \ Pay_{it} + \vec{\gamma} \cdot \vec{V}_{it} + \tau_t + \phi_i + \epsilon_{it} \tag{1}$$

$$Outcome_{it} = \beta_0 + \beta_1 \cdot ES\ \ Pay_{it} + \beta_2 \cdot Explicit_{it} \cdot ES\ \ Pay_{it} + \vec{\gamma} \cdot \vec{V}_{it} + \tau_t + \phi_i + \epsilon_{it} \tag{2}$$

where i is a firm index, t a year index, $\vec{V}_{it}$ a vector of control variables of firm i in year t, τ_t a

[18]For example, Molina Healthcare added ESG initiatives as a new goal to their CEO's incentive plan in 2020 "as evidence of our commitment to ESG," Apple introduced an ESG modifier to reflect the company's "commitment to promoting values-driven leadership," Alfac incorporated an ESG modifier in 2021 to "recogniz[e] the importance of tying our ESG goals to our business strategy," and Coca Cola tied ESG goals to executive compensation, believing that ESG is a "key driver of future growth."

year fixed effect, and ϕ_i a firm fixed effect. Standard errors are clustered at the firm level to allow for residual correlations within firms over time. We examine the impact of ES Pay schemes and their design in year t on the corresponding outcomes in that same year, because firms usually set their compensation scheme at the beginning of each year and determine the payout linked to ES targets based on their achievement within the same year.

In equation (1), we examine the impact of ES Pay schemes on firms' ES performance. The independent variable of interest, $ES\ Pay_{it}$, is an indicator variable that equals one if firm i incorporates ES targets into its compensation plan in year t. In equation (2), we explore the the impact of the contracting structure of the ES Pay schemes. For this purpose, we distinguish ES Pay explicit and implicit ES Pay schemes. The coefficient of the interaction term $Explicit_{it} \cdot ES\ Pay_{it}$ captures the differential impact of explicit versus implicit contracts on ES performance.

Although the firm fixed effects regression models are able to control for time-constant omitted variables, they are still prone to endogeneity concerns. In particular, they cannot rule out potential biases, due to time-varying omitted variables and reverse causality. We also present the dynamic time effects around firms' first adoption of ES Pay to investigate the concern about reverse causality when analyzing the impact of ES Pay on ES scores, but not for individual targets, due to the limited number of treated firms. Unfortunately, we are not aware of any natural experiments or other sources of exogenous variations related to the design of ES Pay schemes that would allow us to decisively rule out concerns about reverse causality or omitted variables. Even if if such experiments would exist, they often come at the cost of losing generalizability because they are not applicable for the universe of public U.S. firms, which is why we leave the task of providing

precise identification for future research.

As a consequence, the focus of this study is to test predictions by contract theory and provide precise, micro-level evidence on the relationship between the design of ES Pay schemes and firms' ES performances. Even if we cannot rule out endogeneity concerns, this relationship is highly informative and relevant for firms' stakeholders, investors, and regulators.

4.2. ES Pay and firm-level ES performance

This subsection explores the relationship between ES Pay and firms' ES performance. The results for the combined ES index score from the rating agencies KLD, MSCI, S&P, and Sustainalytics (see section 2.3 for details on its construction) are presented in Table 7. Columns (1) and (2) show ES Pay is positively related to the combined index score, independently of whether we add control variables. Regarding the economic effect, the combined ES score is approximately 0.07 units higher in firms with ES Pay than in firms without ES Pay, which corresponds to 8.6% of its standard deviation. The results for the individual scores, which are largely similar to the combined score, are presented in Internet Appendix IA.3.

The second step is to investigate the differences between explicit and implicit ES Pay schemes. As previously discussed, contract theory predicts explicit contracting that is legally enforceable is preferable when precise performance measures are available, whereas implicit contracting that is self-enforcing and allows for subjective ex-post judgment could be better when outcomes are difficult to measure. In this test, we do not yet distinguish between easy- and hard-to-measure targets, but provide a first indication of the general effectiveness of those two types of contracting. Columns (3) and (4) provide clear evidence that the positive relationship between ES Pay schemes

and ES index scores is driven by explicit ES Pay schemes. While explicit schemes are associated with 0.165 units higher index scores than those with implicit contracts, we find no significant difference between the scores of firms with implicit schemes and those of firms without ES Pay. This finding shows that the adoption of ES Pay is not what matters for ES performance; rather, how firms implement it is what is important.

A potential concern with the firm fixed effects model is reverse causality, because firms may choose to include ES targets in their executive compensation when they expect their ES performance to improve. To investigate this concern, we examine the changes in ES scores in the five-year window around firms' first adoption of ES Pay schemes. The control group for this test consists of firms that have never adopted ES Pay during our sample period. Thus, this approach compares the behavior of treated firms, that is, those that adopted ES Pay, with control firms without ES Pay, which resembles a difference-in-differences (DiD) approach, However, this approach is far from perfect because firms choose if and when to introduce ES Pay, which makes the "treatment" in our setting endogenous. Nevertheless, investigating the dynamic effects around the introduction can still help to alleviate reverse causality concerns, assuming that implementing an ES Pay scheme precisely at the moment of anticipated ES performance improvements would be difficult.

Table 8 presents the results separately for ES Pay, explicit ES pay, and implicit ES Pay. We use the heterogeneity-robust estimators proposed by De Chaisemartin and D'Haultfoeuille (2024), which accounts for the heterogeneous treatment effects across firms and across time.[19] We present

[19]This estimator computes the average effect by comparing switchers and non-switchers with the same period-one

specifications without matching and one-to-one matching to the firm with the closest size (in the year before the adoption) in the same Fama-French 12 or 49 industry. The post dummy captures the differences between the post-period after ES Pay adoption and the pre-period before the adoption. The time dummies show the dynamic effects relative to the year before the first ES Pay adoption. Figure 4 plots the dynamic treatment effects for the specification with matching within the same Fama-French 49 industry.

We find an increase in firms' combined ES scores following their first adoption of ES Pay, with no clear pre-trend before the adoption. Furthermore, when we differentiate between explicit and implicit ES Pay schemes based on firms' choices at their first adoption, we also find an increase in ES performance for both types of ES Pay schemes. However, the magnitude of the increase is larger for treated firms using explicit schemes. Again, no clear pre-trend exists for either groups of treated firms. Although this test cannot completely alleviate reverse causality concerns, it helps show the time patterns are in line with a causal effect of ES Pay on firms' ES performance.

4.3. ES Pay and target-specific ES performance

In this section, we analyze how ES Pay affects ES performance for individual targets to better understand how the measurability of ES performance affects the effectiveness of explicit and implicit contracting. We categorize these targets into eight general groups: community engagement, customers, diversity, E reporting, employee safety, emissions, S reporting, and talent management. For some targets, such as emissions, performance measures are clearly more precise than for others

treatment, where the timing and magnitude of the treatment can vary across groups.

that are more vague by nature, such as S reporting. For instance, firms typically use precise targets such as "reduce GHG emissions by 10%" for emissions, whereas they would state "enhance disclosure on corporate social responsibility strategy" for S reporting.

Following this logic, we categorize targets based on their measurability to better understand the impact of ES Pay on ES performance. Specifically, we classify targets into two groups: highly measurable and low measurability. Targets that fall into the highly measurable category include those related to emissions, customers, employee safety, and diversity. These targets are quantifiable and can be tracked with a high degree of accuracy. For example, emissions can be measured in terms of carbon footprint, customer satisfaction through net promoter scores or retention rates, employee safety via incident rates or sick days, and diversity by analyzing demographic data within the organization. Conversely, targets related to talent management, community engagement, and E/S reporting are considered to have low measurability. These targets are often more qualitative and harder to quantify consistently. Talent management may involve subjective assessments, community engagement might encompass a wide range of activities with varying impacts, and E/S reporting could involve compiling information that is not easily standardized.

We find that for precisely measurable targets, a significantly larger portion of the ES contracts are explicit. The results are presented in Table 9. For example, 65% of emissions targets rely on explicit contracting. This high percentage indicates that when firms can clearly quantify outcomes, they are more likely to use explicit terms in their contracts. By contrast, for difficult-to-measure targets such as E and S reporting, less than 5% of the ES contracts are explicit.[20] On average,

[20] A notable exception is diversity. Despite the relative ease of measuring diversity outcomes, such as board gender

the explicit contracting share is 41.3% for targets in the easy-to-measure group and 13.2% in the difficult-to-measure group[21], which is consistent with our expectations. When targets are easier to measure and quantify, firms are more likely to use explicit contracting. Conversely, for targets that are harder to quantify, firms prefer more flexible, implicit terms.

To evaluate firms' ES performance at the target level, we utilize real outcomes when available. Specifically, these outcomes include GHG emission intensity for emissions, the proportion of female and non-white board members for diversity, and the incident rate for employee safety. For targets for which real outcomes are unavailable, we employ the corresponding subscores from an ES index.[22] Although ESG index scores are not perfect measures of ES performance, as discussed earlier, these subscores are likely more reliable indicators of a firm's E and S performance than the aggregate indices, because they relate more closely to specific targets.

The results concerning the relationship between ES performance and individual ES targets for the easy-to-measure group are presented in Table 10. We observe that explicit ES Pay schemes are effective in enhancing ES performance for targets with precise performance measures, whereas

diversity, we find that the share of explicit contracting for diversity is only 19.5%. This low share is attributable to the fact that many firms use vague expressions such as "putting greater emphasis on diversity, equity and inclusion" (Emerson Electric, 2021) or "enhancing diversity and inclusion initiatives" (American International Group, 2018) for their diversity targets (see Baker et al., 2024, for a related discussion on diversity washing). Thus, diversity targets typically do not focus on a single aspect such as board gender diversity, but rather on a broader diversity, equity, and inclusion (DEI) culture within the firm, which is challenging to measure precisely.

[21] An example for an explicit ES Pay scheme for a target with low measurability is the annual compensation of Petmed Express for the fiscal year 2021. It assigned a weight of 10% to talent-related goal, which is assessed through Employee Engagement Survey designed to measure employee satisfaction. The target performance was set as 82.0%, while the actual achievement reached 84.3%.

[22] We base our measurements on ES index scores from S&P and KLD for related aspects. The talent score is computed as the weighted average of the *Labor Practice Indicators*, *Talent Attraction & Retention*, *Human Capital Development*, and *Human Rights* scores from S&P. The customer score corresponds to the aspect score of *Customer Relationship Management* from S&P. The E reporting score refers to the aspect score of *Environmental Reporting*, and the S reporting score refers to the *Social Reporting* score from S&P. The community score is the net score of the community category from KLD, excluding *Charitable Giving* and *Non-US Charitable Giving* strengths.

implicit schemes do not yield effective results for these targets. For example, firms with specific emissions targets have 20% lower Scope 1 GHG emission intensity than the sample mean. The effect is driven by firms with explicit emission targets, which have a 41% lower emission intensity, whereas those with implicit schemes do not exhibit any differences from firms without ES Pay. Similar findings are observed for targets related to customers, employee safety, and diversity—although the result for diversity is not statistically significant, it clearly indicates primarily explicit targets are effective at improving board diversity.

Results for targets for which precise performance measures are less easily obtained are reported in Table 11. For those difficult-to-measure targets, we find implicit ES Pay schemes are associated with better ES performance. For example, the talent-related ES index score is 8.5% higher in firms with implicit talent targets than in firms without ES targets. We find similar results for targets related to community engagement and E/S reporting. When comparing explicit and implicit contracting for those difficult-to-measure targets, the signs of the interaction terms between target and explicit indicates implicit ES Pay schemes tend to outperform explicit schemes, although the difference is not statistically significant.

We illustrate these findings in Figure 5, which displays the coefficient of the interaction term between target and explicit, scaled by its standard error for individual targets. The coefficient is adjusted such that a higher value indicates greater improvement. Targets are sorted by the share of explicit contracting within the high and low measurability groups. Consistent with contract theory, the effectiveness of a contracting structure for ES Pay is closely related to the precision with which ES performance can be measured for a given target. For easy-to-measure targets, only

explicit contracting with specific, quantitative targets and direct links between ES performance and executive compensation is associated with improved ES performance. However, although implicit contracting is ineffective when performance can be measured relatively precisely, it can be more effective than explicit contracting for hard-to-measure targets.

4.4. ES Pay and executive compensation

In this section, we explore the relationship between ES Pay, its contracting structure, and compensation levels. We focus on the compensation of the firm's CEO and use the variable $ln(CEO\ total\ compensation_{ijt})$, which is the natural logarithm of the total compensation of CEO j in firm i and year t, as the outcome variable for these tests.[23] In addition to the controls included in the baseline model, we also control for CEO tenure and CEO-chairman duality to capture CEO entrenchment.

Table 12 shows the results. In columns (1) and (2) of Panel A, we examine the association between ES Pay and the total CEO compensation without and with control variables. We find a significant positive relationship under both specifications, although the coefficient estimate and significance level drops with control variables. Based on the model without control variables, our estimates indicate CEO compensation is 4.1% higher in firms with ES Pay than in those without ES Pay. In columns (3) and (4), we differentiate between ES Pay schemes that use explicit and implicit contracting.

We find that the positive relation between ES Pay and CEO compensation is mainly driven by

[23] We find similar results if we use the average compensation per executive instead of only focusing on the CEO's compensation and if we include CEO fixed effects in the models (results are not reported).

schemes that use implicit contracting. Based on the model without control variables in column (3), firms with implicit ES Pay schemes have 6.1% higher compensation levels than firms without ES Pay, while no difference exists between firms without ES Pay and those that use explicit contracting for ES Pay. This difference, however, is less pronounced and statistically insignificant once we add control variables in column (4).

To further explore the impact of the contractual structure on the relationship between ES Pay and compensation levels, we compare firms without ES Pay with those that use ES Pay with explicit (column 1) or implicit contracting (columns 2 to 4). We split firms that use implicit ES Pay schemes into those that include only easy-to-measure targets (column 2), those that include both easy- and hard-to-measure targets (column 3), and those that include only hard-to-measure targets (column 4).[24] We find only firms that use implicit contracting for hard-to-measure targets exhibit different compensation levels than firms without ES Pay, while no differences exist for firms using implicit contracting for easy-to-measure or mixed targets.

4.5. ES Pay and financial performance

A potential concern with ES Pay is that executives might place more emphasis on ES performance, potentially reducing firms' financial performance if the ES projects have negative NPVs. To explore the relationship between ES Pay and financial performance, we regress ES Pay on return on assets (ROA) and stock return in Table 13. We winsorize these measures of financial performance at 5% to ensure our findings are not driven by extreme values, which are not uncommon for

[24] If a firm mentions only "ESG" without specifying individual targets, it is classified in the group of only hard-to-measure targets.

these measures.

We find no evidence that ES Pay has an impact on financial performance, independently of the scheme's design. The coefficient estimates for ES Pay are statistically insignificant for both ROA and stock return, as shown in Panel A columns (1) and (3). When we focus on the design of the ES Pay schemes, we find no significant difference between explicit and implicit contracting. This finding is further supported when we split firms with ES Pay schemes into four subgroups as introduced in section 4.4. We find little effect of ES Pay on financial performance across all four subgroups, regardless of contracting structure or target measurability. This finding helps alleviate concerns that the improvement of ES performance may come at the cost of financial performance.

5. Conclusion

We examine how contracts that link executive compensation to non-financial targets should be structured so that they help to improve firms' environmental and social performance. Our study offers several insights that are relevant to, among others, firms and their stakeholders, regulators, and ESG rating agencies. First, for firms' stakeholders and their compensatiFon committees, our findings highlight the importance of designing tailored ES Pay schemes that effectively incentivize managers. Firms that use explicit contracting for targets that can be precisely and objectively measured, such as emissions and incident rates, demonstrate better performance along these dimensions. By contrast, firms with implicit contracting show little improvement in these areas. However, for targets that are hard to measure, such as community engagement, implicit contracts are effective as well and might even outperform explicit contracting. Thus, the appropriate con-

tracting structure must be carefully selected, taking into account the measurability of ES targets, to impact performance across various environmental and social aspects.

Second, for regulators, our results suggest that voluntary adaption of ES Pay is slow. While its prevalence increased over the last years, approximately three quarters of public firms in the U.S. still do not link executive compensation to ES targets. Relatedly, regulators should advocate for greater transparency in executive compensation schemes to enable public scrutiny, especially in jurisdictions outside the U.S. where such plans are often opaque. The third implication is that ESG rating agencies should focus on how firms structure their ES Pay schemes rather than merely on whether a firm adopts them when calculating sustainability and CSR score. Our results show the importance of treating implicit and explicit ES Pay schemes differently and paying attention to the nuanced relation between the type of targets and the functional form between those targets and compensation.

Finally, the most pressing issue we, as a society, currently face is the consequences of climate change. Although our results suggest that, if designed appropriately, ES Pay is an effective tool to mitigate climate change risks (e.g., reducing CO2 emissions), we also find the number of firms that have ES Pay contracts with explicit targets concerning climate change is alarmingly low. Specifically, in 2021, 25.7% of all firms had some form of ES pay, but only 2% used explicit emission targets to incentivize managers to combat climate risk. Given the limited impact other stakeholders have on firms' environmental behavior, encouraging boards and managements to implement effective incentive contracts concerning climate change mitigation might be even more important.

While the study highlights the crucial role that contractual structure plays in determining the

effectiveness of ES Pay, it also calls for more research. First, we hand collect data on ES Pay contracts for over 95% of public firms in the U.S. (value weighted). We were successful in using ML to identify whether firms include ES Pay in their executive compensation contracts, but less successful in developing an ML algorithm to accurately predict the contractual structure of ES Pay. During this process, we uncover that data vendors such as ISS miss about 50% of firm-years with ES Pay. While we make our data freely available to other researchers, coming up with a reliable NLP algorithm to identify the ES Pay structure remains an important task for future research.

One important limitation of our study is that targets that are are difficult to measure are, by their nature, measured imprecisely in our empirical analysis. Thus, we cannot rule out that measurement error affects our finings for targets in the difficult-to-measure group. Second, our study suffers from a weakness common to many compensation studies, namely, limited ability to conclusively draw causal inferences. To the best of our knowledge, there are currently no exogenous changes that only affect ES Pay or its structure, or instruments that convincingly fulfill the exclusion restriction. Future research will hopefully develop strategies to improve the causal identification of the effect of different ES Pay design choices on firms' ES performance. Third, exploring the determinants of the design of ES Pay schemes presents a promising area for future research. A better understanding of why some firms choose ineffective ES Pay scheme designs while others implement effective schemes will also help distinguish greenwashing and social washing from other potential explanations.

Table 1: Summary statistics

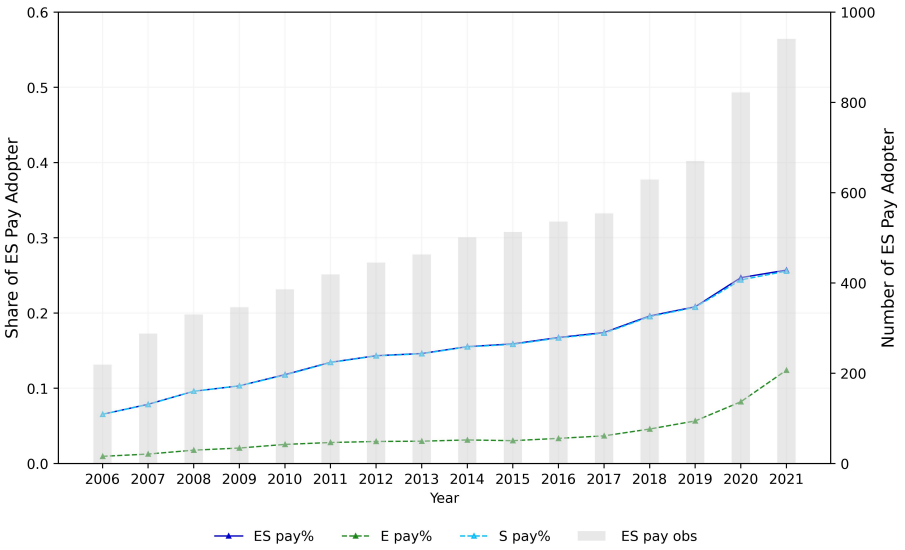
Variables	Obs	Mean	Std. Dev.	P25	P50	P75
ES Pay dummies						
ES Pay	52,690	0.153	0.360	0.000	0.000	0.000
E Pay	52,690	0.039	0.193	0.000	0.000	0.000
S Pay	52,690	0.152	0.359	0.000	0.000	0.000
ES Pay design when ES Pay=1						
Explicit ES Pay	8,062	0.407	0.491	0.000	0.000	1.000
Explicit E Pay	8,062	0.091	0.288	0.000	0.000	0.000
Explicit S Pay	8,062	0.400	0.490	0.000	0.000	1.000
ES performance						
ES score	33,038	-0.121	0.812	-0.605	-0.198	0.270
E score	33,038	-0.082	0.807	-0.454	-0.208	0.197
S score	33,038	-0.117	0.788	-0.674	-0.125	0.346
KLD ES score	24,011	0.007	0.057	-0.025	0.000	0.033
MSCI ES score	21,666	4.302	1.259	3.422	4.250	5.105
SP ES score	10,808	18.040	19.978	2.844	11.908	24.671
SUS ES score	8,493	53.250	10.027	45.280	51.310	60.020
Emission intensity	6,264	0.377	0.949	0.003	0.015	0.169
Customer score	9,318	17.442	24.600	0.000	0.000	33.000
Incident rate	2,473	2.135	2.723	0.384	1.244	2.853
Board diversity	18,042	0.393	0.203	0.250	0.375	0.500
Talent score	10,807	17.494	18.624	3.158	11.417	24.706
Community score	24,011	0.007	0.104	0.000	0.000	0.000
S report score	10,804	17.830	24.927	0.000	0.000	39.000
E report score	10,799	20.381	30.837	0.000	0.000	46.000
Firm fundamentals and other variables						
Size	52,678	6.967	2.077	5.540	7.006	8.369
ROA	52,649	-0.038	0.233	-0.026	0.018	0.062
Tobin's Q	52,654	2.027	1.645	1.061	1.431	2.253
Book leverage	52,439	0.375	0.331	0.083	0.343	0.563
Dividends	52,507	0.012	0.025	0.000	0.000	0.013
Firm age	52,690	2.611	0.990	1.946	2.773	3.296
CEO compensation	28,498	8.286	1.022	7.634	8.388	9.019
CEO tenure	48,271	1.508	0.805	0.875	1.504	2.104
CEO chairman duality	48,271	0.405	0.491	0.000	0.000	1.000
EBITDA	50,320	0.032	0.227	0.017	0.080	0.140
Return	47,420	0.114	0.537	-0.202	0.061	0.324
Return volatility	39,058	0.127	0.068	0.078	0.110	0.157
Inst ownership	44,413	0.670	0.293	0.465	0.741	0.897
CC exposure	41,084	0.001	0.002	0.000	0.000	0.001

This table presents the number of observations, the mean, standard deviation, and 25th, 50th, and 75th percentiles for all variables. Continuous variables are winsorized at the 1% and 99% level. Definitions of all variables can be found in Appendix A.

Figure 1: ES Pay and its contracting structure over time

This figure illustrates the development of ES Pay and its contracting structure from 2006 to 2021. The horizontal axis shows the year. In subfigure (a), the vertical axis shows the share (left axis) and number (right axis) of firms with E/S Pay in a given year. We classify firms as having ES Pay if they include any E or S targets in their executive compensation. Correspondingly, firms are classified as having E Pay (S Pay) if they include any E targets (S targets) in their executive compensation. Please note the lines for ES Pay and S Pay overlap because virtually no firms in our sample have E Pay only. In subfigure (b), the vertical axis shows the share of firms with explicit/implicit schemes in a given year. Definitions of all variables can be found in Appendix A.

(a) ES Pay over time



(b) Explicit and implicit ES Pay over time

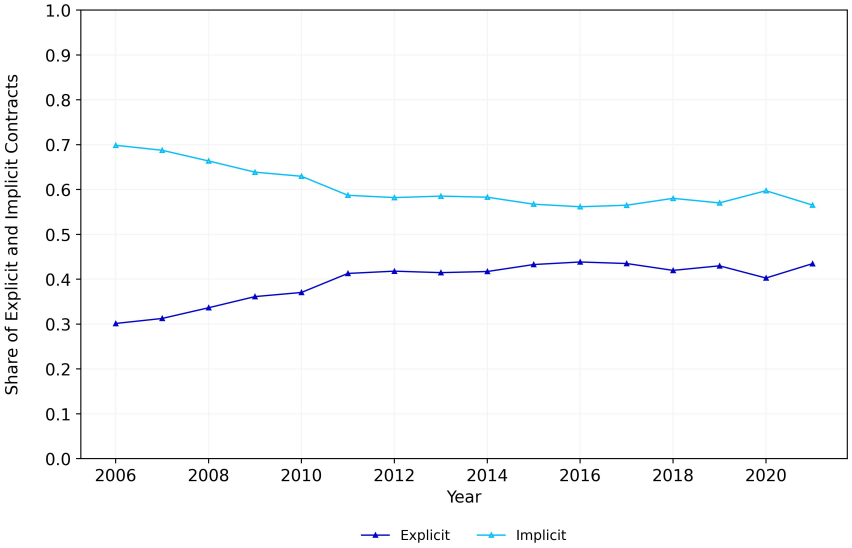
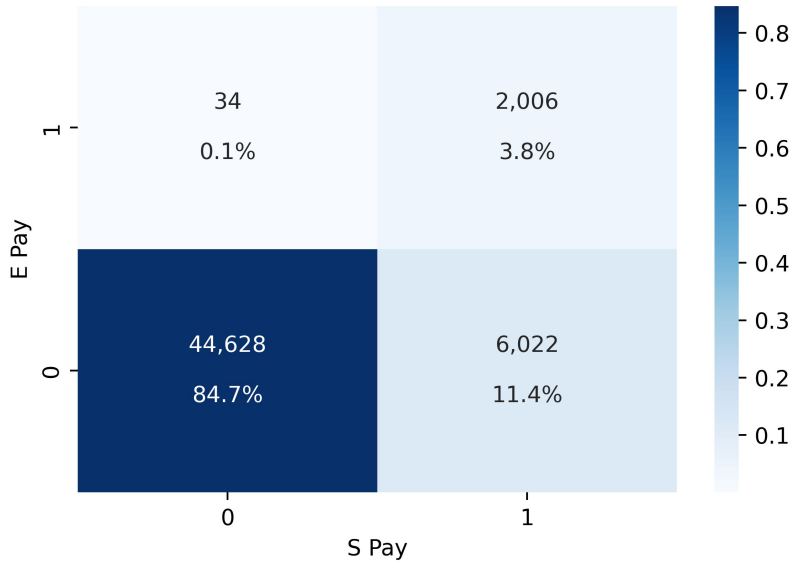


Figure 2: Distribution of ES Pay schemes

This figure illustrates the proportion of firms using each type of ES Pay scheme. Subfigure (a) presents the distribution of ES Pay schemes with E targets only, S targets only, both E and S targets, and neither E nor S targets. The horizontal axis indicates whether the firm includes S targets or not, and the vertical axis, whether the firm includes E targets. Subfigure (b) presents the distribution of ES Pay schemes with/without quantitative targets and with/without fixed links between target achievement and compensation. Darker blue colors correspond to higher proportions. Definitions of all variables can be found in Appendix A.

(a) E Pay versus S Pay



(b) ES targets versus ES Pay links

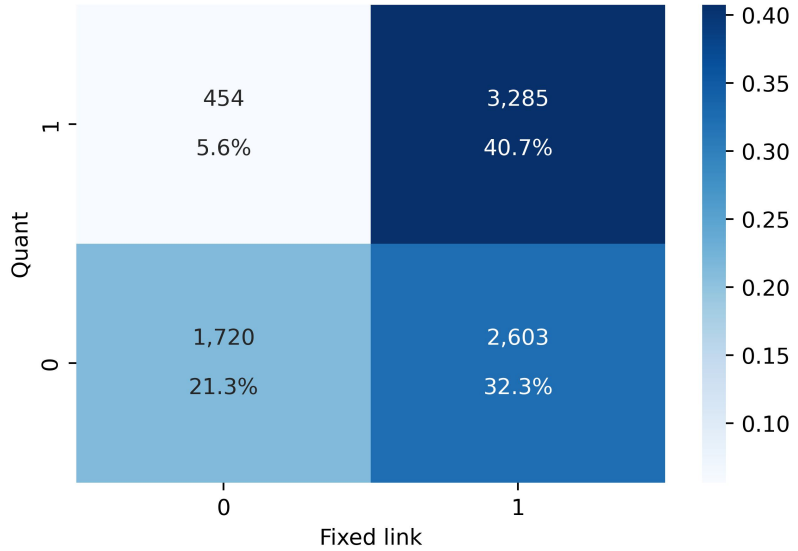


Figure 3: Overview on E and S targets

This figure illustrates the most common E and S targets. E-related targets are shown in green and S-related targets in blue. The vertical axis shows the share for each target, which is calculated as the number of ES Pay schemes with the respective target, scaled by the total number of ES Pay schemes. For each bar, the darker green/blue color shows the proportion of explicit contracting for a specific target. Please refer to Appendix D for examples of how firms incorporate ES targets in their executive compensation.

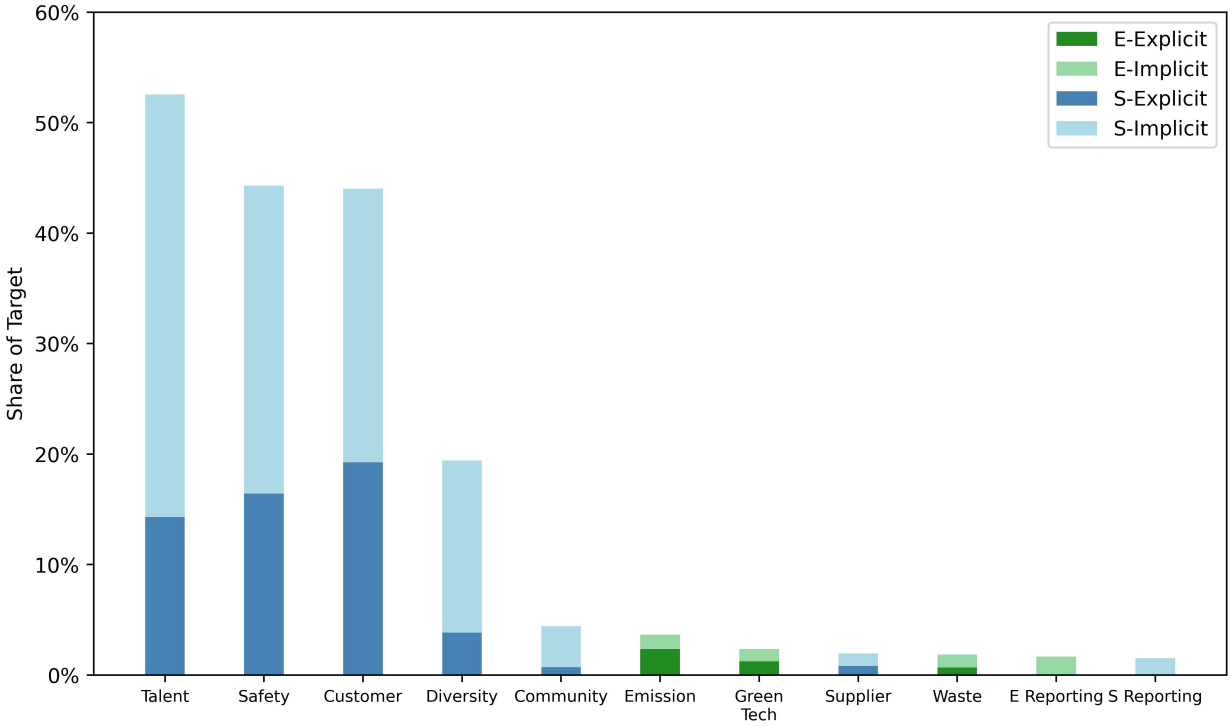
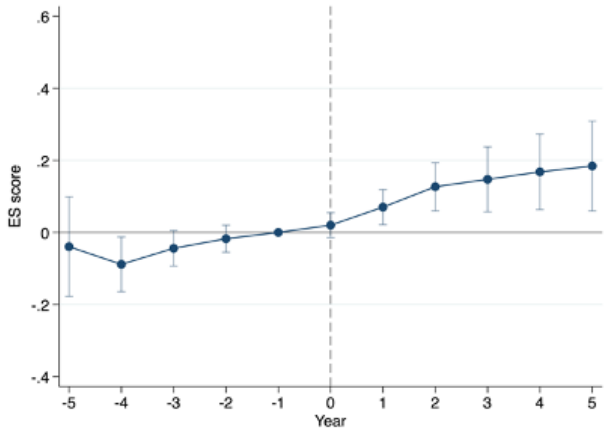


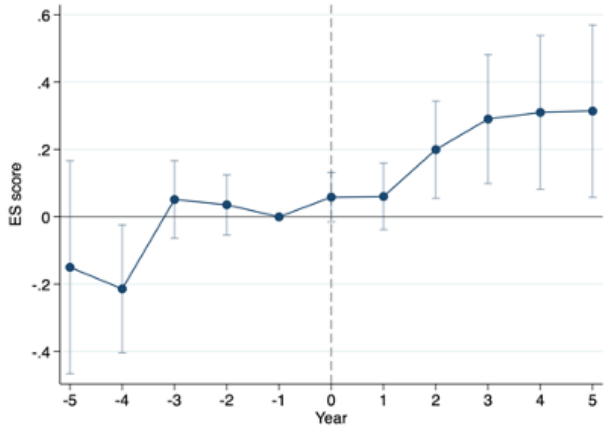
Figure 4: ES Pay and ES scores: Dynamic plots

This figure shows the dynamic effect of ES Pay adoption on the combined ES score using heterogeneity-robust estimators (De Chaisemartin and D'Haultfoeuille, 2024). The horizontal axis indicates time in years since the firm first adopted ES Pay (year $t = 0$). The vertical axis shows the estimated effect of ES Pay on the combined ES scores relative to year $t = -1$. This dynamic effect is estimated based on a matched sample of treated firms that adopt (explicit/implicit) ES Pay and control firms that never adopt ES Pay. The treated firms are matched to the control firms in the same Fama-French 49 industry and with the closest size at $t = -1$. The confidence interval of the 5% significance level is presented. Please refer to Table 8 for estimates of the average treatment effect and Appendix A for a description of the variables.

(a) ES Pay



(b) Explicit ES Pay



(c) Implicit ES Pay

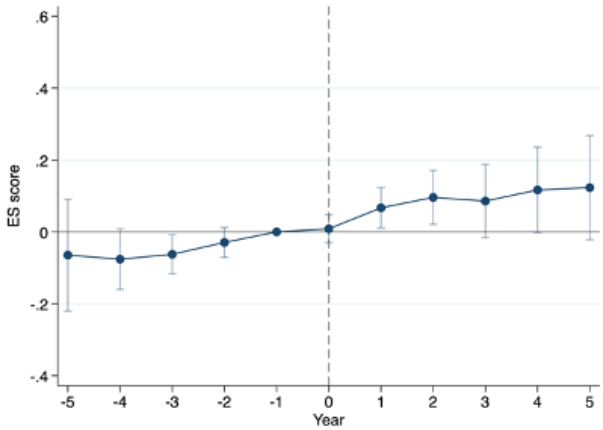


Figure 5: Explicit versus implicit contracting by target

This figure shows the difference of the impact between explicit and implicit contracting for each target. The vertical axis represents the coefficient of the interaction term between Explicit target and *Specific* target, scaled by the standard error of the coefficient. For emission and safety targets, we flip the sign of the coefficients to reflect the improvements in performance. The horizontal axis represents individual targets. The left-hand side shows the targets that are easy to measure, and the right-hand side, the targets that are hard to measure. Within each side, targets are sorted according to the share of explicit contracting in descending order. Please refer to Tables 10 and 11 for the corresponding regression results.

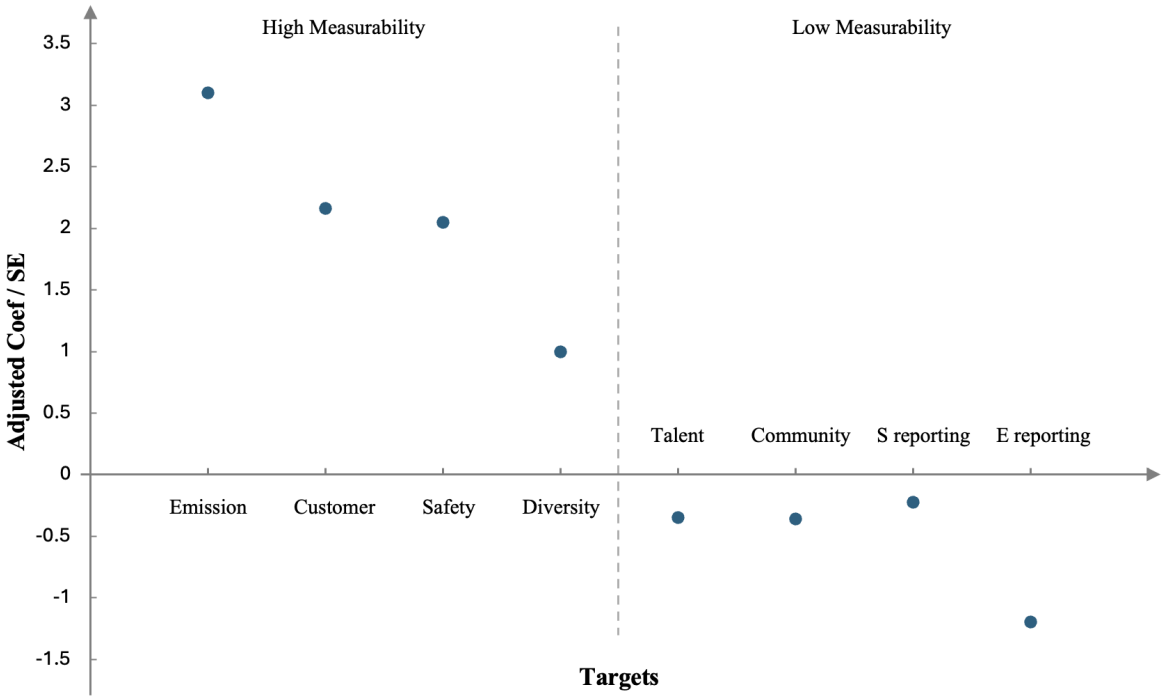


Table 2: ES Pay over time

Year	Obs	ES Pay	E Pay	S Pay	Only E Pay	Only S Pay	E and S Pay
2006	3,347	6.5%	1.0%	6.5%	0.0%	5.6%	1.0%
2007	3,658	7.9%	1.3%	7.8%	0.0%	6.6%	1.2%
2008	3,436	9.6%	1.8%	9.6%	0.0%	7.8%	1.8%
2009	3,351	10.3%	2.1%	10.3%	0.0%	8.3%	2.1%
2010	3,268	11.8%	2.5%	11.8%	0.1%	9.3%	2.5%
2011	3,115	13.5%	2.8%	13.4%	0.0%	10.7%	2.8%
2012	3,105	14.3%	2.9%	14.3%	0.0%	11.4%	2.9%
2013	3,167	14.6%	3.0%	14.6%	0.0%	11.7%	2.9%
2014	3,225	15.5%	3.1%	15.5%	0.0%	12.4%	3.1%
2015	3,226	15.9%	3.0%	15.8%	0.1%	12.9%	3.0%
2016	3,200	16.8%	3.3%	16.7%	0.1%	13.4%	3.3%
2017	3,182	17.4%	3.7%	17.3%	0.1%	13.7%	3.6%
2018	3,207	19.6%	4.6%	19.5%	0.1%	15.0%	4.5%
2019	3,216	20.8%	5.7%	20.8%	0.1%	15.2%	5.6%
2020	3,327	24.7%	8.2%	24.4%	0.3%	16.5%	7.9%
2021	3,660	25.7%	12.4%	25.6%	0.1%	13.3%	12.2%
All	52,690	15.3%	3.9%	15.2%	0.1%	11.4%	3.8%

This table presents the development of ES Pay over time. *ES Pay* shows the proportion of firms that incorporate E or S targets in their executive compensation, *E Pay* with at least one E target, and *S Pay* with at least one S target. *Only E Pay* reports the proportion of firms with E targets only, *Only S Pay* with S targets only, *E and S Pay* with both E and S targets. Definitions of all variables can be found in Appendix A.

Table 3: ES Pay contracting structure over time

Year	Obs	Only Quant	Only Qual	Quant+Qual	Any Quant	Any Qual	Fixed	Non-Fixed	Explicit	Implicit
2006	219	26.0%	63.5%	10.5%	36.5%	74.0%	62.6%	37.4%	30.1%	69.9%
2007	288	25.7%	61.1%	13.2%	38.9%	74.3%	61.5%	38.5%	31.3%	68.8%
2008	330	27.9%	59.4%	12.7%	40.6%	72.1%	63.0%	37.0%	33.6%	66.4%
2009	346	30.3%	56.4%	13.3%	43.6%	69.7%	65.9%	34.1%	36.1%	63.9%
2010	386	28.8%	55.7%	15.5%	44.3%	71.2%	65.5%	34.5%	37.0%	63.0%
2011	419	30.5%	52.3%	17.2%	47.7%	69.5%	72.6%	27.4%	41.3%	58.7%
2012	445	30.8%	51.7%	17.5%	48.3%	69.2%	71.5%	28.5%	41.8%	58.2%
2013	463	29.8%	52.9%	17.3%	47.1%	70.2%	74.7%	25.3%	41.5%	58.5%
2014	501	30.7%	52.9%	16.4%	47.1%	69.3%	74.5%	25.5%	41.7%	58.3%
2015	513	29.4%	51.9%	18.7%	48.1%	70.6%	76.0%	24.0%	43.3%	56.7%
2016	536	30.2%	51.9%	17.9%	48.1%	69.8%	76.5%	23.5%	43.8%	56.2%
2017	554	30.5%	52.0%	17.5%	48.0%	69.5%	76.0%	24.0%	43.5%	56.5%
2018	629	27.3%	53.6%	19.1%	46.4%	72.7%	75.0%	25.0%	42.0%	58.0%
2019	670	26.4%	52.2%	21.3%	47.8%	73.6%	76.7%	23.3%	43.0%	57.0%
2020	822	22.3%	54.9%	22.9%	45.1%	77.7%	73.8%	26.2%	40.3%	59.7%
2021	941	21.0%	50.3%	28.7%	49.7%	79.0%	77.6%	22.4%	43.5%	56.5%
All	8,062	27.4%	53.6%	19.0%	46.4%	72.6%	73.0%	27.0%	40.7%	59.3%

This table presents the development of the ES Pay contracting structure over time. The columns show the proportion of firms (among all firms that have ES Pay) that use only quantitative targets, only qualitative targets, both quantitative and qualitative targets, any quantitative targets, any qualitative targets, a fixed link between target achievement and compensation, and a non-fixed (e.g., discretion-based) link between target achievement and compensation. The last two columns show the share of explicit and implicit ES Pay schemes. Definitions of all variables can be found in Appendix A.

Table 4: Targets in ES Pay schemes over time

				E-related targets				S-related targets						
Year	Obs	E Pay	S Pay	Emission	Green Tech	Waste	E Reporting	Talent	Safety	Customer	Diversity	Community	Supplier	S Reporting
2006	219	14.6%	100.0%	0.9%	0.0%	0.0%	0.0%	44.3%	47.5%	50.7%	14.6%	1.8%	0.5%	0.0%
2007	288	16.0%	99.7%	1.7%	0.7%	0.3%	0.3%	49.3%	45.1%	48.3%	13.5%	4.5%	1.4%	0.3%
2008	330	18.5%	100.0%	1.8%	1.2%	0.0%	0.3%	49.4%	48.2%	48.8%	11.8%	4.2%	1.8%	0.0%
2009	346	19.9%	100.0%	1.2%	1.7%	0.3%	0.0%	50.0%	50.0%	46.5%	11.0%	3.2%	1.7%	0.0%
2010	386	21.5%	99.5%	1.8%	2.6%	0.5%	0.3%	47.2%	49.7%	46.4%	11.9%	4.1%	1.6%	0.3%
2011	419	20.8%	99.8%	1.4%	1.9%	0.7%	1.0%	50.4%	50.1%	48.4%	10.5%	4.1%	1.7%	0.2%
2012	445	20.4%	99.8%	1.3%	1.3%	1.1%	1.3%	52.1%	49.7%	47.9%	12.1%	4.9%	2.0%	0.9%
2013	463	20.3%	99.8%	1.1%	1.1%	1.5%	0.2%	52.3%	48.8%	45.8%	12.7%	3.7%	2.2%	0.0%
2014	501	20.2%	99.8%	1.2%	1.4%	0.4%	0.6%	51.3%	48.9%	46.1%	11.2%	2.8%	1.8%	0.4%
2015	513	19.1%	99.6%	1.8%	1.6%	1.4%	0.0%	51.7%	43.1%	47.2%	11.5%	3.5%	2.3%	0.4%
2016	536	20.0%	99.6%	1.5%	1.5%	1.3%	0.6%	51.1%	42.9%	46.6%	14.4%	3.0%	1.3%	0.4%
2017	554	21.1%	99.5%	1.8%	2.0%	1.1%	0.9%	50.9%	42.4%	44.0%	16.2%	3.2%	1.6%	0.5%
2018	629	23.4%	99.5%	2.5%	2.2%	1.1%	0.6%	51.2%	40.4%	41.7%	18.9%	4.0%	1.0%	0.5%
2019	670	27.2%	99.7%	4.0%	2.4%	2.5%	1.5%	53.7%	39.1%	41.0%	23.1%	3.9%	1.9%	1.9%
2020	822	33.2%	98.8%	6.8%	3.9%	3.3%	3.6%	59.5%	45.0%	40.9%	28.5%	6.9%	2.6%	3.8%
2021	941	48.2%	99.5%	12.9%	5.5%	6.2%	7.0%	58.1%	36.0%	35.1%	45.1%	7.2%	3.4%	6.5%
All	8,062	25.3%	99.6%	3.6%	2.3%	1.9%	1.7%	52.6%	44.3%	44.0%	19.4%	4.4%	2.0%	1.5%

This table presents the development of ES Pay targets over time. The columns show the proportion of firms (among all firms that have ES Pay) that incorporate targets related to E aspects, S aspects, emissions, green technologies (e.g., clean energy), waste (e.g., cycling, packaging, waste management), E reporting (e.g., publication of climate report), talent management (e.g., employee engagement and development), employee safety (e.g., reducing workplace injuries and fatalities), customers (e.g., customer satisfaction, product quality), DEI (e.g., board diversity, workforce diversity, inclusive culture), community (e.g., community involvement, corporate citizenship), suppliers (e.g., responsible supply chain), and S reporting (e.g., publication of CSR report). Definitions of all variables can be found in Appendix A.

Table 5: Explicit versus implicit contracting by targets

				E-related targets				S-related targets						
Year	ES Pay	E Pay	S Pay	Emission	Green Tech	Waste	E Reporting	Talent	Safety	Customer	Diversity	Community	Supplier	S Reporting
2006	30.1%	15.6%	30.1%	100.0%	n/a	n/a	n/a	26.8%	22.1%	30.6%	28.1%	25.0%	0.0%	n/a
2007	31.3%	17.4%	30.7%	60.0%	0.0%	0.0%	0.0%	22.5%	27.7%	34.5%	23.1%	7.7%	50.0%	0.0%
2008	33.6%	24.6%	32.4%	66.7%	50.0%	n/a	0.0%	25.2%	29.6%	31.1%	23.1%	14.3%	33.3%	n/a
2009	36.1%	33.3%	35.5%	100.0%	50.0%	0.0%	n/a	28.9%	31.2%	37.9%	23.7%	9.1%	50.0%	n/a
2010	37.0%	31.3%	36.7%	85.7%	50.0%	50.0%	0.0%	31.3%	29.2%	42.5%	23.9%	18.8%	66.7%	0.0%
2011	41.3%	29.9%	41.4%	66.7%	50.0%	33.3%	0.0%	28.9%	34.8%	44.3%	25.0%	23.5%	71.4%	0.0%
2012	41.8%	29.7%	41.9%	50.0%	66.7%	20.0%	0.0%	29.7%	40.3%	45.1%	14.8%	18.2%	44.4%	0.0%
2013	41.5%	34.0%	41.6%	80.0%	100.0%	42.9%	0.0%	28.9%	38.9%	43.9%	15.3%	23.5%	40.0%	n/a
2014	41.7%	38.6%	41.6%	83.3%	71.4%	50.0%	0.0%	26.1%	41.2%	43.7%	19.6%	14.3%	44.4%	0.0%
2015	43.3%	44.9%	43.1%	88.9%	75.0%	71.4%	n/a	24.9%	46.6%	47.1%	18.6%	16.7%	41.7%	0.0%
2016	43.8%	49.5%	43.1%	87.5%	50.0%	57.1%	0.0%	25.9%	41.7%	48.0%	22.1%	12.5%	42.9%	0.0%
2017	43.5%	47.9%	43.2%	70.0%	45.5%	66.7%	0.0%	26.6%	43.4%	47.5%	16.7%	11.1%	33.3%	0.0%
2018	42.0%	36.7%	42.0%	43.8%	50.0%	42.9%	0.0%	27.3%	42.9%	48.5%	13.4%	20.0%	66.7%	0.0%
2019	43.0%	40.7%	42.2%	55.6%	56.3%	29.4%	0.0%	27.2%	43.1%	46.5%	17.4%	23.1%	38.5%	0.0%
2020	40.3%	34.9%	39.4%	66.1%	46.9%	29.6%	6.7%	25.6%	29.7%	42.9%	16.2%	10.5%	33.3%	6.5%
2021	43.5%	34.9%	41.1%	62.0%	50.0%	34.5%	6.1%	29.1%	36.3%	47.0%	22.4%	17.6%	34.4%	6.6%
All	40.7%	36.0%	40.1%	65.0%	52.9%	37.3%	4.4%	27.3%	37.0%	43.8%	19.5%	16.3%	41.8%	4.8%

This table presents the development of explicit versus implicit contracting in ES Pay schemes over time. The columns show the proportion of firms (among all firms that have ES Pay) that rely on explicit contracting for targets related to E aspects, S aspects, emissions, green technologies (e.g., clean energy), waste (e.g., cycling, packaging, waste management), E reporting (e.g., publication of climate report), talent management (e.g., employee engagement and development), employee safety (e.g., reducing workplace injuries and fatalities), customers (e.g., customer satisfaction, product quality), DEI (e.g., board diversity, workforce diversity, inclusive culture), community (e.g., community involvement, corporate citizenship), suppliers (e.g., responsible supply chain), and S reporting (e.g., publication of CSR report). The term "n/a" indicates that no firm had this specific target in that year. Definitions of all variables can be found in Appendix A.

Table 6: ES Pay magnitude

Panel A. Estimated ES Pay amount

	Obs	Mean	Std. Dev.	P25	Median	P75
Total ES Pay	4,499	585	822	155	319	645
Total ES Pay %	4,499	7.0%	6.7%	2.7%	5.1%	8.9%

Panel B. Actual ES Pay amount (firms with ES Pay in year 2021)

	Obs	Mean	Std. Dev.	P25	Median	P75
Total ES Pay	277	407	626	84	236	475
Total ES Pay %	277	4.3%	5.6%	0.9%	2.7%	5.5%

Panel C. Estimated vs Actual ES Pay amount (overlapping sample)

	Obs	Estimated	Actual	Diff	Diff%
Total ES Pay	244	668	418	250	37.4%
Total ES Pay %	244	6.5%	4.4%	2.1%	32.4%

This table presents the magnitude of ES Pay for CEOs. In Panel A, the estimated ES Pay amount is calculated using the weights assigned to ES targets in the compensation scheme and the CEOs' actual compensation. "Total ES Pay" is the sum of cash-based and equity ES Pay. The cash-based ES Pay amount is calculated as the product of the weight assigned to ES targets under cash-based incentives and the sum of bonus and non-equity incentives. Similarly, the equity-based ES Pay amount is calculated as the product of the the weight assigned to ES targets under equity-based incentives and the sum of stock and option awards. "Total ES Pay %" is calculated as the absolute amount scaled by total compensation. This approach assumes the same level of achievements across all targets, and its sample includes all firm-year observations that include ES targets in their CEO compensation with a fixed link. In Panel B, the actual ES Pay amount is calculated based on the actual target achievements. The sample includes S&P 500 firms that included ES targets and disclosed their achievements in fiscal year 2021. In Panel C, we compare the estimated ES pay amounts with the actual amounts within the overlapping sample. "Diff" is the estimated ES Pay amount minus the actual ES Pay amount. "Diff%" is the difference between the estimated and actual ES Pay amount, scaled by the estimated amount. Compensation data for CEOs comes from Execucomp. Please refer to Appendix A for a description of the variables.

Table 7: ES Pay and ES performance

	ES score			
	(1)	(2)	(3)	(4)
ES Pay	0.071***	0.070***	0.025	0.025
	(0.022)	(0.022)	(0.024)	(0.024)
Explicit × ES Pay			0.167***	0.165***
			(0.037)	(0.037)
Size		-0.014		-0.011
		(0.017)		(0.017)
ROA		-0.037		-0.037
		(0.040)		(0.039)
Tobin's Q		0.002		0.003
		(0.006)		(0.006)
Book leverage		0.036		0.035
		(0.032)		(0.032)
Dividends		0.342		0.339
		(0.291)		(0.291)
Firm age		-0.054**		-0.051*
		(0.026)		(0.026)
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Obs	33,038	32,805	33,038	32,805
Adj. R^2	0.600	0.599	0.601	0.600

This table presents the relationship between ES Pay and the combined ES score from KLD, MSCI, S&P Global, and Sustainalytics. In columns (1) and (2), we examine the effect of having any ES Pay schemes. In columns (3) and (4), we examine the differential effect of ES Pay schemes with explicit and and implicit contracting. ES Pay is a dummy variable that equals one if a firm includes any ES targets for executive compensation. Explicit is a dummy variable that equals one if a firm includes at least one quantitative target with a fixed link between target achievement and compensation. Robust standard errors that are clustered at the firm level are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Please refer to Appendix A for a description of the variables.

Table 8: ES Pay and ES performance: DID

	Post	t=-5	t=-4	t=-3	t=-2	t=-1	t=0	t=1	t=2	t=3	t=4	t=5	Obs
ES Pay													
No matching	0.077***	0.015	-0.056	-0.020	-0.012	-	0.023	0.071***	0.100***	0.113***	0.109**	0.099*	23,009
	(0.023)	(0.055)	(0.035)	(0.022)	(0.017)	-	(0.016)	(0.023)	(0.030)	(0.040)	(0.045)	(0.052)	
1:1 matching (FF12)	0.058**	-0.002	-0.066*	-0.031	-0.008	-	0.011	0.040*	0.073**	0.096**	0.096*	0.099	9,354
	(0.026)	(0.074)	(0.040)	(0.025)	(0.019)	-	(0.017)	(0.024)	(0.033)	(0.045)	(0.053)	(0.062)	
1:1 matching (FF49)	0.100***	-0.040	-0.089**	-0.044*	-0.018	-	0.020	0.070***	0.127***	0.147***	0.168***	0.184***	8,877
	(0.027)	(0.070)	(0.039)	(0.025)	(0.019)	-	(0.018)	(0.025)	(0.034)	(0.046)	(0.053)	(0.064)	
Explicit ES Pay													
No matching	0.201***	-0.057	-0.136*	0.047	0.017	-	0.097***	0.141***	0.244***	0.316***	0.266***	0.291***	17,486
	(0.045)	(0.122)	(0.073)	(0.050)	(0.039)	-	(0.033)	(0.041)	(0.061)	(0.081)	(0.092)	(0.096)	
1:1 matching (FF12)	0.136**	0.037	-0.130	0.094*	0.056	-	0.065*	0.064	0.156**	0.239**	0.208*	0.232*	2,191
	(0.056)	(0.171)	(0.091)	(0.056)	(0.043)	-	(0.036)	(0.049)	(0.069)	(0.094)	(0.115)	(0.130)	
1:1 matching (FF49)	0.168***	-0.150	-0.214**	0.051	0.036	-	0.058	0.060	0.200***	0.290***	0.310***	0.314**	1,993
	(0.057)	(0.162)	(0.097)	(0.059)	(0.046)	-	(0.037)	(0.050)	(0.074)	(0.098)	(0.116)	(0.131)	
Implicit ES Pay													
No matching	0.045*	0.032	-0.035	-0.041*	-0.021	-	0.003	0.053**	0.065**	0.059	0.070	0.043	21,332
	(0.026)	(0.060)	(0.039)	(0.025)	(0.019)	-	(0.018)	(0.026)	(0.033)	(0.044)	(0.051)	(0.060)	
1:1 matching (FF12)	0.035	-0.007	-0.048	-0.066**	-0.023	-	-0.006	0.033	0.046	0.049	0.070	0.059	7,344
	(0.030)	(0.078)	(0.043)	(0.028)	(0.021)	-	(0.019)	(0.028)	(0.037)	(0.050)	(0.058)	(0.070)	
1:1 matching (FF49)	0.071**	-0.065	-0.076*	-0.062**	-0.029	-	0.009	0.067**	0.096**	0.086*	0.117*	0.123*	6,944
	(0.031)	(0.079)	(0.043)	(0.028)	(0.021)	-	(0.020)	(0.028)	(0.038)	(0.052)	(0.061)	(0.074)	

This table presents presents the average treatment effect of ES Pay adoption and the combined ES score using heterogeneity-robust DiD estimators (De Chaisemartin and D'Haultfoeuille, 2024). The dependent variable is the combined ES score from KLD, MSCI, S&P Global, and Sustainalytics. Each row reports the average treatment effect and dynamic effects over the [-5,+5] window around ES Pay adoption relative to the year $t = -1$. We presents the results for treated firms with ES Pay, explicit ES Pay, and implicit ES Pay, respectively. For each treatment group, we represents the specifications without matching, with 1:1 matching by size within the same Fama-French 12 industry, and with 1:1 matching by size within the same Fama-French 49 industry. The control group consists of firms that never use ES Pay during the sample period. Standard errors are clustered at the firm level and reported in parentheses below each estimate. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Please refer to Appendix A for a description of the variables.

Table 9: Measurability of ES targets

Group	Target	Obs	% Explicit		Examples of common targets
High	Emission	294	65.0%	41.3%	Carbon emission intensity, Scope 2/3 emissions
	Customer	3,549	43.8%		Net promoter score, on-time delivery rate
	Safety	3,571	37.0%		Employee incident rate, number of sick days
	Diversity	1,565	19.5%		Board gender/ethnicity diversity, inclusive culture
Low	Talent	4,238	27.3%	13.2%	Employee development, employee engagement
	Community	356	16.3%		Community involvement, corporate citizenship
	S reporting	124	4.8%		Improve S reporting, compliance with S reporting standard
	E reporting	135	4.4%		Improve E reporting, compliance with E reporting standard

This table presents the classification of E/S targets into the high and low measurability groups. The columns show the number of observations by target, the share of explicit ES Pay schemes by target, the unweighted average share of explicit contracting by high/low measurability group, and examples of common targets. The targets within the high/low group are sorted by their share of explicit contracting in descending order.

Table 10: ES Pay and ES performance for targets with high measurability

Target	Emissions		Customers		Safety		Diversity	
Dependent variable	Emission intensity		Customer score		Incident rate		Board diversity	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Emission target	-0.076*	0.060						
	(0.042)	(0.038)						
Explicit target × Emission target		-0.214***						
		(0.069)						
Customer target			1.952*	0.847				
			(1.115)	(1.115)				
Explicit target × Customer target				4.214**				
				(1.949)				
Safety target					-0.033	0.016		
					(0.283)	(0.286)		
Explicit target × Safety target						-0.535**		
						(0.261)		
Diversity target							0.013*	0.011
							(0.007)	(0.007)
Explicit target × Diversity target								0.012
								(0.012)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	6,222	6,222	9,254	9,254	2,462	2,462	17,897	17,897
Adj. R^2	0.952	0.952	0.742	0.742	0.636	0.636	0.761	0.761
Proportion of explicit contracts								
Full sample	65.0%		43.8%		37.0%		19.5%	
Regression sample	64.6%		46.1%		36.9%		20.1%	

This table presents the relationship between ES Pay and ES performance for targets with high measurability. The dependent variables are self-disclosed Scope 1 emission intensity from Trucost in columns (1) and (2), the incident rate from OSHA in columns (3) and (4), the customer score from S&P in columns (5) and (6), and board diversity from ISS Director in columns (7) and (8). *Specific* target is a dummy variable that equals one if a firm includes the specific target (e.g., emission-related targets) for executive compensation. Explicit target is a dummy variable that equals one if the target is quantitative and has a fixed link between target achievement and compensation. Robust standard errors that are clustered at the firm level are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Please refer to Appendix A for a description of the variables.

Table 11: ES Pay and ES performance for targets with low measurability

Target	Talent		Community		S reporting		E reporting	
Dependent variable	Talent score		Community score		S reporting score		E reporting score	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Talent target	1.405**	1.480**						
	(0.622)	(0.662)						
Explicit target × Talent target		-0.349						
		(1.003)						
Community target			0.059**	0.060*				
			(0.030)	(0.031)				
Explicit target × Community target				-0.013				
				(0.036)				
S reporting target					3.303	3.382		
					(2.367)	(2.480)		
Explicit target × S reporting target						-1.424		
						(6.317)		
E reporting target							5.266**	5.781**
							(2.531)	(2.617)
Explicit target × E reporting target								-9.987
								(8.372)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	10,728	10,728	23,866	23,866	10,725	10,725	10,720	10,720
Adj. R^2	0.800	0.800	0.260	0.260	0.681	0.681	0.736	0.736
Proportion of explicit contracts								
Full sample	27.3%		16.3%		4.8%		4.4%	
Regression sample	26.7%		13.6%		5.6%		5.4%	

This table presents the relationship between ES Pay and ES performance for targets with low measurability. The dependent variables are the talent score from S&P in columns (1) and (2), the community score from KLD in columns (3) and (4), the S reporting score from S&P in columns (5) and (6), and the E reporting score from S&P in columns (7) and (8). *Specific* target is a dummy variable that equals one if a firm includes the specific target (e.g., talent-related targets) for executive compensation. Explicit target is a dummy variable that equals one if the target is quantitative and has a fixed link between target achievement and compensation. Robust standard errors that are clustered at the firm level are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Please refer to Appendix A for a description of the variables.

Table 12: ES Pay and CEO compensation level

Panel A. Explicit and implicit ES Pay versus firms without ES Pay

	Ln(CEO Compensation)			
	(1)	(2)	(3)	(4)
	Ln(CEO Compensation)			
	(1)	(2)	(3)	(4)
ES pay	0.041**	0.026	0.061***	0.031*
	(0.019)	(0.017)	(0.020)	(0.018)
Explicit × ES pay			-0.071***	-0.020
			(0.026)	(0.025)
Controls	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
N	28,498	26,658	28,498	26,658
Adj. R^2	0.735	0.768	0.735	0.768

Panel B. ES Pay subgroups versus firms without ES Pay

Subgroup	Explicit	Implicit - Only Easy	Implicit - Mixed	Implicit - Only Hard
	(1)	(2)	(3)	(4)
ES pay	-0.022	0.007	-0.021	0.089***
	(0.029)	(0.027)	(0.027)	(0.031)
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
N	23,004	21,754	21,812	21,288
Adj. R^2	0.763	0.761	0.767	0.760

This table presents the relationship between ES Pay contracting and CEO compensation. The dependent variable is the natural logarithm of CEO's total compensation. In Panel A, we focus on the existence of any ES Pay schemes in columns (1) and (2) and compare the differential effect between explicit and implicit contracting in columns (3) and (4). ES Pay is a dummy variable that equals one if a firm includes any ES targets for executive compensation. Explicit is a dummy variable that equals one if a firm includes at least one quantitative target with a fixed link between target achievement and compensation. In Panel B, the sample in column (1) includes only firms without ES Pay and those with explicit ES Pay. Columns (2) to (4) include only firms without ES Pay and those with implicit ES Pay. We split firms with implicit ES Pay into those that use implicit contracting for easy-to-measure targets only in column (2), those that use implicit contracting for both easy- and hard-to-measure targets in column (3), and those that use implicit contracting for hard-to-measure targets only in column (4). Robust standard errors that are clustered at the firm level are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Please refer to Appendix A for a description of the variables.

Table 13: ES Pay and financial performance

Panel A. Explicit and implicit ES Pay versus firms without ES Pay

	ROA		Return	
	(1)	(2)	(3)	(4)
ES Pay	-0.001	-0.001	-0.004	-0.008
	(0.002)	(0.003)	(0.008)	(0.009)
Explicit × ES Pay		-0.001		0.014
		(0.003)		(0.012)
Controls	Yes	Yes	Yes	Yes
Year FE + Firm FE	Yes	Yes	Yes	Yes
Obs	52,270	52,270	47,123	47,123
Adj. R^2	0.719	0.719	0.319	0.319

Panel B. ES Pay subgroups versus firms without ES Pay: ROA

Subgroup	Explicit	Implicit - Only Easy	Implicit - Mixed	Implicit - Only Hard
	(1)	(2)	(3)	(4)
ES Pay	-0.002	-0.000	-0.005	-0.005
	(0.004)	(0.004)	(0.003)	(0.004)
Controls	Yes	Yes	Yes	Yes
Year FE + Firm FE	Yes	Yes	Yes	Yes
Obs	47,518	46,142	45,952	45,295
Adj. R^2	0.722	0.725	0.728	0.728

Panel C. ES Pay subgroups versus firms without ES Pay: Stock Return

Subgroup	Explicit	Implicit - Only Easy	Implicit - Mixed	Implicit - Only Hard
	(1)	(2)	(3)	(4)
ES Pay	0.012	-0.018	-0.024	0.001
	(0.014)	(0.015)	(0.015)	(0.015)
Controls	Yes	Yes	Yes	Yes
Year FE + Firm FE	Yes	Yes	Yes	Yes
Obs	42,883	41,636	41,472	40,793
Adj. R^2	0.318	0.320	0.322	0.321

This table shows the relationship between ES Pay and financial performance. In Panel A, we focus on the existence of ES Pay in columns (1) and (3), and compare the differential effect between explicit and implicit contracting in columns (2) and (4). ES Pay is a dummy variable that equals one if a firm includes any ES targets for executive compensation. Explicit is a dummy variable that equals one if a firm includes at least one quantitative target with a fixed link between target achievement and compensation. In Panels B and C, the sample in column (1) includes only firms without ES Pay and those with explicit ES Pay. We split firms with implicit ES Pay into those that use implicit contracting for easy-to-measure targets only in column (2), those that use implicit contracting for both easy- and hard-to-measure targets in column (3), and those that use implicit contracting for hard-to-measure targets only in column (4). All dependent variables are winsorized at 5%. Robust standard errors that are clustered at the firm level are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Please refer to Appendix A for a description of the variables.

References

Aggarwal, R. K., Samwick, A. A., 2003. Performance incentives within firms: The effect of managerial responsibility. Journal of Finance 58 (4), 1613–1650.

Aswani, J., Raghunandan, A., Rajgopal, S., 2024. Are Carbon Emissions Associated with Stock Returns? Review of Finance, 75–106.

Badawi, A. B., Bartlett, R., 2024. ESG Overperformance? Assessing the Use of ESG Targets in Executive Compensation Plans. Working Paper.

Baker, A., Larcker, D. F., McClure, C., Saraph, D., Watts, E. M., 2024. Diversity Washing. Journal of Accounting Research 62, 1661–1709.

Baker, G., 1992. Incentive Contracts and Performance Measurement. Journal of Political Economy 100 (3), 598–614.

Baker, G., Gibbons, R., Murphy, K. J., 1994. Subjective Performance Measures in Optimal Incentive Contracts. Quarterly Journal of Economics 109 (4), 1125–1156.

Baker, G. P., Jensen, M. C., Murphy, K. J., 1988. Compensation and Incentives: Practice vs. Theory. Journal of Finance 43, 593–616.

Bebchuk, L. A., Tallarita, R., 2022. The Perils and Questionable Promise of ESG-Based Compensation. Journal of Corporation Law, 37–75.

Berg, F., Fabisik, K., Sautner, Z., 2021. Is History Repeating Itself? The (Un)Predictable Past of ESG Ratings. Working paper.

Berg, F., Kölbel, J. F., Rigobon, R., 2022. Aggregate Confusion: The Divergence of ESG Ratings. Review of Finance, 1–30.

Bull, C., 1987. The Existence of Self-Enforcing Implicit Contracts. Quarterly Journal of Economics 102 (1), 147–160.

Caskey, J., Ozel, N. B., 2017. Earnings Expectations and Employee Safety. Journal of Accounting and Economics 63, 121–141.

Chaigneau, P., Sahuguet, N., 2025. Executive Compensation with Environmental and Social Performance. Review of Finance, forthcoming.

Chen, T., Dong, H., Lin, C., 2020. Institutional Shareholders and Corporate Social Responsibility. Journal of Financial Economics 135, 483–504.

Chen, T., Guestrin, C., 2016. Xgboost: A Scalable Tree Boosting System. Proceedings of the 22nd ACM SIGKDD international conference on knowledge discovery and data mining, 785–794.

Cohen, S., Kadach, I., Ormazaba, G., Reichelstein, S., 2023. Executive Compensation Tied to ESG

Performance: International Evidence. Journal of Accounting Research 61, 805–853.

Dai, R., Liang, H., Ng, L., 2021. Socially responsible corporate customers. Journal of Financial Economics 142, 598–626.

De Angelis, D., Grinstein, Y., 2015. Performance Terms in CEO Compensation Contracts. Review of Finance 19 (2), 619–651.

De Chaisemartin, C., D'Haultfoeuille, X., 2024. Difference-in-Differences Estimators of Intertemporal Treatment Effects. Review of Economics and Statistics, 1–45.

Edmans, A., Gabaix, X., Jenter, D., 2017. Executive Compensation: A Survey of Theory and Evidence. Handbook of the Economics of Corporate Governance 1, 383–539.

Erel, I., Stern, L. H., Tan, I., Weisbach, M. S., 2021. Selecting Directors Using Machine Learning. Review of Financial Studies 34, 3226–3264.

Flammer, C., Hong, B., Minor, D., 2019. Corporate Governance and the Rise of Integrating Corporate Social Responsibility Criteria in Executive Compensation: Effectiveness and Implications for Firm Outcomes. Strategic Management Journal 40, 1097–1122.

Frydman, C., Saks, R. E., 2010. Executive Compensation: A New View from a Long-Term Perspective, 1936–2005. Review of Financial Studies 23, 2099–2138.

Gabaix, X., Landier, A., 2008. Why has CEO pay Increased So Much? Quarterly Journal of Economics 123, 49–100.

Gillan, S. L., Hartzell, J. C., Parrino, R., 2009. Explicit versus Implicit Contracts: Evidence from CEO Employment Agreements. Journal of Finance 64, 1629–1655.

Hart, O., Zingales, L., 2022. The New Corporate Governance. University of Chicago Business Law Review 1, 195–216.

Hazarika, S., Kashikar, A., Peng, L., Röell, A., Shen, Y., 2023. ESG-Linked Pay Around the World-Trends, Determinants, and Outcomes. Working paper.

Hemmings, D., Hodgkinson, L., Williams, G., 2020. It's OK to pay well, if you write well: The effects of remuneration disclosure readability. Journal of Business Finance & Accounting 47 (5-6), 547–586.

Holmström, B., 1979. Moral Hazard and Observability. Bell Journal of Economics 10, 74–91.

Homroy, S., Mavruk, T., Nguyen, V. D., 2023. ESG-Linked Compensation, CEO Skills, and Shareholder Welfare. Review of Corporate Finance Studies 12 (4), 939–985.

Hong, B., Li, Z., Minor, D., 2016. Corporate Governance and Executive Compensation for Corporate Social Responsibility. Journal of Business Ethics 136 (1), 199–213.

Ikram, A., Li, Z. F., Minor, D., 2019. CSR-contingent Executive Compensation Contracts. Journal of Banking & Finance, 105655.

IPCC, 2023. Sixth assessment report. Tech. rep., Intergovernmental Panel on Climate Change.

Jensen, M. C., Murphy, K. J., 1990. Performance Pay and Top-Management Incentives. Journal of Political Economy 98, 225–264.

Krueger, P., Sautner, Z., Starks, L. T., 2020. The Importance of Climate Risks for Institutional Investors. Review of Financial Studies 33, 1067–1111.

Li, K., Mai, F., Shen, R., Yan, X., 2021. Measuring Corporate Culture Using Machine Learning. Review of Financial Studies 34, 3265–3315.

Li, M., 2024. Climate-linked Pay and Supply Chain Management. Working Paper.

Lins, K. V., Servaes, H., Tamayo, A., 2017. Social Capital, Trust, and Firm Performance: The Value of Corporate Social Responsibility during the Financial Crisis. Journal of Finance 72, 1785–1824.

Maas, K., 2018. Do Corporate Social Performance Targets in Executive Compensation Contribute to Corporate Social Performance? Journal of Business Ethics 148 (3), 573–585.

Murphy, K. J., 1985. Corporate Performance and Managerial Remuneration. Journal of Accounting and Economics 7, 11–42.

Pearce, D. G., Stacchetti, E., 1998. The Interaction of Implicit and Explicit Contracts in Repeated Agency. Games and Economic Behavior 23 (1), 75–96.

Sautner, Z., Lent, L. v., Vilkov, G., Zhang, R., 2023. Firm-level Climate Change Exposure. Journal of Finance 78 (3), 1449–1498.

Starks, L. T., 2023. Presidential Address: Sustainable Finance and ESG Issues—Value versus Values. Journal of Finance 78, 1837–1872.

Tsang, A., Wang, K. T., Liu, S., Yu, L., 2021. Integrating Corporate Social Responsibility Criteria into Executive Compensation and Firm Innovation: International Evidence. Journal of Corporate Finance 70, 102070.

Appendix A. Variable Definition

This table shows the definition of all variables and their sources. HC stands for hand-collected. KLD stands for KLD stats (acquired by MSCI), SP stands for S&P Global, SUS stands for Sustainalytics, TC stands for Trucost, ISS stands for Institutional Shareholder Services, OSHA stands for Occupational Safety and Health Administration, CRSP stands for Center for Research in Security Prices, CS stands for Compustat, EC stands for Execucomp, BE stands for BoardEx and TR stands for Thomson Reuters.

Variable	Definition	Source
ES Pay		
ES Pay	Dummy variable that equals one if the firm incorporates any ES targets for executive compensation.	HC
E Pay (S Pay)	Dummy variable that equals one if the firm incorporates any E-related (S-related) targets for executive compensation.	HC
Explicit	Dummy variable that equals one if the firm incorporates at least one quantitative target with a fixed link between target achievement and compensation.	HC
Specific target	Dummy variable that equals one if the firm incorporates any targets related to the *specific* target group (e.g., emissions, diversity, talent) for executive compensation.	HC
Explicit target	Dummy variable that equals one if the target is quantitative and uses a fixed link between target achievement and compensation.	HC
ES performance		
Combined ES score	Combined ES index score, calculated as the average of all available ES scores from KLD, MSCI, S&P, and Sustainalytics. Each score is standardized by subtracting its mean and dividing by its standard deviation. The score ranges from -2.78 to 3.84 and is available over the full sample period.	
KLD ES score	Average of the KLD E category score and the KLD S score, which is the average of the five S-related KLD categories (employee relations, diversity, human right, community, product). The score for each category is computed as the net score by subtracting concerns from strengths, where the strengths (concerns) are scaled by their maximum number (Lins, Servaes and Tamayo, 2017). The score ranges from -1 to 1 and is available until 2019.	KLD
MSCI ES score	Weighted average of the MSCI E and S pillar scores. The weighting factor is provided by MSCI. The score ranges from 0 to 10 and is available from 2007.	MSCI
S&P ES score	Weighted average of the S&P E and S scores. The weighting factor is provided by S&P. The score ranges from 0 to 100 and is available from 2013.	SP
SUS ES score	Average of the Sustainalytics E and S scores. The score ranges from 0 to 100 and is available from 2009 to 2019.	SUS

Emission intensity	Self-disclosed Scope 1 GHG emissions in 1,000 metric tons CO2 equivalent, scaled by total revenues in million USD. We identify self-disclosed emissions if "estimate" is not mentioned in the data source description (Aswani, Raghunandan and Rajgopal, 2024).	TC
Customer score	Customer Relationship Management score from S&P.	SP
Incident rate	Sum of injuries and illnesses that result in days away from work or transfers and other recordable cases in a given year, divided by the number of hours worked by all employees, multiplied by 200,000 (Caskey and Ozel, 2017).	OSHA
Board diversity	Percentage of female directors on the board plus percentage of non-white directors on the board. Data are available from 2007.	ISS
Talent score	Weighted average S&P score of the following aspects: Labor Practice Indicators, Talent Attraction & Retention, Human Capital Development, and Human Rights.	SP
Community score	Community score from KLD, excluding Charitable Giving and Non-US Charitable Giving strengths. It is computed as the net score by subtracting concerns from strengths, where the strengths (concerns) are scaled by their maximum number.	KLD
S reporting score	Social Reporting score from S&P.	SP
E reporting score	Environmental Reporting score from S&P.	SP
Firm fundamentals		
Size	Natural logarithm of the firm's total assets (AT).	CS
ROA	Net income (NI) scaled by total assets (AT).	CS
Tobin's Q	Book value of total asset (AT) minus book value of common equity (CEQ), plus market value of equity (PRCC_F×CSHO), scaled by total asset (AT).	CS
Book leverage	Total debt (DLTT+DLC) scaled by total debt plus book equity (CEQ).	CS
Dividends	Common dividend (DVC) scaled by total assets (AT).	CS
Firm age	Natural logarithm of years since the firm went public (BEGDAT).	CRSP
CEO compensation	Total annual compensation of the CEO (TDC1).	EC
CEO tenure	Logarithm of one plus the years since the CEO was appointed (TIME-ROLE).	BE
CEO chairman duality	Dummy variable that equals one if the CEO also serves as the chairman.	BE
Return	Cumulative annual stock return (RET), adjusted for the delisting return (DLRET).	CRSP
Return volatility	Standard deviation of monthly returns over the previous 60 months, requiring that at least 48 months of returns are available.	CRSP
Inst ownership	Percent of shares held by institutional investors (INSTOWN).	TR
CC exposure	Equally-weighted climate change exposure based on conference calls (Sautner et al., 2023).	

Appendix B. Sample Construction

This table shows the construction of our ES Pay sample from 2006 to 2021.

	Firm-year observations
Proxy statements with fiscal year end between 2006.12.15 and 2022.05.31	64,940
minus firm-years could not matched with Compustat	(6,344)
minus cannot find CD&A or executive compensation section	(3,942)
minus duplicated proxy statements	(1,964)
Final sample	52,690

Appendix C. Comparison with ISS Data

This table shows a comparison of ES Pay according to the ISS ECA dataset with our hand-collected ES Pay data. We match our ES Pay data with the ISS ECA data and compare firm-year observations that are available in both datasets. Although ECA data starts in 2007, we start the comparison in 2011 because ECA lacks comprehensive coverage of performance metrics before 2011 (less than 200 firm-year observations per year). We code a firm to have ES Pay in the ISS ECA dataset if at least one of its performance metrics fulfills any of these conditions: (a) the ISS overall metric type equals environment, social, or CSR; (b) the ISS itemized metric type equals corporate social responsibility, staff health and safety, staff relations/engagement/training, climate change and energy use, diversity, environmental protection, customer and product responsibility, society and human rights, labor conditions in supply chain, or cyberinformation security; (c) the disclosed metric according to ISS contains any of the words environment, emission, safety, customer, or community.

	Overlapping sample				Only S&P 500			
Year	Obs	ES%	ISS ES%	$\frac{ES\%}{ISS\,ES\%}$	Obs	ES%	ISS ES%	$\frac{ES\%}{ISS\,ES\%}$
2011	2,242	16.1%	4.7%	3.42	390	31.8%	6.4%	4.96
2012	2,593	16.4%	7.4%	2.20	456	35.7%	12.9%	2.76
2013	2,600	17.0%	9.0%	1.89	463	36.7%	14.9%	2.46
2014	2,832	17.0%	9.1%	1.87	459	39.2%	16.1%	2.43
2015	2,889	17.2%	9.0%	1.91	459	37.7%	16.3%	2.31
2016	2,912	18.0%	9.4%	1.91	477	40.0%	17.0%	2.36
2017	2,922	18.6%	9.7%	1.92	478	41.0%	17.6%	2.33
2018	2,935	21.1%	10.0%	2.11	487	45.8%	18.3%	2.51
2019	2,965	22.3%	10.6%	2.11	486	47.5%	18.5%	2.57
2020	3,043	26.7%	14.8%	1.80	487	52.8%	27.9%	1.89
2021	3,277	28.4%	21.5%	1.32	489	63.0%	41.1%	1.53
All	31,210	20.2%	10.8%	1.87	5,131	43.2%	19.2%	2.25

Appendix D. Examples of ES Pay Schemes

This appendix shows examples of how firms include ES targets in executive compensation. All examples are taken from firms' proxy statements for the 2021 fiscal year.

Panel A. 2021 Long-term Incentives of Xcel Energy

Xcel Energy awards 30% of its long-term incentives in the form of performance shares based on carbon emission reduction. This scheme uses a quantitative target with a fixed link, which is why we classify it as an explicit scheme with an emission target.

Long-Term Incentives

Long-term incentive ("LTI") awards are intended to reward NEOs for the achievement of long-term performance goals and shareholder value creation, and to retain critical talent. For 2021, our long-term incentive program had two components, which addressed these objectives:

- Performance shares (80% weighting based on target LTI value); and
- Restricted Stock Units ("RSU") (20% weighting based on target LTI value).

50% Performance Shares – Relative TSR	30% Performance Shares – Carbon Emissions Reduction	20% Restricted Stock Units – Service-Based

Grant of 2021-2023 LTI Awards

Long-term incentive compensation is approximately 70% of the current CEO's target total direct compensation and 54% of the average of the other current NEOs' target total direct compensation and is primarily performance based. Prior to vesting, long-term incentive awards may not be sold, encumbered or otherwise transferred by the participant. Stock earned under long-term incentive compensation is subject to our Stock Ownership Policy (see page 42).

Performance Shares

In 2021, the GCN Committee approved the grant of performance shares to each NEO which are subject to the achievement of pre-determined performance metrics for the three-year period ending December 31, 2023. These performance metrics are relative TSR and carbon dioxide emissions reduction.

	Performance Shares based on the Company's Relative TSR			Performance Shares based on Carbon Dioxide Emissions Reduction		
	Threshold	Target	Maximum	Threshold	Target	Maximum
	30th percentile	50th percentile	85th or greater percentile	52% reduction	55% reduction	58% or greater reduction
Payout	30%	100%	200%	30%	100%	200%

For performance between percentiles, the number of performance shares earned is determined by straight line interpolation.

Performance shares are based on the achievement of specified levels of the Company's TSR relative to our peer group.	Performance shares are based on the achievement of a specified reduction in carbon dioxide emissions in 2023 below 2005 levels associated with electric service.
Payout range is from 0% to 200% of target.	Payout range is from 0% to 200% of target.
The relative TSR goal links the interest of executive officers with those of our shareholders by rewarding NEOs for creating superior shareholder returns relative to utility industry peer companies.	The reduction in carbon dioxide emissions goals align to our lead the clean energy strategic priority to provide 100% carbon-free electricity by 2050.

Panel B. 2021 Annual Incentives of Apple

Apple links annual cash incentives to ESG using a non-fixed link. Their ES Pay scheme includes an ESG modifier that the compensation committee uses to adjust the payout amount upwards or downwards by up to 10%. The ES targets are purely qualitative, such as values related to the environment or inclusion and diversity. The scheme is classified as an implicit scheme that includes environment, diversity, supplier, and community targets.

ESG Modifier

Beginning in 2021, the Compensation Committee incorporated the ESG Modifier into the annual cash incentive program. The ESG Modifier is based on a holistic evaluation by the Compensation Committee of key accomplishments and actions taken during the year to advance our Apple values: accessibility, education, environment, inclusion and diversity, privacy, and supplier responsibility, and key community initiatives. The Compensation Committee may choose to apply the ESG Modifier to adjust the payout amounts upwards or downwards by up to 10% or determine not to make any adjustments. The Compensation Committee will not apply the ESG Modifier to increase an annual cash incentive payout above the overall cap of 200% of the total target payout opportunity under the program.

Panel C. 2021 Annual Incentives of Astec Industries Inc

Astec Industries Inc links its annual cash incentive to safety metrics using a fixed link. The safety metric is quantitative, defined as the number of work-related injuries per 100 full-time workers during a one-year period with a weighting of 15%. The scheme is classified as an explicit scheme that includes an employee safety target.

Company Performance Goals and 2021 Results						
	Weighting	Threshold	Target	Maximum	Actual 2021 Results	Actual Payout as a % of Target
Adjusted EBITDA(1)	50%	$78.3M	$97.9M	$117.5M	$67.8M	0%
Working Capital Turnover(2)	35%	2.3	2.9	3.5	2.7	83%
Safety Metrics(3)	15%	1.58	1.26	0.95	1.71	0%
Payout % (% of Target)		50%	100%	200%		29%(4)

(1) Adjusted EBITDA is a non-GAAP financial measure that is defined as net income before interest, income taxes, depreciation and amortization, further adjusted for gains or losses outside the normal scope of our ordinary activities including but not limited to restructuring costs, asset impairments, gains or losses on the sale of assets or businesses, transformation program costs, exit expenses for employee benefit plans, and other items of income, expense, gain or loss, that, in the case of each of the foregoing are identified in the publicly filed reports.

(2) Working capital turnover ratio is a formula that calculates how efficiently the company utilizes working capital to support sales and growth. Working capital is current assets minus current liabilities. The working capital turnover ratio is calculated as follows: annual net sales divided by the average amount of working capital during the same year.

(3) Safety Metric derived from the United States Occupational Safety and Health Administration Incident Rate, which compares the Company's safety performance against a national or state average, and is defined as the number of work-related injuries per 100 full-time workers during a one-year period.

Panel D. 2021 Annual compensation of Emerson Electric

Emerson Electric links the CEO's compensation to ESG performance using a discretion approach. The committee considers qualitative targets such as diversity, equity, and inclusion or talent acquisition and development,, but there is no specific quantitative target or pre-determined link between target achievement and compensation. It is thus classified as an implicit scheme that includes targets related to DEI and talent development.

The Committee does not set specific financial or operating targets related to annual cash compensation and pay determinations are not based on any formula. Actual pay is dependent on Company and individual performance and based on the Committee's informed judgment. The Committee does monitor the relative internal compensation relationships between the CEO and the other NEOs, however, no specific pay ratio is targeted.

Fiscal 2021 CEO and NEO Performance

CEO Performance. In determining the appropriate level of total compensation for each of Mr. Farr and Mr. Karsanbhai in the role of CEO, the Committee evaluated the Company's strong and consistent financial performance in fiscal 2021 (summarized on page 19) led by the Company's priority of execution and value creation; the decisive actions taken to mitigate the near-term impact of supply-chain challenges exacerbated by the continuing global pandemic; the disciplined management of the Company's business and operations, including through focused portfolio actions and continued progress toward cost reset targets and the successful leadership transition.

The Committee also considered Mr. Karsanbhai's individual leadership, performance and contributions, including: his actions toward upholding the Value of Support Our People through his resolute focus on strengthening the Company's culture and workplace – putting greater emphasis on diversity, equity and inclusion, talent acquisition and development and the employee experience – as well as promoting the health and safety of our employees and their families during the continued global pandemic; his continued integration of environmental, social and governance (ESG) priorities into the core of the Company's culture; and his actions to propel the Company's portfolio forward with intention – all in furtherance of our Purpose of driving innovation that makes the world healthier, safer, smarter and more sustainable.

Appendix E. Heterogeneity of ES Pay

This table explores the heterogeneity of ES Pay. The dependent variable are the ES Pay dummy in Columns (1) and (2), and explicit ES Pay dummy in Columns (3) and (4). The independent variables include firm fundamentals and governance factors, such as firm size, ROA, Tobin's Q, book leverage, dividends, firm age, return volatility, institutional ownership, and climate change exposure. When examine the design of ES Pay in Columns (3) and (4), we limit the sample to firms with ES Pay. Robust standard errors that are clustered at the firm level are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Please refer to Appendix A for a description of the variables.

	ES Pay		Explicit ES Pay	
	(1)	(2)	(3)	(4)
Size	0.060***	0.016	0.020*	0.026
	(0.005)	(0.011)	(0.011)	(0.026)
ROA	-0.018	0.008	0.002	0.081
	(0.027)	(0.022)	(0.092)	(0.079)
Tobin's Q	0.001	-0.004	-0.011	-0.022**
	(0.004)	(0.003)	(0.011)	(0.011)
Book leverage	-0.002	-0.019	0.046	0.013
	(0.020)	(0.016)	(0.050)	(0.046)
Dividends	0.230	-0.046	-0.166	-0.495
	(0.258)	(0.147)	(0.818)	(0.491)
Firm age	0.012	-0.036	-0.030	-0.146*
	(0.011)	(0.032)	(0.022)	(0.084)
Return volatility	0.331***	0.101	0.325	0.512**
	(0.108)	(0.093)	(0.278)	(0.257)
Inst ownership	0.087***	0.047*	0.156*	-0.086
	(0.027)	(0.028)	(0.091)	(0.078)
Cc exposure	13.926***	6.976**	6.736	3.928
	(3.707)	(2.817)	(5.763)	(6.869)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	No	Yes	No
Firm FE	No	Yes	No	Yes
Obs	23,310	23,310	4,738	4,738
Adj. R2	0.235	0.704	0.263	0.719

Appendix F. Industry Heterogeneity of ES Pay

This appendix shows the prevalence of ES Pay, the share of explicit schemes, and the distribution of individual targets across industries. Panel A relies on the Fama-French 12-industry classification. Panels B presents the 10 industries with the highest and lowest prevalence of ES Pay based on the Fama-French 49-industry classification.

Panel A. ES targets by industry (Fama-French 12 industries)

		Full sample		Sample with ES Pay											
					E-related targets				S-related targets						
Rank	Ind	Obs	ES Pay	Explicit	Emission	Green Tech	Waste	E Reporting	Talent	Safety	Customer	Diversity	Community	Supplier	S Reporting
1	Utils	1,317	73.7%	72.4%	7.3%	9.5%	3.5%	0.8%	49.6%	74.0%	73.7%	19.8%	6.9%	5.8%	0.4%
2	Enrgy	2,166	43.6%	59.6%	7.2%	2.1%	1.4%	2.4%	34.0%	95.7%	7.1%	8.6%	3.3%	0.3%	1.7%
3	Chems	1,240	27.3%	42.9%	3.6%	2.7%	3.3%	1.2%	58.6%	77.2%	21.0%	18.3%	2.7%	1.8%	0.9%
4	Other	5,932	22.8%	46.7%	0.9%	1.1%	0.4%	1.6%	47.5%	56.1%	40.9%	9.3%	2.5%	0.3%	1.2%
5	Telcm	1,122	17.2%	50.3%	4.7%	0.5%	0.0%	0.5%	45.1%	0.0%	68.9%	43.0%	1.0%	7.8%	1.6%
6	Manuf	4,590	16.4%	40.0%	5.7%	1.2%	2.8%	1.2%	47.7%	62.2%	30.9%	16.5%	3.1%	0.9%	1.9%
7	Money	12,514	10.9%	20.0%	2.7%	2.1%	1.2%	3.5%	68.6%	7.3%	43.3%	32.3%	9.7%	1.1%	3.2%
8	Durbl	1,191	10.0%	29.4%	0.8%	0.0%	0.0%	0.0%	48.7%	27.7%	58.8%	12.6%	0.8%	0.0%	0.0%
9	BusEq	8,563	9.9%	26.8%	2.9%	1.2%	2.5%	0.7%	54.4%	14.2%	63.7%	22.5%	2.9%	2.5%	0.8%
10	NoDur	2,162	9.4%	14.2%	2.5%	0.0%	6.4%	3.4%	73.5%	26.0%	33.3%	39.2%	1.5%	5.4%	3.4%
11	Shops	4,358	8.3%	33.8%	1.1%	0.8%	1.9%	1.1%	42.9%	23.5%	58.2%	25.2%	2.2%	3.0%	0.8%
12	Hlth	7,535	8.2%	25.7%	1.1%	0.3%	1.1%	0.6%	63.3%	11.5%	48.4%	13.1%	3.4%	1.5%	1.3%

Panel B. ES targets by industry (top/bottom ten Fama-French 49 industries)

1	Util	1,317	73.7%	72.4%	7.3%	9.5%	3.5%	0.8%	49.6%	74.0%	73.7%	19.8%	6.9%	5.8%	0.4%
2	Coal	141	72.3%	77.5%	0.0%	0.0%	0.0%	0.0%	50.0%	92.2%	2.0%	3.9%	0.0%	0.0%	0.0%
3	Gold	134	53.0%	56.3%	0.0%	0.0%	0.0%	7.0%	67.6%	90.1%	0.0%	0.0%	2.8%	0.0%	2.8%
4	Mines	275	50.2%	40.6%	0.7%	0.0%	0.7%	3.6%	37.7%	97.8%	10.1%	5.1%	8.0%	1.4%	1.4%
5	Oil	2,009	42.0%	57.4%	8.1%	2.4%	1.5%	2.7%	32.0%	96.1%	7.7%	9.1%	3.7%	0.4%	1.9%
6	Steel	490	33.1%	74.7%	8.6%	1.2%	0.0%	1.2%	31.5%	95.7%	34.0%	6.2%	0.0%	0.6%	1.2%
7	Chems	1,016	28.8%	45.1%	4.1%	3.1%	3.4%	1.4%	57.7%	82.9%	18.4%	14.3%	2.4%	1.0%	1.0%
8	Trans	1,143	27.9%	61.4%	0.9%	0.3%	0.6%	0.6%	45.1%	66.5%	51.1%	5.0%	0.3%	0.0%	0.9%
9	Guns	112	26.8%	13.3%	0.0%	0.0%	0.0%	0.0%	76.7%	30.0%	56.7%	10.0%	0.0%	0.0%	0.0%
10	Cnstr	671	26.1%	64.0%	0.0%	5.1%	1.1%	0.6%	26.9%	71.4%	25.7%	2.9%	0.6%	0.0%	0.6%
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	RlEst	376	7.7%	13.8%	3.4%	0.0%	0.0%	3.4%	65.5%	6.9%	13.8%	48.3%	6.9%	3.4%	3.4%
41	LabEq	873	7.3%	25.0%	4.7%	3.1%	1.6%	4.7%	78.1%	15.6%	67.2%	48.4%	6.3%	4.7%	4.7%
42	Rtail	2,232	6.8%	45.7%	0.7%	0.0%	0.7%	1.3%	23.8%	9.9%	64.9%	26.5%	0.7%	2.6%	1.3%
43	Drugs	4,906	6.3%	18.3%	1.6%	0.3%	1.3%	1.0%	78.5%	13.2%	22.2%	18.6%	3.2%	0.6%	2.6%
44	Clths	510	5.5%	7.1%	7.1%	0.0%	7.1%	0.0%	92.9%	0.0%	10.7%	21.4%	3.6%	10.7%	0.0%
45	Rubbr	222	5.0%	0.0%	0.0%	0.0%	0.0%	0.0%	45.5%	72.7%	27.3%	0.0%	0.0%	0.0%	0.0%
46	Agric	125	4.8%	0.0%	0.0%	0.0%	50.0%	16.7%	100.0%	0.0%	16.7%	0.0%	0.0%	0.0%	16.7%
47	Soda	129	3.1%	25.0%	0.0%	0.0%	0.0%	0.0%	75.0%	0.0%	50.0%	50.0%	0.0%	25.0%	0.0%
48	Txtls	112	2.7%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
49	Toys	246	2.4%	0.0%	0.0%	0.0%	0.0%	0.0%	83.3%	33.3%	0.0%	66.7%	16.7%	0.0%	0.0%

Internet Appendix

IA.1. Automatic Preprocessing of CD&A Sections

To automatically determine which firms are likely to include ES targets in their executive pay plans, we begin by hand-collecting information from a subset of firms. We then use these data to train an XGBoost model using textual information from the CD&A sections of all sample firms as input. This process is described in detail in the following paragraphs.

Initial hand collection. Our initial hand-collection sample consists of all S&P 500 firms between 2006 and 2021, plus 300 randomly selected S&P 400 mid-cap or S&P600 small-cap firms, and 300 randomly selected non-S&P 1500 firms. After subtracting firm-years for which we could not find a proxy statement, this sample consists of 1,386 unique firms with 16,569 firm-years. Among them, 7,552 observations are from S&P 500 firms (8,000 minus 448 firm-years for which we cannot find a proxy statement), 2,521 observations are from non-S&P 500 firms that were part of the S&P 500 in other years, and 6,496 observations are from firms that were never in the S&P 500 during our sample period.

Automatic proxy download and text extraction. The first step for the automatic classification is to batch download all proxy statements for firms from 2006 to 2021 from Edgar. We keep observations with a fiscal year end between December 15, 2006, and May 31, 2022, that can be matched with Compustat. This process results in 7,575 unique firms and 58,596 firm-year observations. We restrict our analysis to the CD&A section to focus on ES-related information relevant to executive compensation.[25] To extract the text content of CD&A section, the main challenge arises from the lack of a standardized format in proxy statements. The section titles and the order of sections and subsections tend to vary across firms and over time. Additionally, some firms do not provide HTML links (the <a> tag with *href* attribute) in the table of contents, especially in earlier years, which further complicates the extraction process.

[25] For firms that qualify as SRC, we retrieve their executive compensation section instead because they do not have a CD&A section.

We use three different approaches to locate and extract the CD&A section in a sequential order. The first approach uses the hyperlink, then tag location and last text location (Hemmings, Hodgkinson and Williams, 2020). For the hyperlink approach, we go through all section titles with hyperlinks in the table of contents to locate the CD&A section. A section title is considered the CD&A title if it contains all of the words "compensation," "discussion," and "analysis," and does not contain "report," "vote," "supplemental," "appendix," or "exhibit." We do not exclude titles that contain other words, special characters, or HTML character codes, and we do not distinguish between uppercase and lowercase letters.[26] The start of the CD&A section is located based on the hyperlink of the CD&A section title. When multiple sections are identified as CD&A, we keep the first instance if they are successive; otherwise, we consider the extraction failed.

After locating the start of the CD&A section, we use the start of the next unrelated section as the end of the CD&A section. If more than 25,000 characters exist between the CD&A section title and the next section title, the two sections are considered unrelated. If there are fewer than 25,000 characters in between, we skip any sections that appear less than 5,000 characters after the CD&A, or contain any of the following words and phrases in their titles: "report," "vote," "committee," "capitalization," "exelon," "approval," "compensation of executive officers," or "investments"—because manual inspection suggests these words and phases likely indicate subsections of the CD&A. For each remaining section after the CD&A, it is considered unrelated if its title contains "report," "interlock," "table," or "insider." Otherwise, a section is considered unrelated if more than 25,000 characters are between the start of the CD&A section and this section, and its title contains "risk," "committee," "executive" and "compensation," or "officer," but not containing any words from the negative list.[27] We repeat this process until an unrelated section is identified.

[26]For example, qualified titles for the CD&A section include "Compensation Discussion and Analysis," "Compensation Discussion & Analysis," "COMPENSATION DISCUSSION & ANALYSIS," and "Compensation Discussion & Analysis."

[27]The negative list includes "guideline," "highlight," "philosophy," "element," "policies," "policy," "decision," "vote," "program," "benefit," "component," "salary," "analysis," "target," "incentive," "process," "principles," "result," "action," "practice," "performance," "bonus," "grants," "data," "summary," "overview," "introduction," "business," "2006," "2007," "2008," "2009," "2010," "2011," "2012," "2013," "2014," "2015," "2016," "2017," "2018," "2019," "2020," "2021," "2022," "design," "background," "objectives," "oversight," "purpose," "factors," "named," "governance," "setting," "role," "NEO," "base salar."

If the hyperlink approach fails, we use the tag location approach. It finds the starting and ending tags of the CD&A section by their title and position. To identify the title of the CD&A section, we apply the same keyword search criteria as the hyperlink approach.[28] Among tags that satisfy the criteria, we differentiate tags of section titles from sentences by their length. We keep tags with less than 50 characters, or the shortest one with less than 100 characters. If no tag meets these criteria, we consider the extraction failed.

If multiple tags satisfy the criteria, we sort them in the order they appear and apply a set of rules to select the tag most likely to be the start of the CD&A section. To ensure those tags are not found in the table of contents, we check if (1) the source line of the first tag in the qualified list is smaller than or equal to 20% of the maximum source line, or (2) the source line of the first tag is smaller than or equal to 2,000, and the source line of the last tag is greater than twice the source line of the first tag or 1,000 plus the source line of the first tag, or (3) the source position of the first tag is greater than 10,000 and less than 20% of the maximum source position of the same source line or one-third of the maximum source position among tags in the qualified list.[29] If none of these three criteria holds, we consider the proxy does not include tags of the CD&A section title in its table of contents. In this case, we use the first or <font> tag, if any, as the starting tag of the CD&A section; otherwise, we use the first tag in the qualified list.

If either of the first two criteria holds, we do the following to find the starting tag of the CD&A: (1) choose the first tag with a source line greater than the maximum of 20% of the maximum source line, twice the source line of the first tag, and 1,000 plus the source line of the first tag, and less than 80% of the maximum source line; (2) if no tag meets such conditions, choose the first tag with a source line greater than the minimum of 20% of the maximum source line, twice the source line of the first tag, and 1000 plus the source line of the first tag, and less than 80% of the maximum source line; (3) if no tag qualifies, use the second tag in the qualified list as long as its source line is less than 80% of the maximum source line. If the third criterion holds, we do the following: (1) choose

[28] A section title is considered as the CD&A title if it contains all of the words "compensation," "discussion," and "analysis," but not "report," "vote," "supplemental," "appendix," or "exhibit." The searching criteria are case-insensitive.

[29] We get the source line and source position of a tag by "tag.sourceline" and "tag.sourcepos" in Beautiful Soup.

the first tag with source position greater than both 20% of the maximum source position in the same source line and one-third of the maximum source position among tags in the qualified list; (2) if no tag meets such conditions, choose the first tag with source position greater than either 20% of the maximum source position in the same source line or one-third of the maximum source position among tags in the qualified list. If we fail to position the start of the CD&A using "compensation", "discussion", and "analysis" as keywords, we try "executive compensation" following the same procedure.

To position the end of the CD&A, we identify the next unrelated section title if it contains "compensation table," "compensation committee report," "compensation committee interlock," or "insider participat."[30] The same criteria to distinguish section titles from sentences apply, and we require the tag to appear after the starting tag. If multiple tags qualify, we sort them in the order they appear and do the following to find the ending tag: (1) choose the first or <font> tag with source line greater than the starting tag's source line plus 25% of the maximum source line, and less than 90% of the maximum source line; (2) if no or <font> tag qualifies, choose the first tag that meets all other criteria; (3) if no tag qualifies, reduce the distance between the starting and ending tags from 25% to 2.5% in increments of 2.5%, and iterate the above two steps until a qualified tag is found; (4) if still no tag qualifies, choose the first or <font> tag with the same source line as the starting tag and the source position greater than the starting tag's source position plus 25% of the maximum source position of this source line; (5) if no or <font> tag qualifies, choose the first tag that meets all other criteria; (6) if no tag qualifies, reduce the distance between the source position of the starting and ending tags from 25% to 2.5% in increments of 2.5%, and iterate the above two steps until a qualified tag is found; (7) if no tag qualifies, choose the first tag in the list. With the start and end tag, we extract the text content from the tags in between for further analysis. Images are ignored. For tables, the text components within the tables are extracted.

If we could not locate the starting or ending tag of the CD&A, the section is likely contained

[30]No uniform title exists for the section following CD&A. We consider the most common ones for keyword search.

in a single tag. Thus, we use the text location approach to extract text content of each tag using regular expression.[31] If multiple texts are extracted, we choose the shortest one that contains more than 200 words. If none exceeds 200 words, we choose the longest one.

For firms with duplicate proxy statements in one year, we keep the one with the longest extracted text, provided it is not over 20,000 words. For remaining duplicates, we keep the one with the later filing date, removing 1,964 duplicate firm-years in total. We also exclude 795 failed extractions, 5,213 extractions with less than 200 words, and 548 extractions with more than 20,000 words, because they are likely failed extractions, either missing details on executive compensation or capturing irrelevant content from other sections. The final sample of successful CD&A text extraction consists of 50,076 observations from 6,937 firms. Among them, 23,588 are extracted using the hyperlink approach, 25,705 using tag location, and 783 using text location. We successfully match 14,704 of them to our hand-collected data. However, for 1,865 observations, we have hand-collected data but fail to automatically extract their CD&A sections, so they are excluded from the ML sample.

List of ES keywords. For our automatic classification of ES Pay, we develop a list of keywords and phrases that indicate the existence of E and/or S pay. Following Li et al. (2021), we train a word embedding (Word2Vec) model using all extracted CD&A sections as the corpus. We clean the text by expanding abbreviations, removing entities such as person, geographic, organization, date, time, number, and percentage using name entity recognition (NER), and removing punctuation and stop-words. The dimension of word vectors is set as 300. Two words are defined as neighbors if they appear within five words of each other in a sentence. Words or phrases are excluded if they appear fewer than 10 times in the corpus.

To create the keyword list, we first select seed words related to environmental and social aspects based on our hand-collection experience. For E, seed words include ESG, environmental, sustainability, solar, carbon, methane, emission, and spill. For S, seed words include ESG, safety,

[31] Specifically, we use regular expression `r'compensation discussion(.*?)summary compensation table|compensation table|compensation committee report|compensation report'` to extract the CD&A section.

incident, diversity, customer satisfaction, human capital, CSR, ethic, integrity, and philanthropy. Then, we create the E and S keyword lists by selecting the top 100 most similar words or phrases for each seed word, with a similarity threshold of 0.5. We manually review the auto-generated lists to exclude irrelevant words or phases. If a word appears in both the E and S keyword lists and is not considered a common keyword related to both E and S, like ESG, we assign it to the list where it has a higher cosine similarity to the average of the seed word vectors. The complete list of these keywords is shown in IA.2.

Training and testing sample. The sample for training and testing includes all 14,704 firm-year observations that overlap with our hand-collection sample. We divide the firms in this overlapping sample into training and testing groups by 8:2. The training set includes all firm-year observations from firms in the training group, and the testing set includes all observations from firms in the testing group. We split by firms, not by firm-year observations, to ensure a clean testing sample. This approach prevents contamination from firms with similar CD&A contents across years appearing in both training and testing samples. The training set consists of 1,034 firms and 11,805 firm-year observations, with 3,389 having ES pay. The testing set consists of 259 firms and 2,899 firm-year observations, with 803 having ES pay.

XGBoost classification model. We apply a supervised machine learning model, eXtreme Gradient Boosting (XGBoost), to predict whether a firm includes ES targets in its executive compensation. The XGBoost model is a scalable ensemble tree-based method developed by Chen and Guestrin (2016).[32] The basic idea is to iteratively train decision trees, with each new tree trained to correct the errors made by the previous one, thus improving the overall accuracy of the model.

Our calibration when we train the model to predict the ES Pay dummy is as follows. The input parameters include the frequency of ES keywords, the co-occurrence of ES keywords and compensation keywords, the length of the CD&A section, and the firm's 2-digit SIC code.[33] The

[32] Erel et al. (2021) find that the XGBoost model provides better predictions regarding directors' performance than other ML models such as neural networks, Ridge, or Lasso.

[33] See IA.2 for the list of ES keywords. Co-occurrence is defined as compensation keywords appearing within the [-20, +20] context window around ES keywords. Compensation keywords include "compensation," "incentive,"

co-occurrence measures ensure that ES keywords are discussed in the context of executive compensation. Validation tests show that they are strong predictors of the ES Pay dummy. The hyperparameters of the XGBoost model are determined using 5-fold cross-validation to maximize the prediction accuracy. The number of estimators is set to 50, maximum depth to 6, minimum child weight to 4, learning rate to 0.1, and "scale_pos_weight" to 2.[34] Only 2.55% of the firm-year observations in the testing sample for which the model never predicts E or S targets actually have such targets according to our manual reading.

"award," "cash," "bonus," "equity," "stock," "option," "sti," "lti."

[34]The hyperparameter "scale_pos_weight" controls the balance of positive and negative weights, which is helpful when there is an imbalanced sample distribution. A typical value is the ratio of negative to positive instances. In our case, $(3389+803) \div (11,805+2,899) = 2.85$, so we restrict the "scale_pos_weight" to be at least 2 for hyperparameter search.

IA.2. ES Keyword List

This internet appendix shows the full list of the ES keywords that we used to predict the existence of ES Pay. More details on the automatic classification are introduced in IA.1.

Common keyword list: ehs, environmental social, environmental social governance, esg, health safety environmental, hse, hsse, inaugural esg report, sasb, social environmental

E keyword list (excluding common keywords): air emission water, air reportable, biodiversity, biogas, caprolactam, carbon, carbon capture, carbon dioxide, carbon emission, carbon footprint, carbon intensity, carbon neutral, carbon neutrality, circular economy, clean energy, cleaner, co emission, coal fired plant, decarbonization, deforestation, diverted landfill, electric vehicle, emission, emission intensity, emission reduction, emission water, energy consumption, energy storage, environmental, environmental citation, environmental footprint, environmental incident, environmental stewardship, environmental sustainability, ev charging, flaring intensity, fossil fuel, fossil nuclear, fresh water, freshwater, gas emission, gas steam, ghg, ghg emission, greenhouse, greenhouse gas, greenhouse gas emission, greenhouse gas intensity, inaugural sustainability report, landfill gas, leak detection, lost spill, low carbon, methane, methane emission, methane intensity, nuclear generating station, permit discharge exceedance, pollutant, potable water, power generation fleet, propylene, recycled water, reduce carbon emission, reduce energy consumption, reduce greenhouse gas, release hazardous, renewable electricity, renewable energy, renewable feedstock, renewable natural gas rng, reportable oil spill, reportable quantity, reportable spill, reproducibly, sbti, solar, solar power, spill, spill land, spill prevention rate, spill severity, spill volume, spill water, spilled, sustainability, unplanned uncontrolled release, waste diversion, waste landfill, water consumption, water recycling, water supplied agriculture, water waste, wind, zero carbon

S keyword list (excluding common keywords): average speed answer, call answered within, call center, citizenship, citizenship sustainability, client satisfaction, contractor recordable, csr, customer satisfaction, customer satisfaction score, cybersecurity, dart, day away work, diverse background, diverse representation, diversity, diversity belonging, diversity equality inclusion, diversity inclusion, diversity inclusion belonging, diversity inclusion initiative, diversity representation, employee fatality, ethic, ethic integrity, ethical, ethical conduct, ethnicity race, excellence integrity, fatality, fatality prevention, female, female minority, gender, gender diversity, gender ethnic, gender ethnicity, gender racial, gender racial ethnic diversity, guest satisfaction, honesty integrity, human capital, human resource, incidence rate, incident, incident rate, incident rate preventable vehicle, incident severity, inclusion diversity, inclusion teamwork collaboration, inclusiveness diversity, increasing representation woman, industrial hygiene, injury, injury frequency, injury incident, inpatient satisfaction, integrity, lost workday, ltir, motor vehicle accident, msha, net promoter score, operational excellence, osha, osha incident, osha recordable, philanthropic, philanthropy, preventable fleet, preventable motor vehicle, preventable vehicle accident, preventable vehicle incident, quality, race ethnicity gender, racial diversity, racial ethnic, racial gender diversity, racially ethnically,

recordable incidence rate, recordable incident, recordable injury, recordable rate, recordable safety incident, refinery reliability, reliability saidi, reportable accident, reportable incident, reportable incident rate, reportable injury, representation woman, residential customer satisfaction, rifr, safe, safe workplace, safety, safety incident, safety reliability, safety trir, safety well being, serious incident, serious injury, severity incident, severity injury, sif, succession planning, tcir, trir, uncompromising safety, woman minority, woman underrepresented, workforce diversity, workplace injury, workplace safety

IA.3. ES Pay and ES Performance: Individual ES Scores

This table presents the relationship between ES Pay contracting and ES scores from KLD, MSCI, S&P, and Sustainalytics (SUS). ES Pay is a dummy variable that equals one if a firm includes any ES targets for executive compensation. Explicit is a dummy variable that equals one if a firm includes at least one quantitative target with a fixed link between target achievement and compensation. Robust standard errors that are clustered at the firm level are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Please refer to Appendix A for a description of the variables.

	KLD		MSCI		S&P		SUS	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ES pay	0.143***	0.058	0.003	-0.016	0.087***	0.075**	0.068*	0.049
	(0.039)	(0.043)	(0.028)	(0.030)	(0.029)	(0.030)	(0.037)	(0.038)
Explicit × ES pay		0.314***		0.074*		0.048		0.076
		(0.077)		(0.041)		(0.039)		(0.048)
Size	-0.027	-0.025	-0.029	-0.028	0.080**	0.081**	-0.020	-0.018
	(0.026)	(0.026)	(0.027)	(0.027)	(0.033)	(0.033)	(0.039)	(0.039)
ROA	-0.049	-0.042	-0.031	-0.031	0.003	0.001	-0.198**	-0.191*
	(0.056)	(0.056)	(0.065)	(0.065)	(0.078)	(0.078)	(0.099)	(0.100)
Tobin's Q	-0.007	-0.007	-0.000	0.000	0.018*	0.019*	0.001	0.002
	(0.008)	(0.008)	(0.008)	(0.008)	(0.011)	(0.011)	(0.014)	(0.014)
Book leverage	0.069	0.069	-0.016	-0.015	-0.028	-0.027	0.065	0.065
	(0.045)	(0.044)	(0.048)	(0.048)	(0.067)	(0.067)	(0.058)	(0.058)
Dividends	-0.191	-0.203	0.788*	0.795*	1.908***	1.911***	2.161***	2.195***
	(0.367)	(0.366)	(0.467)	(0.467)	(0.577)	(0.578)	(0.672)	(0.673)
Firm age	-0.114***	-0.108***	-0.187***	-0.185***	0.134**	0.136**	0.087	0.088
	(0.040)	(0.040)	(0.048)	(0.048)	(0.057)	(0.057)	(0.056)	(0.056)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	23,866	23,866	21,522	21,522	10,729	10,729	8,434	8,434
Adj. R2	0.551	0.553	0.660	0.660	0.856	0.856	0.819	0.819

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