Green Paychecks – Does CEO ESG-based Compensation Influence Future Earnings?

Abstract: The proportion of firms that give ESG-based grants to the CEOs increased five-fold over our sample period, from 7 percent in 1998 to 35 percent in 2020. ESG-based compensation depends on absolute (firm-specific) performance metrics, vests on a cliff (as opposed to graded) basis, is paid in cash (as opposed to equity), and focuses primarily on meeting social metrics. CEO ESG-based compensation ranges from a low of $10,216 in 1999 to a high of $571,441 in 2020, corresponding to 1.3 percent and 6.9 percent of the total yearly performance-based award. These changes have been accompanied by a significant improvement in the quality of ESG-based disclosures. The relationship between ESG-based compensation and future earnings is convex – i.e., negative at small values, but it turns exponentially positive when it crosses 4.73 percent of the total annual performance-based award. The positive payoff is driven by firm-specific economic determinants, which suggest that firms with strong financial fundamentals and growth expectations grant more ESG-based compensation, and such firms perform well in the future. While governance factors have no explanatory power. Collectively, our evidence suggests that ESG-based compensation is reflective of efficient contracting.

Keywords: Environmental, Social, and Governance (ESG) performance metrics; ESG-based compensation; executive compensation; performance-vesting grants; performance-contingent (p-c) grants; performance-based grants; CEO pay; operating earnings; operating margin

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1. Introduction

A raging debate about the value-relevance of Environmental, Social, and Governance (ESG) activities/investments is ongoing. Like a culture of innovation or the contribution of human and intellectual capital, one perspective is that ESG is an intangible asset whose long-term value implications can be assessed (Edmans 2023). Another, generally broader, perspective is that firms (through their managers) have a responsibility to improve the welfare of a larger set of stakeholders, beyond maximizing the shareholders' objective function. To some extent, both perspectives imply that if boards of directors expect executives to improve ESG performance, they need to incentivize executives to exert effort and invest in ESG-related activities. Despite the importance of the topic, the literature examining ESG-performance-contingent executive compensation (henceforth referred to as ESG-based compensation) is scant. Thus, our objective is two-fold. First, we provide a comprehensive longitudinal analysis of ESG-based compensation practices, the relative weights boards of directors' place on ESG performance metrics within the performance-based award, and the magnitude of the resulting ESG-based incentives.[1] Second, to the extent that ESG-based compensation generates significant incentives, we should be able to quantify their impact on firm performance. Thus, we examine the impact of ESG-based compensation on future operating earnings.

We focus on the compensation for the chief executive officer (CEO), since this position is responsible for the overall management and operations of the firm. At the outset, it is unclear if tying CEO compensation to ESG performance is desirable or efficient. CEOs manage complex

[1] Recent related research (Bettis et al. 2018, Bizjak et al. 2019; Philip et al. 2023) examines performance-based grants of equity or cash where the payoff is contingent on firms' ability to meet one or more accounting, stock price or other key performance indicators (e.g., same store sales). None of these studies focuses on grants whose payoff is contingent on ESG-based metrics.

operations that require them to focus on multiple activities at once. Compensating the CEO based on meeting ESG performance metrics not only expands the CEO's set of responsibilities (each connected to a different output), but also ties the CEO to the objectives of additional stakeholders (Holmstrom and Milgrom 1991; Bebchuk and Tallarita 2022; Edmans 2023). On the one hand, tying CEO pay to ESG performance aligns CEO's interests to a broader set of stakeholders, which in turn creates implicit contracts that can lead to trust, improved managerial decision-making, and better operating performance (Lins et al. 2017; Cook et al. 2019). Under this perspective, ESG-based compensation can be reflective of an investment in intangible assets, and consequently may be part of an efficient compensation contract. On the other hand, tying CEO pay to ESG performance spreads the CEO's cognitive effort and time into areas that may not be central (or are unclear how they tie) to the objective function of maximizing long-term firm value. That is, linking compensation to ESG can be deleterious to firm performance because of the distortions it creates on resource allocation decisions and other central tasks (Holmstrom and Milgrom 1991).

Additional complications arise when tying CEO compensation to ESG performance metrics. If CEO compensation is contingent on ESG performance, the weights placed on each of the "E," "S," and "G" activities should be significant enough to create incentives (Bebchuk and Tallarita 2022). Moreover, some CEO compensation packages trigger payoffs associated with meeting measurable and specific ESG metrics, typically over a window ranging between one and three years. In other cases, meeting or exceeding ESG-based metrics enhance the overall payoff to the CEO, to the extent that a financial performance metric (e.g., accounting performance, stock price appreciation) is also achieved. When these weights are too low, not specified with clarity, or the payoff window is too long, the incentive effect of ESG investment is minimized, which can lead some CEOs to not commit to ESG investments with positive Net Present Values (NPV). On the other hand, if the weights placed on ESG compensation are too high, these can encourage

CEOs to take on ESG-based projects with negative NPVs and/or to place less emphasis on other important and positive NPV projects and investments. These additional complications can generate significant investment inefficiencies and create opportunities for rent extraction.[2]

These tensions highlight the stark need to gain a greater understanding of CEO compensation that depends on meeting ESG performance metrics. Bebchuk and Tallarita (2022) analyze CEO ESG-based compensation for the largest 100 firms in the Standard and Poor's 500 index (S&P 500) for the year 2020. Bebchuk and Tallarita (2022) provide evidence suggesting that the use of ESG metrics in compensation packages exacerbate agency costs. Similarly, Badawi and Barlett (2024) examine the ESG-based pay practices amongst S&P 500 firms for the year 2023 and conclude ESG-based compensation is reflective of weak governance. They find that ESG compensation targets are easily met but that such achievements do not translate into higher ESG performance. On the other hand, another line of research suggests that tying ESG metrics to executive compensation leads to greater levels of managerial risk-taking, increases in firm innovation, and better employee well-being (e.g., Hong, Li, and Minor 2016; Tsang, Wang, Liu, and Yu 2021; Ikram, Li, and Minor 2023).

Against this backdrop, we offer significant novel insights and contributions by providing large-sample evidence on the evolution of ESG-based compensation practices. In addition to providing rich descriptive evidence on the frequency, magnitude, and weights associated with ESG-based performance metrics, we examine the impact of ESG-based compensation on future operating earnings – a performance metric reflective of core operating activities. We additionally decompose ESG-based compensation into three components, following Hanlon et al. (2003).

[2] It is possible that ESG-based compensation is the result of board members' preferences, CEO preferences, or both. Boards (CEOs) may design (accept) compensation contracts based on values (e.g., desire to improve the environment, improve workplace conditions) that are too broad and/or the result of herding "good-citizen" behavior, which can create weak incentives with unclear priorities (Starks 2023).

Specifically, we break ESG-based compensation into three set of factors: *i)* a predicted ESG-based compensation component attributable to firm-specific economic determinants, such as firm size, growth opportunities, innovation intensity, cash constraints, stock market performance, and variability in operating performance, *ii)* a predicted ESG-based compensation component due to governance characteristics, including relative power between managers and shareholders, board characteristics and board meetings, and *iii)* an unexplained or residual component. This test allows us to determine whether ESG-based compensation is reflective of efficient contracting or rent extraction.

We base our analysis on firms that make up the S&P 500 index over the 1998-2020 period. The sample comprises 7,877 firm-year observations for 473 firms. We find that CEO ESG-based compensation has become more prominent over time. The proportion of firms that give ESG-based compensation to the CEOs increased five-fold over the sample period, from 7 percent in 1998 to 35 percent in 2020. In terms of design, the vast majority of ESG-based compensation grants are based on absolute (firm-specific) performance metrics, have cliff vesting schedules (as opposed to ratable), are paid in cash (relative to equity), and the payoff is based primarily on meeting social performance metrics. In terms of the magnitude, the unconditional mean value of ESG-based compensation ranges from a minimum of $1,496 in 1998 to a high of $201,040 in 2020. Restricting the sample to firm-year observations when a CEO actually receives compensation tied to ESG performance, the range goes from a low of $22,039 in 1998 to a high of $571,441 in 2020, which equates to about 1.9 percent and 6.9 percent of the total yearly performance-based award.

Turning to the impact of ESG-based compensation on future operating earnings, we find a convex relation, where it is negative at small values of ESG-based compensation, but it turns exponentially positive as ESG-based compensation is sufficiently large. Our point estimates suggest that the inflection point occurs when ESG-based compensation corresponds to 4.73 percent

of the total performance-based award. Consequently, when we regress future operating income on ESG-based compensation, we include a squared term whose coefficient is reliably positive confirming the convex relation. Even though we regress future earnings on 3 lags of ESG-based compensation to set temporal precedence, the possibility of simultaneity bias remains. Thus, we use the industry-level ESG-based compensation as an instrument to mitigate simultaneity bias. Economically speaking, moving from the median to the 95th percentile of ESG-based compensation, which corresponds to 9.48 percent of total performance-based compensation, implies a $2.97 increase in future operating income. This main result is consistent with the notion that the investment in ESG-based compensation pays off, assuming it is sufficiently strong.

Next, we parse ESG-based compensation into economic determinants, governance mechanisms, and the residual component. In this first stage model, we find that the economic determinants, primarily those related to past ESG-based pay practices, investment opportunities and R&D intensity, explain approximately 34 percent of the variability in ESG-based compensation. In contrast, we find that the governance variables we consider add little explanatory power over and above economic determinants. This suggest that firms appear to grant ESG compensation based on economic determinants, suggesting incentive alignment is at play. In the second stage, we find that the predicted component of ESG-based compensation due to economic determinants is positively related to future earnings, which suggest that firms with strong fundamentals and growth expectations that grant ESG-based compensation perform well in the future. We also find that neither the predicted component of ESG-based compensation due to governance, nor the residual component, are related to future earnings. Collectively, these results suggest that ESG-based compensation is generally the result of efficient contracting.[3]

[3] In untabulated tests, we do not find a difference in the levels of total "excess compensation" between CEOs who receive ESG-based compensation and those who do not. This result also suggest that ESG-based compensation is not associated with rent extraction.

Our study provides several important contributions to a nascent area of research. While much research focuses on understanding the implications of ESG performance (primality based on ratings by external evaluators) on firm performance (Christensen, Serafeim, and Sikochi 2022; Gilbert 2019), only a handful of studies focus on CEO ESG-based compensation. Bebchuk and Tallarita (2022) conduct a thorough analysis of CEO ESG-based compensation within the top 100 S&P firms in 2020. One of their conclusions is that ESG-based compensation receives a very modest weight in relation to the total compensation package and that the disclosure around ESG-based compensation is opaque, which leaves the door for rent extraction. Badawi and Barlett (2024), who focus on S&P 500 firms for the year 2023, also conclude that ESG-based pay is reflective of weak governance. Our analysis of the entire S&P 500 index over a significantly larger period (1998-2020) paints a different picture. We are able to provide a clearer picture of the evolution of ESG-based pay, its changing attributes across time, and the relation between ESG-compensation with firm-specific economic determinants and governance mechanisms. We fail to find evidence supporting the arguments that entrenched managers use ESG pay to advance their own self-interest. Instead, our evidence suggests that firms that use ESG-based compensation experience higher levels of future operating earnings. We propose that our significantly larger sample and identification strategy allow us to capture the variation in ESG-incentive strength.

We also extend and complement recent research in the area (Flammer, Hong and Minor 2019; Cohen, Kadach, Ormazabal, and Reichelstein 2023). Flammer et al. (2019) finds that ESG/CSR-based pay has been increasing over time and leads to greater long-term focus and increase in firm value. Our results that ESG-based incentives improve future earnings is consistent with Flammer et al. (2019), who suggest that well-designed ESG-based incentives can translate into tangible firm outcomes. Our evidence of the increase in prominence of ESG pay over time is consistent with the international descriptive evidence by Cohen et al. (2023). A distinctive factor

of our study over Cohen et al. (2023) is our quantification of ESG-incentives. We answer the call of several prior research (Cohen et al. 2023) and manually classify performance metrics in the Incentive Lab database (IL) into ESG and carefully collect relative weights of performance metrics for S&P 500 firms over the 1998 to 2020 sample period. Our careful data collection not only allows us to document the presence of ESG performance metrics in CEO compensation but also illuminate the magnitude of ESG-based compensation in light of existing incentives held by the CEO, which is an incremental contribution to the executive compensation literature. By documenting the increase in use, dollar value, firm-specific, and governance-related characteristics associated with ESG-based compensation, this study provides important insights to market participants and regulators on the emergence and relevance of these grants. Importantly, our study sheds light on the debate as to whether ESG-based compensation is reflective of efficient contracting or rent extraction.

The rest of the paper is organized as follows. In Section 2, we describe the background and theoretical framework around the ESG-based compensation-future earnings relation. In section 3, we describe the sample construction and variable measurement. Next, in section 4, we discuss the results. Lastly, in section 5, we provide a discussion and conclude our paper.

2. Background and the Theoretical Relation Between ESG-based Compensation and Future Earnings

2.1 Background on ESG-based Compensation

Research in ESG-based executive compensation is growing. Focusing on CEO ESG-based compensation within the top 100 S&P firms in 2020, Bebchuk and Tallarita (2022) find that ESG-based pay receives a very modest weight in relation to the total yearly compensation package, which implies that the incentives related to this form of compensation are perfunctory at best. They

also find that the disclosure around ESG-based compensation is very opaque, which leaves the door for rent extraction. Similarly, focusing on pay practices amongst S&P 500 firms for the year 2023, Badawi and Barlett (2024) find that ESG compensation targets are easily met (in contrast to financial metrics, which are substantially harder to meet), but that such achievements do not translate into higher ESG performance. The evidence Bebchuk and Tallarita and Badawi and Barlett present is suggestive of symbolic/greenwashing practices and weak governance. While these findings shed light on an important issue and provide a strong foundation for subsequent research, their analysis focuses on a single year (2020 and 2023, respectively), and does not analyze the implications of ESG-based compensation on firm performance.

A related area of research finds that integrating ESG-based metrics into CEO compensation can have a positive impact on firm performance, but such effect can be contextual. Cohen et al. (2023), analyze ESG-based compensation practices across the world and document an increase in prominence of ESG pay over time. A distinctive characteristic of Cohen et al. (2023) is their primary focus on the adoption of ESG-based compensation practices, as opposed to the quantification of the magnitude of ESG-based incentives. While they document improvements in future ESG performance, they do not find improvements in financial performance. Flammer et al. (2019) examine the relation between the adoption of executive compensation based on CSR metrics and firm value, subsequent social and environmental initiatives, emissions and green innovations. Unlike Cohen et al. (2023), who does not find an improvement in financial performance, Flammer et al. (2019), find an increase in Tobin's Q, return on assets, and employee satisfaction, particularly in stakeholder-sensitive firms. Homroy, Li, and Simnett (2023) similarly find that ESG-based compensation can improve shareholder value, particularly amongst firms with strong corporate governance and CEOs with high general ability. Relatedly, Ioannou, Li, and Serafeim (2016) further show that monetary incentives can interact with the difficulty of reaching

environmental targets. Together, these studies underscore that ESG-based compensation can be effective when thoughtfully designed and well-aligned with firm context.

While extant research advances the understanding in meaningful ways, much remains to be examined in relation to ESG-based compensation and its impact on future firm performance. By conducting a comprehensive analysis of ESG-based compensation practices and how those impact future earnings, we seek to answer whether these compensation practices are reflective of an intangible asset with measurable payoffs.

2.2 The Relation Between ESG-based Compensation and Future Earnings

In their seminal study, Lev and Sougiannis (1996) model the relation between the value of assets and future operating earnings. Specifically, they model earnings as a function of tangible assets, which are reported in the balance sheet at historical cost, and intangible assets whose value is not capitalized and therefore have to be estimated. The relation is modeled as follows:

$$OE_{it} = f\,(TA_{it},\, IA_{it}) \qquad (1)$$

Lev and Sougannis (1996) consider accumulated research and development (R&D) expenditures as the proxy for intangible assets (*IA*). They find that R&D has a reliable impact on future operating earnings and stock returns lending support to the notion that R&D is an important value-relevant intangible asset. Under similar framework, Hanlon et al. (2003) considers employee stock options (ESO) granted to executives as a proxy for the intangible assets created by human and intellectual capital. Hanlon et al. (2003) focus on Black-Scholes values of the accumulated ESOs, which they argue capture the investment-expenditure that firms make in anticipation of higher future operating income.[4]

[4] Lev and Sougannis (1996) use 10 lags of accumulated R&D expenditures but find that the five most recent accumulated lags have an impact on current operating earnings. Hanlon et al. (2003) use five lags of accumulated

We adopt the framework outlined in equation *(1)* and consider ESG-based compensation as an investment in an intangible asset, whose payoff can be measured.[5] Tying CEO pay to ESG performance aligns the CEO's interests to a broader set of stakeholders, which in turn can create positive externalities including higher levels of trust, enhanced managerial decision-making, improved monitoring, and consequently better operating performance (Lins et al. 2017; Cook et al. 2019). Given the increased demand for ESG corporate performance, a CEO who successfully improves ESG performance increases his/her firms' reputation, attract and retain loyal customers and appeal to socially conscious investors (Starks 2023), which in turn can increase sales, lower cost of capital, and thus generate higher operating earnings. Similarly, a CEO who is incentivized to improve employee's workplace conditions and benefits can create an innovative environment that improves employee satisfaction and morale, reduce costly turnover, and enhance employee productivity (Edmans 2011; 2012; Cook et al. 2019). Relatedly, CEOs who are attentive to environmental concerns and firm governance are in a better position to anticipate risks and be proactive in terms of regulatory compliance. Collectively, CEOs who engage in the aforementioned activities generate greater levels of social capital and trust in the capital markets, which can manifest itself in higher levels of performance and returns (Lins et al. 2003). Under this perspective, ESG-based compensation generates incentives that should reflect positively in future operating earnings.

The arguments above point strongly to the notion that ESG-based compensation is indeed an investment in an intangible asset, which is consistent to some of the prior research in the area (e.g., Flammer et al. 2019). However, it is possible that the incentives generated by ESG-based compensation is not strong enough and/or is reflective of weak governance (Bebchuk and Tallarita

Black-Scholes ESO values. Based on the typical ESG-based compensation vesting length, we utilize three lags in our analysis.

[5] Unlike prior research that examines the impact of ESG scores generated by external raters on firm performance, we argue that focusing on the ESG-based incentives granted to the CEO is a more direct test.

2022; Badawi and Barlett 2024). Further, it is possible that tying CEO pay to ESG performance increases the CEO's cognitive effort and time into areas that may not be central to maximizing long-term firm value. Therefore, connecting compensation to ESG can be deleterious to firm performance because of the distortions it creates on other central tasks (Holmstrom and Milgrom 1991). Moreover, granting ESG-based compensation may be reflective of the personal values/beliefs of the board and/or the CEO for ESG engagement, even though in some cases engaging in ESG activities may be deleterious to firm performance (Starks 2023). Further, given the opacity in disclosures, ESG-based compensation provides an opportunity for rent extraction, with the "added benefit" of signaling a superficial commitment to legitimate ESG objectives (Bebchuk and Tallarita 2022; Badawi and Barlett 2024). Under this perspective, ESG-based compensation may be at best (at worst) unrelated (negatively related) with future earnings. We seek to shed light onto these competing perspectives by testing the following null hypothesis:

H1: *CEO ESG-based compensation has no effect on future earnings*.

3. Sample Construction and Variable Measurements

3.1 Sample Construction

We start the sample construction by identifying firms that are members of the S&P 500, as of the end of 2020. Over time, these firms make up between 70-80 percent of the total capitalization in the U.S. stock market, which makes them a barometer of the entire equity market. We utilize the Institutional Shareholder Services (ISS) Incentive Lab database (IL) to identify performance-based grants to executives. We then merge IL with data from the following databases: Compustat, Standard and Poor's Execucomp, CRSP, and ISS Board of Directors. After merging the databases above, the final sample consists of 7,877 firm-year observations representing 473 firms (approx. 95% of S&P 500 index) over the 1998-2020 sample period. Table 1, Panel A, shows the sample

reconciliation. The number of observations in the analysis presented below may vary depending on data availability to construct the variables used in the analysis.

Table 1, Panel B, shows the number of firm-year observations across time, while Panel C presents the number of observations based on industry affiliation. Since we focus on the identification of membership within the S&P 500 index as of 2020, the number of observations is lower in earlier sample years. The industries with the largest representation are business services (9.64 percent), electric, gas, and sanitary services (8.51 percent), and instruments and related products (8.18 percent). We include year and industry-related fixed-effects in the multivariate analyses in Tables 7-8 to control for macroeconomic and industry factors.

3.2 Descriptive Statistics

Table 1, Panel D, presents the descriptive statistics. The average operating earnings in our sample is 20.97 percent of sales. The average metric-weighted dollar value of ESG grants to CEOs is $81,933, which is only 1.3 percent of total CEO performance-based compensation. While the accounting-based (stock price-based) compensation is 35.45 percent (13.98 percent) of total CEO performance-based compensation. The average book to market ratio is 0.57 and research and development expenditure is 3.58 percent of sales. On average, 47.38 percent of the firms have a tax loss carry forward in previous 3 years and approximately 13 percent of the firms have dividend constraints. The CEO also serves as the chair of the board in 75.47 percent of the firms, while 34.54 percent of the top 5 executives hold board positions. On average, firms hold 1.26 board meetings in a year.

Table 2 presents pairwise correlation between the dependent and independent variables of interest used in our baseline estimations. Operating earnings is not significantly correlated with the average of first-order terms for years *t* to *t-3* of ESG-based compensation, while it is

significantly and positively correlated with the second-order terms of ESG-based compensation. Operating earnings is also significantly and positively correlated with equity incentives *(CEO Delta$_{it-1}$),* firm size *(Assets$_{it-1}$),* and research and development expenditures *(R&D Intensity$_{it, t-3}$).*

3.2 Identifying and Quantifying ESG-based Incentives

The IL database provides details on each grant awarded to the CEO including the total dollar amount of the grant, the performance-metrics used, the method of payment (cash versus equity), whether the grant vests on meeting absolute (firm-specific) or relative (to industry or peers) metrics, whether the grant vests on a cliff, ratable, or accelerated manner, to name a few.[6] While the IL database helps identify the use of a particular performance metric within a grant, it does not allocate the total dollar amount of the grant to individual metrics. This is a major deficiency and prior research either focuses solely on the presence of a performance measure in the grant and/or assigns the total weight to each performance measure to estimate the dollar amount allocated to each performance measure in the grant (e.g., Bizjak et al. 2019; Philip et al. 2023).[7]

To identify firms that utilize ESG performance metrics in performance-based grants awarded to the CEO, we rely on the following fields in the IL database: "metric type," "metric,"

[6] Absolute awards are performance-based awards that vest contingent on a firm meeting an absolute (firm-specific) performance metric while relative awards vest based on a firm's performance relative to its industry or peer-firms. Absolute-relative awards use a combination of absolute and relative vesting provisions in the same grant. Cliff awards are performance-based grants that vest all at once as soon as the performance goal is met, while ratable grants vest uniformly over a period of time (Bettis et al. 2018).

[7] Estimating the incentive effects of ESG-based compensation require detailed data from compensation contracts including the grant-date fair values (*GDFVs*) and accurate weightings of performance metrics within each grant. Though IL dataset provides some information regarding the grants of options, stocks, and cash to CEOs in 2,232 large U.S. firms over the period 1998–2020, over 40 percent of the grants have missing *GDFVs*. In contrast to prior papers (Philip et al. 2023), we fill in these missing *GDFVs* using two main approaches as outlined in Bettis et al. (2018). First, for equity grants with missing *GDFVs*, we use the "target value", defined as "the product of the target number of shares or options expected to vest times the grant-date market value per share or option" (Bettis et al. 2018, page 196). Second, for stock option-based grants with missing market values or option pricing, we utilize the intersection between IL and Execucomp compensation datasets and calculate the missing option pricing using the Black-Scholes model. For missing market values in stock-based grants, we use stock-price during the grant year to calculate missing *GDFVs*, following the methodology outlined in Core and Guay (1999; 2002) and Bettis et al. (2018). For performance-based cash awards with missing grant dollar value, we use the target cash payout from IL when available, if not we use the threshold or maximum values provided in IL (Bettis et al. 2018). Using this methodology, we successfully fill in over 90 percent of the missing grant dollar value in our sample.

and “other metric.” “Metric type” provides the broadest performance category, whereas “metric” and “other metric” contain increasingly greater levels of details about the performance measure included in the grant. For example, “metric type” may denote a broad ESG-based measure such as “Environment ,” “Social,” “CSR,” to name a few, while “metric” may contain key words such as “climate change,” “employee health,” “diversity and inclusion,” “ethical leadership,” to name a few. The “other metric” category includes more details such as “carbon dioxide emission rate,” “oil spill rate,” “total recordable incident rate,” and “sox compliance,” among others. This level of information allows us to classify each performance measure into “Environment,” “Social” and “Governance” categories. Please refer to Appendix D for more a complete list of ESG-related metrics.

While the IL database provides information to infer the presence of ESG performance measures in CEO grants, it does not contain information on the weightings or contextual details of these metrics—neither does any other machine-readable database. Obtaining this information requires careful and extensive hand-collection from proxy statements (SEC forms DEF 14A). For each firm-year in which the CEO receives ESG-based compensation, we examine the proxy statement carefully and undertake the following steps: *i)* verify and validate the information in the proxy statement against the details provided in the IL database, *ii)* examine the descriptions and related tables providing the details about each performance-based grants, and *iii)* obtain the weights assigned to ESG performance metrics. It is common for CEOs to receive multiple performance-based grants in a given year, and some grants vest based on the firm’s or the executive’s ability to achieve the desired performance objective. In some cases, a performance-based grant may also be awarded in tandem with a grant that vests solely based on the passage of time. Hence, in addition to collecting the weights assigned to ESG performance measures, we also obtain the weights allocated to other performance measures, including the most commonly used

accounting (e.g., earnings, sales, cash flows) and stock price measures.[8] Equipped with these details, we apply the weights to the total dollar amount of the grant to construct a measure of ESG-based incentives. This approach enables us to allocate the total dollar amount of the grant across all the performance measures included in the grant.

3.3 Main empirical model

Following Lev and Sougannis (1996) and Hanlon et al. (2003), we estimate the following OLS model to determine the impact of ESG-based compensation on future earnings:

$$\begin{aligned} \textit{Operating Earnings}_{it} = \beta_0 + \sum_{k=0}^{3} \beta_{1,k}\, ESG\ Comp\ Prop_{it-k} + \\ \sum_{k=0}^{3} \beta_{2,k}\, (ESG\ Comp\ Prop)^2{}_{it-k} + \sum_{k=0}^{3} \beta_{3,k}\, Acct\ Comp\ Prop_{i,t-k} + \\ \sum_{k=0}^{3} \beta_{4,k}\, (Acct\ Comp\ Prop)^2{}_{it-k} + \sum \sum_{k=0}^{3} \beta_{5,k}\, Stk\ Prc\ Prop_{it-k} + \\ \sum_{k=0}^{3} \beta_{6,k}\, (Stk\ Prc\ Prop)^2{}_{it-k} + \beta_7\, CEO\ Delta_{it-1} + \beta_8\, CEO\ Vega_{i,t-1} + \\ \beta_9\, Assets_{it-1} + \sum_{k=0}^{3} \beta_{10,k}\, R\&D\ Intensity_{it-k} + \\ \beta_{11}\, \sigma(Operating\ Earnings)_{it-1} + \varepsilon_{it} \qquad (2) \end{aligned}$$

Operating Earnings$_{it}$ is operating income, before R&D expenses and after SGA, scaled by sales. *ESG Comp Prop*$_{it\text{-}k}$ is ESG-based compensation scaled by the value of the total annual performance-based compensation awarded to the CEO. We include ESG-based compensation for

[8] A majority of performance-based ESG grants vest based on a firm meeting one or more ESG performance metrics, along with achieving several accounting metrics that directly determine whether the executive receives a target number of options, shares, or a cash payout. Some companies allocate a percentage weight of total grant dollar value to ESG performance metrics, while others use ESG performance metrics as a modifier that adjusts the payout. Figures 1 and 2 illustrate two examples of such grants. Figure 1 shows a performance-based cash grant paid to Mr. John Kilroy, CEO of Kilroy Realty Corporation, in 2020. In this particular grant, ESG goals accounts for 15 percent of the total grant payout, which is equivalent to $450,000 calculated as $3,000,000*0.15, where $3,000,000 is total grant dollar value and 0.15 is the performance weighting for ESG goals, provided in the proxy statement (DEF 14A filing). Figure 2 presents a performance-based cash grant given to Mr. Donnie King, President and CEO of Tyson Food Inc., in 2021. This grant vests contingent on the firm meeting an accounting performance objective and three different ESG metrics (used as modifiers) over a one-year performance period. Each of these three ESG metrics modify the actual payout by plus or minus 5 percent, therefore the maximum weighting (positive or negative adjustment) of ESG metrics in this grant is 15 percent. The potential impact of ESG performance on payout is $165,750, calculated as $1,105,000*0.15, where $1,105,000 is grant target dollar value and 0.15 is the weighting for ESG goals. For further details including excerpts from annual proxy statements, please refer to Appendices B and C.

years *t-k*, where the maximum value of *k* is 3, which corresponds to the typical window over which performance is measured. In order to control for other most commonly used performance-based grants tied to accounting and stock price, we include $Acct\ Comp\ Prop_{it-3}$ and ($Stk\ Prc\ Comp\ Prop_{it-3}$) which is accounting- (stock price-) based compensation scaled by the value of the total annual performance-based compensation awarded to the CEO. The *Equity Incentives* takes two values: the $CEO\ Delta_{it-1}$ ($CEO\ Vega_{it-1}$), or the sensitivity of the CEO's accumulated equity-based portfolio to a 1 percent change in stock price (the volatility of stock prices). $Assets_{it-1}$ represents total assets scaled by sales. $R\&D\ Intensity_{it-k}$ represents research and development expenditures scaled by sales. *Equity Incentives* and *R&D Intensity* control for the intangible assets created by these two measures, consistent with Lev and Sougannis (1996) and Hanlon et al. (2003), respectively. $\sigma(Operating\ Earnings)_{i,t-1}$ represents the standard deviation of operating income over the last five years to control for operating firm-specific risk.

There are two important considerations in model (*2*). First, as discussed more fully below, when plotting 25 portfolio means of ESG-based compensation and operating earnings we find a convex relation, so we also incorporate the squared term of the ESG-based compensation. Thus, we expect $\Sigma_k\beta_{2,k}$ to be negative and significant, while we expect $\Sigma_k\beta_{3,k}$ to be positive and significant. Second, the relation between operating earnings and intangible assets can be endogenous. For example, more profitable firms may be more likely to invest more in R&D and/or be more sensitive to the expensing of stock options. Similarly, more profitable firms may have greater levels of resources to implement ESG-based initiatives. Hence, following Lev and Sougannis (1996) and Hanlon et al. (2003), we use industry ESG-based compensation levels as an instrument for firm-level ESG-based compensation. In other words, the main analysis is based on the predicted value of ESG-based compensation obtained after regressing it on the industry-year

average, where industry and year dummies are excluded since the instrumental variable is constructed at the industry-year level.

While utilizing the industry-based instrumental variable alleviates (removes the firm-specific characteristics) the possible endogeneity between ESG-based compensation and future earnings, it does not allow us to directly determine the factors that drive the economic relation. Hence, following the approach developed by Hanlon et al. (2003), we model ESG-based compensation into the economic determinants, governance characteristics, and residual components. Such partition will provide a better test on whether the relation between ESG-based compensation and future earnings is the due to efficient contracting. Specifically, we model ESG-based compensation as a function of economic determinants, governance factors and the residual:

$$ESG\ Comp\ Prop_{it} = f\ (Lagged\ Economic\ Determinants,\ Lagged\ Governance\ Characteristics,\ Residual\ Unexplained\ by\ Economic\ Determinants\ and\ Governance\ Characteristics) \quad (3)$$

If efficient contracting drives the relation between ESG-based compensation and future earnings, the explanatory power of the economic determinants should be larger than the explanatory power provided by the governance characteristics, and consequently the impact of ESG-based compensation on future earnings due to economic determinants would be positive and significant. On the other hand, if the explanatory power due to governance characteristics is greater than the explanatory power of the economic determinants, and the relation between governance-based ESG compensation and future earnings is insignificant or negative, then rent extraction is a strong explanation.

Following Hanlon et al. (2003), the economic determinants we consider include prior ESG-compensation practices, firm size, growth opportunities, innovation intensity, cash constraints, stock market performance, and variability in operating performance. Specifically, we include the

lagged value of ESG-based compensation, *ESG Comp*$_{it-1}$, since a policy of including ESG-based incentives would be a strong predictor of current compensation practices. We also include cash compensation, *Cash Comp*$_{it-1}$, since it provides liquidity and decreases the CEO's risk (due to diversification of human capital) due to managing multiple stakeholders (Guay 1999; Hanlon et al. 2003). We expect to see an increase in ESG-based compensation with firm size proxied by sales, *Size*$_{it-1}$. We also include the book-to-market ratio, *Book to Market*$_{it-1}$, and research and development intensity, *R&D Intensity*$_{it-1}$, to control for the investment opportunity set and innovation levels. Firms with higher levels of cash constraints, *Cash Constraint*$_{it-1}$, dividend constraints, *Dividend Constraint*$_{it-1}$, and tax carry loss-forward, *Tax Loss Carry Fwd*$_{it-1}$, are less likely to incentivize CEOs to utilize resources toward ESG-based initiatives that require cash investments. Finally, we consider stock returns, *Return*$_t$ and *Return*$_{it-1}$, leverage, *Leverage*$_{it-1}$, and the variability of operating earnings, *σ(Operating Earnings)*$_{it-1}$, since more profitable, solvent, and consistent firms may be in a better position to undertake ESG-based initiatives (Hanlon et al. 2003).

In terms of governance characteristics, we consider the relative power between managers and shareholders, board characteristics, and board meetings (Hanlon et al. 2003). We consider several variables to capture the overall balance of power between the managers and shareholders. First, we consider the entrenchment index (Bebchuk, Cohen, and Ferrell 2009), *E index*$_{it-1,}$ and a categorical variable indicating whether the CEO also serves as the chairman of the board, *CEO Chair*$_{it-1}$ (Core et al. 1999). If rent extraction is the explanation behind ESG-based compensation, we should observe a positive relation between *E Index*$_{it-1}$ *and CEO Chair*$_{it-1}$. Second, we consider the number of top 5 executives that sit on the board of directors, *On Board*$_{it-1}$, and the number of top 5 executive-team who *i)* have interlocked relations with board members that comprise the compensation committee, or *ii)* serve on the board of another firm that has an executive office

serving on the compensation committee of the current officer's firm, *Interlock Directors*$_{it-1}$ (Core et al. 1999). If *On Board*$_{it-1}$ and *Interlock Directors*$_{it-1}$ are positively related with ESG-based compensation, then the possibility of rent extraction is latent. Finally, we consider the frequency of board meetings (Adams 2000; Hanlon et al. 2003) as a measure of board monitoring effort and quality, *Board Meetings*$_{it-1}$, and the level of executive ownership as a measure of alignment due to firm ownership (Jensen and Meckling 1976), *Prior Ownership*$_{it-1}$. Since the number of meetings and high prior ownership indicate better monitoring and greater incentive alignment, we should observe a negative relation between these variables and ESG-based compensation.

4. Results

4.1 CEO ESG-based Compensation Over Time

We provide a comprehensive descriptive analysis of ESG-based compensation practices across time, including award characteristics, relative weights placed on ESG metrics, and the magnitude of ESG-based incentives. Because ESG-based compensation is often part of a grant that includes accounting and stock price-based performance metrics, we also provide an evolution of such compensation metrics. This analysis allows us to show the trend of ESG compensation relative to compensation that hinges on more traditional performance metrics. Table 3 and Figure 3 show a steady increase in the proportion of firms using ESG-based compensation (secondary-axis), ranging from a low of 7 percent in the late 1990s and early 2000s to a high of 35 percent in 2020. Similar trends, but at relatively higher frequencies, occurred for grants containing accounting, and stock price. Grants that include accounting (stock price) metrics ranged from a low of 43 percent (21 percent) in 1998 to a high of 93 percent (64 percent) in 2020. On average, 21 percent of firms grant ESG-based compensation across the sample period, relative to 78 percent and 38 percent of firms granting compensation based on accounting and stock price performance. Similar trends for grants including accounting and stock price performance have been documented

in the literature (e.g., Bettis et al 2018; Bizjak et al. 2019). In the multivariate models, we control for the proportion of the compensation that depends on meeting accounting or stock price metrics.

Figure 4 and 5 presents the type of ESG performance metrics (absolute versus relative) as well as the vesting schedules (cliff versus ratable) used in CEO performance-based grants. On average, 81 percent of sample firms award CEO ESG-based grants that vest upon meeting absolute (firm-specific) ESG metrics, while 22 percent of sample firms use a combination of absolute and relative (tied to industry benchmarks or peer performance) in their vesting provisions. Firms rarely use grants that vest solely based on meeting relative ESG performance metrics. Regarding vesting schedules, firms use ESG-based grants with cliff vesting schedules almost exclusively. On average, 96 percent of ESG-based compensation to CEOs have a cliff-vesting schedule, while only 4 percent use a ratable schedule.

Firms grant ESG-based compensation that payout in either cash or equity. Table 4 and Figure 6 present the proportion of firms that payout ESG-based compensation as cash awards versus equity awards. On average, 93 percent of sample firms make ESG grants where the payout is in cash, while only 17 percent of the sample firms make ESG grants where the payout is in equity (stock options or shares of stock). Grants with equity-based payout range from 7 percent of the firms in 1998, to 19 percent in 2020. In contrast, the proportion of firms making awards with a cash payout has experienced a slight decline in recent years, the proportion remains quite high at 86 percent at its lowest point (i.e., in 2010). Figure 7 presents the frequency of grants that contain environmental, social, and governance metrics. On average, 91 percent of the firms that award ESG-based grants include social metrics, compared to only 16 percent and 17 percent include environmental and governance metrics, respectively. Overall, firms mainly use ESG metrics that focus on the welfare of employees, customers, suppliers, and communities, rather than on the environment and governance.

On balance, ESG-based compensation has undergone notable shifts across time, becoming a more popular form of CEO compensation in recent years. The majority of ESG-based grants are based on absolute (firm-specific) performance metrics, with cash being the predominant form of payment (as opposed to equity), structured on a cliff (all-at-once) vesting schedule, and are primarily based on meeting social metrics, such as employee, customer, supplier, and community welfare.

4.2 Magnitude of CEO ESG-based Compensation

An important attribute of our analysis is that not only do we document the adoption and characteristics of ESG-based compensation across time, but we also quantify the number of ESG metrics and dollar value connected to this form of compensation. Table 5, Panel A, presents descriptive statistics on ESG-based compensation from two views: the full sample and a restricted sample, with the latter consisting only of firm-year observations where ESG-based compensation is granted (*ESG-based Award*==1). In the full sample, the mean ESG-based compensation is $81,933, which represents 1.3 percent of total performance-based compensation. In the restricted sample, the mean ESG-based compensation is $395, 217, which represents 6.3 percent of total performance-based compensation. Among firms that grant ESG-based compensation, the average number of ESG-based metrics included in a grant is 2.54. Of these, 91 percent of firms use ESG social-based metrics, only 17 percent use ESG governance-based metrics, and 16 percent use ESG environmental-based metrics.

Table 5, Panel B, presents the dollar amount associated with ESG-based compensation over the sample period, presented separately for the full sample and the restricted sample. In the full sample, ESG-based compensation ranges from a minimum of $1,496 in 1998 to $201,040 in 2020. Whereas in the restricted sample, the range goes from a low of $22,039 in 1998, representing 1.9 percent of total performance-based compensation, to a high of $571,441 in 2020, equivalent to 6.9

percent of total performance-based compensation. In aggregate, there is a consistent increase in weights and magnitude of ESG-based compensation over time. Next, we turn our attention to determining whether ESG-based compensation is associated with future earnings. This tests whether ESG-based compensation generates strong-enough incentives to generate economic value and whether it is part of an efficient contract.

4.3 The Relation Between ESG-based Compensation and Future Operating Earnings

We examine the relation between ESG-based compensation and future operating earnings to better understand whether ESG-based compensation is reflective of efficient contracting or rent extraction. On one hand, tying CEO pay to ESG-based performance metrics can be reflective of efficient contracting since it can align CEO's interest to a broader set of stakeholders that can lead to trust, improved managerial decision-making, and better operating performance (Lins et al. 2017; Cook et al. 2019). On the contrary, tying CEO compensation to ESG can be damaging to firm performance because it can spread CEO's time and effort into areas that do not maximize long-term firm value (Holmstrom and Milgrom 1991). Especially when relatively modest weights are placed on ESG metrics in compensation, there is high opacity around ESG-based compensation disclosures, or if the payoff window is too long, the incentive effects of ESG investment can be minimized and create opportunities for rent extraction.

We begin the analysis by first providing descriptive evidence on the relation between ESG-based compensation and operating earnings. Figure 8, Panel A, which plots 25 portfolio means of ESG-based compensation and operating earnings of our entire sample, shows that the relation between ESG-based compensation and future operating earnings is convex. In Panel B, we restrict the sample to only include firms that actually grant ESG-based compensation to their CEO, and the convex relation between ESG-based compensation and future earnings becomes even more clear. At small values of ESG-based compensation the relation is negative, but it turns positive at

the inflection point when ESG-based compensation is approximately 5 percent of the total performance-based compensation. Based on this analysis, modeling a linear specification can yield incorrect results. Therefore, as discussed previously, we include the first-order and second-order terms of the proportion of ESG-based compensation for years *t* to *t-3*, *ESG Comp Prop*$_{t\ to\ t-3}$, in the multivariate tests.

Even though we use lagged values of the independent variable, the relation between ESG-based compensation and operating earnings is subject to simultaneity bias. For example, higher levels of firm profitability may afford boards to grant greater levels of ESG-based compensation (Smith and Watts 1992; Hanlon et al. 2003). Following Lev and Sougiannis (1996) and Hanlon et al. (2003), we instrument ESG-based compensation using the industry average of ESG-based compensation in other firms in the same two-digit SIC code classification. We construct a fitted ESG-based compensation from the instrumental variable (*IV*) approach and substitute it for actual ESG-based compensation. In Table 6, Panel A, column 1, we present the payoff estimates using non-linear specification and after addressing the simultaneity bias through the *IV* approach. The sum of first-order coefficients of ESG-based compensation for the years *t* to *t-3* is negative and statistically significant at 1.27, while the sum of the second-order coefficients of ESG-based compensation for years *t* to *t-3* is positive and significant at 14.57. These results confirm the convex relationship between ESG-based compensation and future operating earnings. The coefficients on accumulated equity-based incentives, *CEO Delta and CEO Vega*, and the summed coefficients of the three year-lags of *R&D Intensity* are directionally and statistically significant, consistent with Lev and Sougannis (1996) and Hanlon et al. (2003). These results show that even after controlling for equity-based incentives and R&D expenditures, ESG-based compensation is incremental to the intangibles generated by these measures (i.e., intellectual/human capital and innovation).

As mentioned before, in a given year, firm can make multiple grants to their CEOs, and often, grants that include ESG-based metrics include accounting and stock price metrics. Given this correlation, it is important to control for the incentives generated by the portion of the incentives due to accounting or stock price metrics. In column 2, we present payoff estimates of ESG-based compensation on future earnings after controlling for accounting-based and stock price-based compensation. These results show that the coefficients of the summed accounting-based incentives are not associated with operating earnings. In contrast, the summed first-order coefficients of stock price-based incentives are positive and statistically significant, while the summed second-order coefficients are negative but not significant, suggesting a positive relation between stock price-based compensation and future earnings. Importantly, the evidence regarding ESG-based compensation remain unchanged. The sum of first-order coefficients of ESG-based compensation for years *t* to *t-3* continue to be negative and significant at 1.57, while the sum of the second-order coefficients of ESG-based compensation for years *t* to *t-3* is positive and significant at 16.65. Figure 8, Panel C which plots the post-regression results examining the impact of ESG Comp $Prop_{it}$ on operating earnings, based on Column 2 of Table 6 (Panel A), clearly reveals a convex relation.

Table 6, Panel B, reports the implied sensitivity which refers to the change in operating earnings predicted by the non-linear *IV* variable payoff estimated of ESG-based compensation from column 2 of Table 6, Panel A. Particularly moving from the median to the 95^{th} percentile of ESG-based compensation, which corresponds to 9.48 percent of total performance-based compensation, implies a $2.97 increase in future operating income.

In Table 6, Panel A, column 3, we present the results after restricting the sample to firm-year observations where firms actually grant ESG-based compensation to their CEOs. In this specification, both the first- and second-order coefficients of ESG-based compensation are positive

and statistically significant, confirming the main result.[9] In summary, our results suggest a strong positive payoff from compensating CEOs based on ESG-based metrics—provided that the proportion of ESG-based compensation relative to total performance-based compensation exceeds 4.73 percent. This threshold, identified as the convexity minimum point in Panel C, lends support to the incentive alignment perspective, suggesting that ESG-linked pay can be an effective mechanism for enhancing long-term firm performance when implemented at economically meaningful levels.

4.4 Estimation of the Determinants of ESG-based Compensation

Though the industry *IV* mitigates endogeneity concerns, it does not clearly estimate firm-specific economic determinants that drive the association. To better articulate how firm-specific economic determinants and corporate governance factors drive future earnings: (*1*) we model ESG-based compensation as a function of firm-specific economic determinants, corporate governance attributes, and residual component (i.e., unexplained variability not captured in both economic and governance factors) and (*2*) we examine the influence of predicted economic, predicted governance, and residual components separately and collectively on future operating earnings (Hanlon et al. 2003). If efficient contracting is descriptive, we expect to see the predicted component of ESG-based compensation due to economic determinants to be positively related to future earnings, which suggest that firms with strong fundamentals and future growth prospects grant more ESG-based compensation, and such firms perform well in the future. Hence, the explanatory power of the economic determinants should be larger than the explanatory power provided by the governance characteristics. On the contrary, if the explanatory power due to

[9] This test excludes all observations in which ESG-based compensation equals zero. Among firms that award performance-based ESG compensation (ESG-based Award = 1), the sum of both first-order and second-order coefficients of ESG-based compensation for years *t* to *t-3* turns positive and statistically significant. This finding implies that for firms with an average ESG-based compensation of 6.3 percent (as reported in Table 5, Panel A), the influence of ESG-based compensation on future earnings approximates a linear relation.

corporate governance factors is greater than the explanatory power of the economic determinants, and the relation between governance-based ESG compensation and future earnings is insignificant or negative, then rent extraction is at play.

Table 7 reports the estimation of determinants of ESG-based compensation. Column 1 presents results from estimating only firm-specific economic determinants on ESG-based compensation. ESG-based compensation is significantly and positively associated with the lagged value of ESG-based compensation (*ESG Comp*$_{it-1}$), which suggest previous policies of incorporating ESG-based incentives is a strong predictor of current compensation practices. ESG-based compensation is also positively associated with lagged book to market ratio, *Book to Market*$_{it-1}$, and research and development intensity, *R&D Intensity*$_{it-1}$, suggesting that ESG-based compensation is prevalent in firms with greater investment opportunities. ESG-based compensation is not associated with lagged cash shortages or constraints (*Cash Constraint*$_{it-1}$), constraints on its dividend payments (*Dividend Constraint*$_{it-1}$), firms that has a tax loss carry-forward (*Tax Loss Carry Fwd*$_{it-1}$), lagged and current stock return (*Return*$_{it}$ *and Return*$_{it-1}$) and leverage (*Leverage*$_{it-1}$), suggesting liquidity or prior performance does not affect this type of compensation. Collectively, the firm-specific economic determinants, primarily those related to investment opportunities and R&D intensity, explain 34.4 percent of the cross-sectional variation in a firm's ESG-based compensation.

On the other hand, corporate governance factors only explain 13 percent of the cross-sectional variation in ESG-based compensation. Contrary to rent extraction perspective, current year ESG-based compensation is not associated with lagged entrenchment index (*E Index*$_{it-1}$), proportion of top 5 executives on the board (*On Board*$_{it-1}$), and the proportion of top 5 executives that are interlocked with the other directors of the board (*Interlock Directors*$_{it-1}$). In column 3, we report both economic and governance factors together, and the adjusted R^2 is 34.6 percent, which

is scarcely different from the explanatory power of economic determinants alone. In the combined model (column 3), we find that consistent with column 1, current year proportion of ESG-based compensation over total performance-based compensation (*ESG Comp Prop*$_{it}$) is significantly and positively associated with intrinsic value of prior year ESG-based compensation (*ESG Comp*$_{it-1}$), book to market ratio (*Book to Market*$_{it-1}$), and research and development intensity (*R&D Intensity*$_{it-1}$), while significantly positive if the CEO is also the chairman of the board in prior year (*CEO Chair*$_{it-1}$). Surprisingly, *ESG Comp Prop*$_{it}$ is significantly and negatively associated with current year stock return (*Return*$_{it}$) and prior year stock return (*Return*$_{it-1}$). Overall, the results provide weak evidence to support the argument that ESG-based compensation facilitates rent extraction.

We next report the results showing the influence of predicted ESG-based compensation components due to economic determinants, corporate governance factors, and an unexplained residual component on future operating earnings separately and in a combined regression. Table 8, column 1, reports the estimates from the sum of first-order and second-order predicted ESG economic component. The sum of first-order payoff from predicted ESG-based compensation due to economic determinants is significantly negative at -2.87 (*p-value<0.01*) while the second-order is significantly positive 31.94 (*p-value<0.01*). Column 2 and 3 presents the estimates from predicted ESG-based compensation due to corporate governance and residual component and we find no significant results. Column 4 reports results after including all three components in the same estimation. Consistent with the primary results, we find that the relation between ESG-based compensation and future operating earnings is convex, and more importantly, that relation is predominantly driven by the economic determinants. In column 5, we report the results after controlling other most commonly used performance-based grants tied to accounting, *ΣAcct Comp Prop*$_{it,t-3}$, and stock price metrics, *ΣStk Prc Comp Prop*$_{it,t-3}$, and continue to find consistent evidence.

In summary, our results show that the predicted component of ESG-based compensation due to economic determinants is positively related to future operating earnings, which suggest that firms with strong economic characteristics such as better fundamentals and growth expectations grant more ESG-based compensation and such firm have significantly better future earnings performance in future. Our evidence collectively suggests incentive alignment perspective rather than rent extraction.

5. Discussion and Conclusions

The number of firms that use ESG-based performance metrics in their executive compensation has been increasing rapidly around the world (Cohen et al. 2023) and the debate regarding the value relevance of ESG-related corporate activities and compensation practices has been ongoing, yet literature examining ESG-based compensation practices in scant. Our study provides a comprehensive longitudinal empirical analysis of ESG-based compensation in S&P 500 companies over a sample period of 1998 to 2020, including the evolution of ESG-based compensation over the years, characteristics of such awards, the relative weights placed on these metrics in executive grants, and the magnitude of these ESG-based incentives. In addition, we examine the impact of ESG-based compensation on future operating earnings.

We find that the relation between ESG-based compensation and future operating earnings is convex. We parse ESG-based compensation into three separate components predicted by firm-specific economic determinants, corporate governance mechanisms, and uncaptured residual component. The positive payoff of ESG-based compensation is predominantly driven by firm-specific economic determinants, which implies that ESG-based compensation reflects efficient contracting. Overall, our analysis suggests that there is a payoff associated with ESG-based compensation, but the incentives need to be large enough to be meaningful.

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Appendix A: Variable Definitions

Dependent Variables	
Operating Earnings	The annual operating income, before R&D expenses and after SGA, of firm scaled by sales ((oiadp+xrd)/sale). Missing values of R&D are set to 0. Data to construct this variable comes from Compustat.
Independent Variables	
ESG Comp	The grant-date dollar value of ESG-based compensation awards to CEOs with vesting provisions calculated using the metric weighing from proxy statements in a given year. Data to construct this variable comes from the firm's annual DEF 14A report.
ESG Metrics	The number of ESG-based performance metrics used in compensation awards to CEOs in a given year.
ESG Comp Prop	The proportion of dollar grant-date value of ESG-based compensation awards to CEOs with vesting provisions calculated using metric weights from proxy statements over the total CEO performance-based compensation in a given year. Data to construct this variable comes from the firm's annual DEF 14A report.
Acct Comp Prop	The proportion of dollar grant-date value of accounting-based compensation awards to CEOs with vesting provisions calculated using metric weights from proxy statements over the total CEO performance-based compensation in a given year. Data to construct this variable comes from the firm's annual DEF 14A report.
Stk Prc Comp Prop	The proportion of dollar grant-date value of stock price-based compensation awards to CEOs with vesting provisions calculated using metric weights from proxy statements over the total CEO performance-based compensation in a given year. Data to construct this variable comes from the firm's annual DEF 14A report.
ESG Absolute	A categorical variable set to 1 if a firm makes ESG-based equity or cash awards with absolute vesting provisions to CEOs in a given year, and 0 otherwise.
ESG Relative	A categorical variable set to 1 if a firm makes ESG-based equity or cash awards with relative vesting provisions to CEOs in a given year, and 0 otherwise.
ESG Cliff	A categorical variable set to 1 if a firm makes ESG-based equity or cash awards with cliff vesting provisions to CEOs in a given year, and 0 otherwise.
ESG Ratable	A categorical variable set to 1 if a firm makes ESG-based equity or cash awards with ratable vesting provisions to CEOs in a given year, and 0 otherwise.
ESG Cash	A categorical variable set to 1 if a firm makes ESG-based cash awards to CEOs in a given year, and 0 otherwise.
ESG Equity	A categorical variable set to 1 if a firm makes ESG-based equity awards to CEOs in a given year, and 0 otherwise.

Appendix A (*continued*)

ESG Environmental	A categorical variable set to 1 if a firm makes ESG-based equity or cash awards with environmental vesting provisions to CEOs in a given year, and 0 otherwise.
ESG Social	A categorical variable set to 1 if a firm makes ESG-based equity or cash awards with social vesting provisions to CEOs in a given year, and 0 otherwise.
ESG Governance	A categorical variable set to 1 if a firm makes ESG-based equity or cash awards with governance vesting provisions to CEOs in a given year, and 0 otherwise.
CEO Delta	The natural logarithm of the sensitivity of the CEO's equity-based portfolio for a one percent change in stock price (Core and Guay 2022). Data to construct this variable comes from Execucomp.
CEO Vega	The natural logarithm of the sensitivity of the CEO's equity-based portfolio for a one-percent change in stock price volatility (Core and Guay 1999, 2002). Data to construct this variable comes from Execucomp.
Assets	The total assets scaled by sales (at/revt). Data to construct this variable comes from Compustat.
R&D Intensity	The research and development expenditure (R&D) scaled by sales (xrd/at). Missing values of R&D are set to 0. Data to construct this variable comes from Compustat.
σ(Operating Earnings)	The standard deviation of annual operating earnings calculated over the prior 5 years scaled by contemporaneous sales ((oiadp+xrd)/sale). Missing values of R&D are set to 0. Data to construct this variable comes from Compustat.
Cash Comp	Is the sum of salary and bonus related to the top 5 executives scaled by sales ((salary+bonus)/sale). We rank the top 5 executives in a firm based on the sum of their salary and bonus in a given year. Data to construct this variable comes from Execucomp and Compustat.
Size	The natural logarithm of sales (ln(revt)). Data to construct this variable comes from Compustat.
Book to Market	The book value of assets scaled by market value of assets (at/(at - ceq + (csho x prcc_f)). Data to construct this variable comes from Compustat.
Cash Constraint	The preceding three-year average of cashflow from investing plus common and preferred dividend less cashflow from operations scaled by total assets ((ivncf + dvc + dvp - oancf)/at). Data to construct this variable comes from Compustat.
Dividend Constraint	A dichotomous variable set to one if retained earnings (re) at the end of year t-1 divided by year t-1's dividends (dvc) is less than two in any of the previous three years, and 0 otherwise. Data to construct this variable comes from Compustat.
Tax Loss Carry Fwd	A dichotomous variable set to one if the firm has a tax loss carry-forward (tlcf) in any of the previous three years, and 0 otherwise. Data to construct this variable comes from Compustat.
Return	The stock market return, constructed as the percent change in stock price (prcc_c). Data to construct this variable comes from Compustat.

Appendix A (*continued*)

Leverage	The ratio of book value of total liabilities to the market value of the firm (dltt / (csho x prcc_f)). Data to construct this variable comes from Compustat.
E index	A measure of entrenchment following Bebchuk et al. (2009) based on 6 corporate governance provisions collected by the Investors Responsibility Research Center: staggered boards, limits to shareholder bylaw amendments, poison pills, golden parachutes, and supermajority requirements for mergers and charter amendments. Since E Index is only available for 1990, 1993, 1995, 1998, 2000, 2002, 2004, and 2006, following Gompers et al. (2001) available E Index from 1990 (1993) is used for 1990 and 1991 (1992 and 1993). E Index from 1995 is used for years 1994, 1995, and 1996. While E Index from 1998 is used for years 1997-1999. E Index from 2002 is used for 2001-2003. And E Index from 2006 is used for 2005. For missing years 2007-2020, we constructed E Index (from IRRC ISS Governance dataset) following the methodology provided in Bebchuk et al. 2009. Data to construct this variable comes from Investors Responsibility Research Center.
CEO Chair	A dichotomous variable that is set to one if the CEO is also the chair of the board of directors, and otherwise 0. Constructed using variables (title) and (titleann) and other character strings "chairman" or "chmn" to identify CEOs who are also Chairman of the Board of Directors. Data to construct this variable comes from Execucomp.
On Board	The proportion of the top 5 executive team that is on the board of directors. Constructed using (execdir) which indicates that the named executive officer served as a director during given year. The top 5 executives in a firm are ranked based on the sum of their salary and bonus in a given year. Data to construct this variable comes from Execucomp.
Interlock Directors	The proportion of top 5 executives that are interlocked in some way with the other directors of the board. Constructed using the variable (interlock) which is defined as (1) The officer serves on the board committee that makes his compensation decisions, (2) The officer serves on the board (and possibly compensation committee) of another company that has an executive officer serving on the compensation committee of the indicated officer's company, and (3) The officer serves on the compensation committee of another company that has an executive officer serving on the board (and possibly compensation committee) of the indicated officer's company. The top 5 executives in a firm are ranked based on the sum of their salary and bonus in a given year. Data to construct this variable comes from ISS Directors.
Board Meetings	The number of meetings held by the board of directors during the year. Data to construct this variable comes from ISS Directors.
Prior Ownership	The proportion of firm's stock holdings held by top 5 executives of the firm. Constructed the total equity compensation of top 5 executives (shrown_excl_opts / (csho x prcc_f)). The top 5 executives in a firm are ranked based on the sum of their salary and bonus in a given year. Data to construct this variable comes from Execucomp.

Appendix B
Excerpts from 2020 DEF 14-A Filing for Kilroy Realty Corporation (Pages 57-58, 61)

Short-Term Incentives

General Description

Our short-term incentives (annual cash bonuses) are based on the annual performance of our Company and each individual's contribution to the annual performance of our Company.

(22) See page 71 for a list of our peers.

During the first quarter of the year, the Compensation Committee approves a performance measurement framework for that year and establishes a target short-term incentive amount for each NEO. This process typically takes place over several months, at multiple meetings of the Compensation Committee and typically involves an on-going dialogue between the Chair of the Compensation Committee and our CEO regarding the plan and outlook for the year. In establishing the performance measurement framework, the Compensation Committee considers the Company's business plan for the year, the Company's bonus goals and actual performance for the completed year, feedback received from stockholders and the discussions between the Chair of the Compensation Committee and our CEO regarding the plan and outlook for the year. The Compensation Committee also receives direct input from management regarding the Company's business plan and the business environment generally and from its independent compensation consultant, Mercer. Mercer is involved throughout the process in advising the Compensation Committee on the general structure of the program, as well as the specific metrics and goals under consideration.

The Compensation Committee selects the performance categories, metrics and goals that it believes will accurately assess the annual performance of the Company and strategic goals. In response to stockholder feedback, the Compensation Committee consolidated the number of performance metrics used for the 2020 annual cash incentive program and continued to apply a weighting of each metric relative to the others, with the weightings varied between each of the executive officers based on the executive's area of responsibility. The weighting produced a maximum bonus opportunity corresponding to each category, thereby further reducing the degree of qualitative judgment applied in determining final payouts. An ESG category was once again included to take into account and incentivize the Company's achievement of carbon neutrality and LEED certifications on new developments and the Company's continued focus on diversity within the Company.

Following the performance year, the Compensation Committee compares the Company's actual performance results to the pre-established goals. The Compensation Committee then rates the Company's performance in each category based on actual operating results against the goals in that category as follows:

- Extraordinary – 150% of target
- Superior – 125% of target
- On Target – 100% of target
- In-Line – 75% of target
- Below Target – 50% of target
- Well Below Target – 0% of target

The Compensation Committee then applies the weighting for each performance goal to determine the Company's overall achievement and potential bonus payout percentages. Like the process in establishing the performance measurement framework each year, the process to rate actual performance against the performance goals and determine the final short-term incentive award amounts typically takes place over several months at multiple meetings of the Compensation Committee. The Compensation Committee's determination on the actual short-term incentive amount paid for each of the NEOs is based on a holistic assessment of results achieved and the business environment for the year, including consideration of the Company's TSR and individual awards may vary based on the Compensation Committee's assessment of each NEO's contributions and achievements. The Compensation Committee engages in discussions with management regarding the Company's business plan for the year, the goals that had been established for the performance measurement framework, actual performance results for the year and the general business environment for the year. The Compensation Committee also receives input from Mercer regarding these matters and our CEO provides the Compensation Committee with input regarding the performance of the NEOs (other than himself). The maximum amount that may be awarded to an NEO is 150% of the NEO's target short-term incentive amount.

Category	Metric	2020 Goals	2020 Performance	Why It Is Important
ESG	We set a goal to maintain and enhance diversity, equity and inclusion in our workforce. We accomplished this in 2020 first by increasing the transparency around our diversity metrics through disclosing increased diversity data to the Bloomberg Gender Equality Index ("Bloomberg GEI"). Bloomberg GEI ultimately selected us for inclusion for the second year in a row in its 2021 Index for our superior diversity, equity and inclusion programs and results. We also increased our employee training on this subject by mandating that all employees complete an unconscious bias training in 2020. We also set a goal of achieving carbon neutral operations by year-end 2020, which we achieved in December 2020. Another key goal was that all new development projects completed in 2020 would be certified LEED Gold or higher. We achieved this goal: 100% of our new development/redevelopment projects completed in 2020 earned LEED Gold or higher. Additionally, we continue to be recognized by various industry groups across the world for our commitment to and leadership position in sustainability. In 2020, for the seventh year in a row, the Company was chosen as the North American office leader in sustainability by GRESB and received NAREIT's Leader in the Light award in the Officer Sector. In 2020, for the fifth year in a row, the Company was awarded the EPA's highest ENERGY STAR honor, Partner of the Year Sustained Excellence, and for the fourth year in a row, the Company was included in the Dow Jones Sustainability World Index. The Company has again received all of the awards and recognitions listed above for 2021 as well.			*We maintain a focus on corporate social responsibility and sustainability. We continuously look for new and better ways to foster a diverse and inclusive work environment, improve employee health and safety, engage our surrounding communities and minimize our environmental impact, all while creating value for our stockholders.*

Appendix C
Excerpts from 2021 DEF 14-A Filling for Tyson Foods, Inc. (Pages vii, 34, and 46)

In addition to the Adjusted Operating Income metric, in fiscal year 2021, the Compensation and Leadership Development Committee approved the inclusion of a "People Goals" modifier to the Executive Incentive Plan to promote and reward behaviors in support of (1) diversity, equity and inclusion, (2) health, safety and wellness and (3) talent development. The table below summarizes the goals within each of these categories:

Goals
Diversity, Equity & Inclusion • Increase favorability on "Inclusion Index" on engagement survey for diverse groups • Greater than 80% of candidate slates considered are diverse
Health, Safety & Wellness • 50% reduction in OSHA recordable rate • 0 fatalities
Talent Development • Increase favorability on Engagement Metrics from engagement survey • Greater than 80% of transforming/rising talent is actively engaged in a leadership development program or with a mentor

HOW PAY IS TIED TO COMPANY PERFORMANCE

Incentive payments under the Company's Annual Incentive Compensation Plan for Senior Executives (the "Executive Incentive Plan") are based on performance measures established by the Compensation and Leadership Development Committee. For fiscal year 2021, the Compensation and Leadership Development Committee selected Adjusted Operating Income, which is operating income adjusted for unusual or unique items, as the performance measure under the Executive Incentive Plan. The Compensation and Leadership Development Committee believes Adjusted Operating Income is an appropriate measure of Company performance to utilize in making performance-based compensation decisions because it is a good indicator of value creation and is used by senior management to evaluate the day-to-day performance of the business. In addition to the Adjusted Operating Income metric, in fiscal year 2021, the Compensation and Leadership Development Committee approved the inclusion of a "People Goals" modifier to the Executive Incentive Plan to promote and reward behaviors in support of (1) diversity, equity and inclusion, (2) health, safety and wellness and (3) talent development. Each of the three above-referenced factors can modify annual incentive payments based on actual Adjusted Operating Income performance by plus or minus 5% of target performance incentive payments, with a total potential impact of plus or minus 15% of target performance incentive payments. A positive modifier applies if we achieve or exceed these goals, and a negative modifier applies if we maintain status quo or see a decrease in these measured goals. Adjusted Operating Income for purposes of incentive payments for fiscal year 2021 was $4.223 billion, which generally resulted in performance incentive payment eligibility for our NEOs at 200% of each of their respective target annual incentive payment amounts. As discussed in greater detail in the section titled "Compensation Discussion and Analysis" in this Proxy Statement, because of mixed results in our achievement of the various "People Goals," no net payout modifier was applied to our NEOs' fiscal year 2021 annual incentive payments.

Appendix C (*continued*)

Grants of Plan-Based Awards During Fiscal Year 2021

The table below provides information on equity and cash-based performance awards granted to each of the Company's NEOs during fiscal year 2021. The equity awards were granted under the Stock Incentive Plan. The cash-based performance awards were granted under the Executive Incentive Plan. More information on plan-based awards is provided in the section titled "Compensation Discussion and Analysis—Elements of Compensation" in this Proxy Statement.

			Estimated Future Payouts Under Non-Equity Incentive Plan Awards(1)			Estimated Future Payouts Under Equity Incentive Plan Awards(2)						
Name	Grant Date	Approval Date	Threshold ($)	Target ($)	Maximum ($)	Threshold (#)	Target (#)	Maximum (#)	All Other Stock Awards: Number of Shares of Stock or Units (#)(2)	All Other Option Awards: Number of Securities Under-lying Options (#)(3)	Exercise or Base Price of Option Awards ($/Sh)(4)	Grant Date Fair Value of Stock and Option Awards ($)(5)
John H. Tyson	11/11/2020	11/11/2020	900,000	1,800,000	3,600,000							
	11/20/2020	11/11/2020				24,695	49,390	98,781				3,000,000
	11/20/2020	11/11/2020							24,695			1,500,000
	11/20/2020	11/11/2020							17,781			1,080,000
	11/20/2020	11/11/2020								134,048	60.74	1,500,000
Donnie King	11/11/2020	11/11/2020	552,500	1,105,000	2,210,000							
	11/20/2020	11/11/2020				11,112	22,225	44,451				1,350,000
	11/20/2020	11/11/2020							11,113			675,000
	11/20/2020	11/11/2020							11,195			680,000
	11/20/2020	11/11/2020								60,322	60.74	675,000
	5/14/2021	2/20/2021							2,664			214,000
	6/2/2021	6/1/2021							9,343			750,000
	6/2/2021	6/1/2021								50,725	80.27	750,000
Stewart Glendinning	11/11/2020	11/11/2020	426,250	852,500	1,705,000							
	11/20/2020	11/11/2020				8,232	16,463	32,927				1,000,000
	11/20/2020	11/11/2020							8,232			500,000
	11/20/2020	11/11/2020							8,643			525,000
	11/20/2020	11/11/2020								44,683	60.74	500,000
Chris Langholz	11/11/2020	11/11/2020	343,750	687,500	1,375,000							
	11/20/2020	11/11/2020				6,585	13,170	26,341				800,000
	11/20/2020	11/11/2020							6,585			400,000
	11/20/2020	11/11/2020							6,174			375,000
	11/20/2020	11/11/2020								35,746	60.74	400,000
Amy Tu	11/11/2020	11/11/2020	371,250	742,500	1,485,000							
	11/20/2020	11/11/2020				7,820	15,640	31,280				950,000
	11/20/2020	11/11/2020							7,820			475,000
	11/20/2020	11/11/2020							7,656			465,000
	11/20/2020	11/11/2020								42,449	60.74	475,000

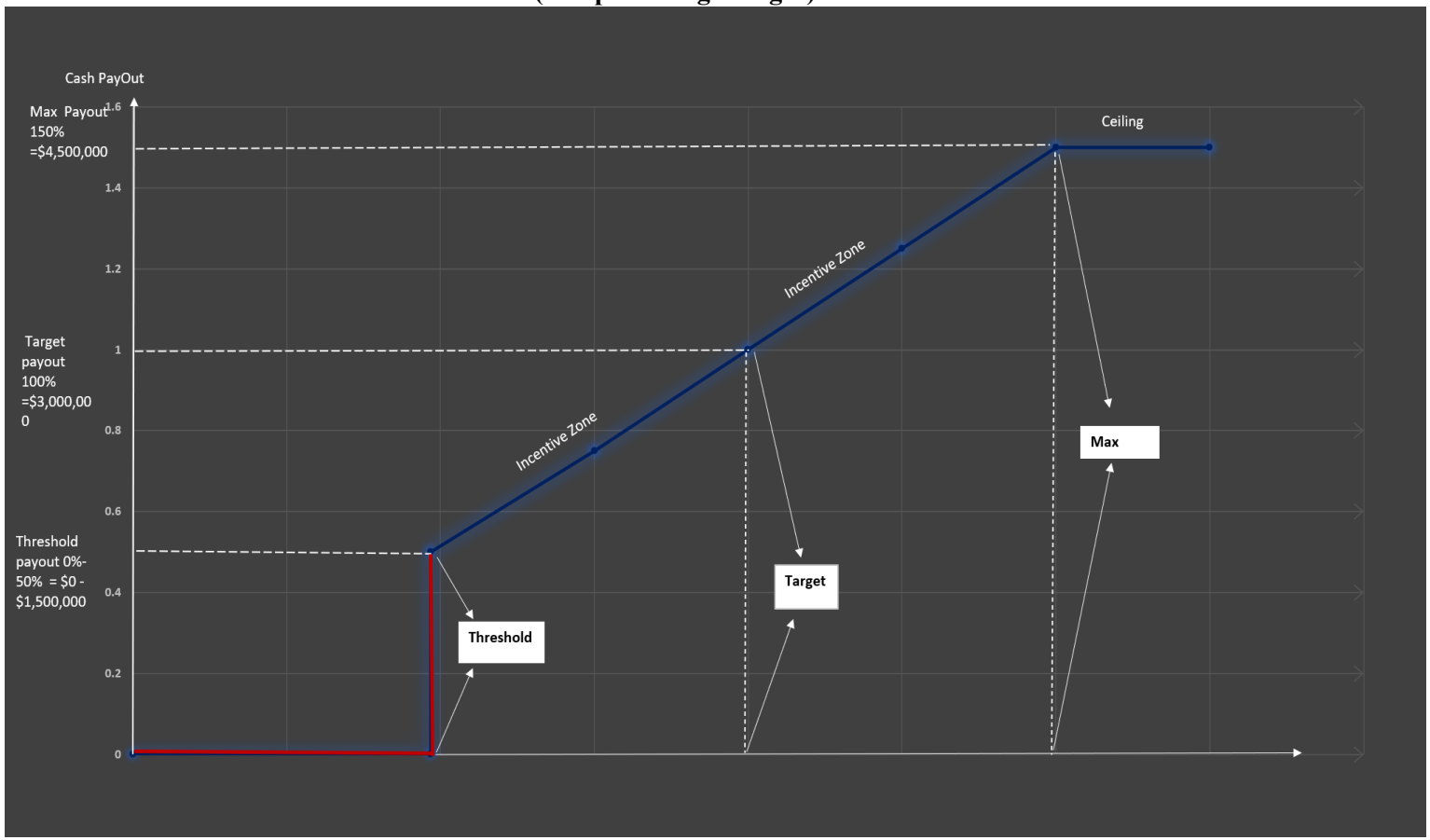
Appendix D

Classification of Environmental, Social, Governance (ESG) Measures (CEOPC ESG)

	"Metric" variable (ISS Incentive Lab database)		
"OtherMetric" variables	**Environmental**	**Social**	**Governance**
	Environmental protection; Climate change; CSR; Energy use; Resource use	**Customer satisfaction; CSR; Product responsibility; Diversity; Labor conditions; Staff health and safety; Society and human rights; Staff relations, engagement, and training**	**Other; CSR**
	sample key words (or variations) used:	**sample key words (or variations) used:**	**sample key words (or variations) used:**
	renewable energy; energy effici*; clean energy; electricity gen*	cust* loyalty; cust* loyal*; nps*; net promoter score;	board relation*; stakeholder engage*; stakehol* relation*
	emission*; greenhouse gas (ghg) emission*; customer emiss*; sulfur dioxide emiss*; air emiss*	csi*; cust* satis* index; client satis*; patient satis*	compliance*; regulatory priori*; regulatory compliance; effi*governance;
	spill rate*; reportable spill*; oil spill*; envir* spills severity rate	product quality; approv* of new prod*; warrant*; service qual*; qual* perf*	ethics*; ethical*; ethical train*; ethical conduct; ethics and compliance; compliance require*
	conservation*; sustainable*; envi* stewardship*;	employee* perf*; emp* objec*; ind* objec*; exec*perf*	financial controls; sox compliance; sox implementation; timely financial reporting
	water, wastewater manage*; wastewater compli*; drinking water quali* saltwater disposal;	talent*; tal* manage*; tal* reten*; staff* reten*; leader* develop*; workfor* manage*; human resource*	anti-corruption; zero anti-corruption violation
	wind* develop*; air*; solar*; wildfire polici*; wildfire mitigation* climate score*;	safety; osha record* inci*; trir; tot* recor* inci*rate; injuries; zero injur*; staff health and safety; hse; healt* saf* env*; emp* healt*	audits; internal controls; internal audits; regulatory audits; clean audits; audit committee; audit committee independ*
	coal*; nuclear power*; fossil* generation*	succession* plan*; peop* deve*; peop* engag*	compensation committee; workers comp* claim*
	carbon*; carbon neutrality*; carbon dioxide (co2) emiss*	diversity; inclusion; dei; diverse hire*; diverse leaders	risk manage*; governance; risk and control
	gas leak*; gas damage preven*; environ* compliance*	society*; community*; comm* develop*; commu involve*	

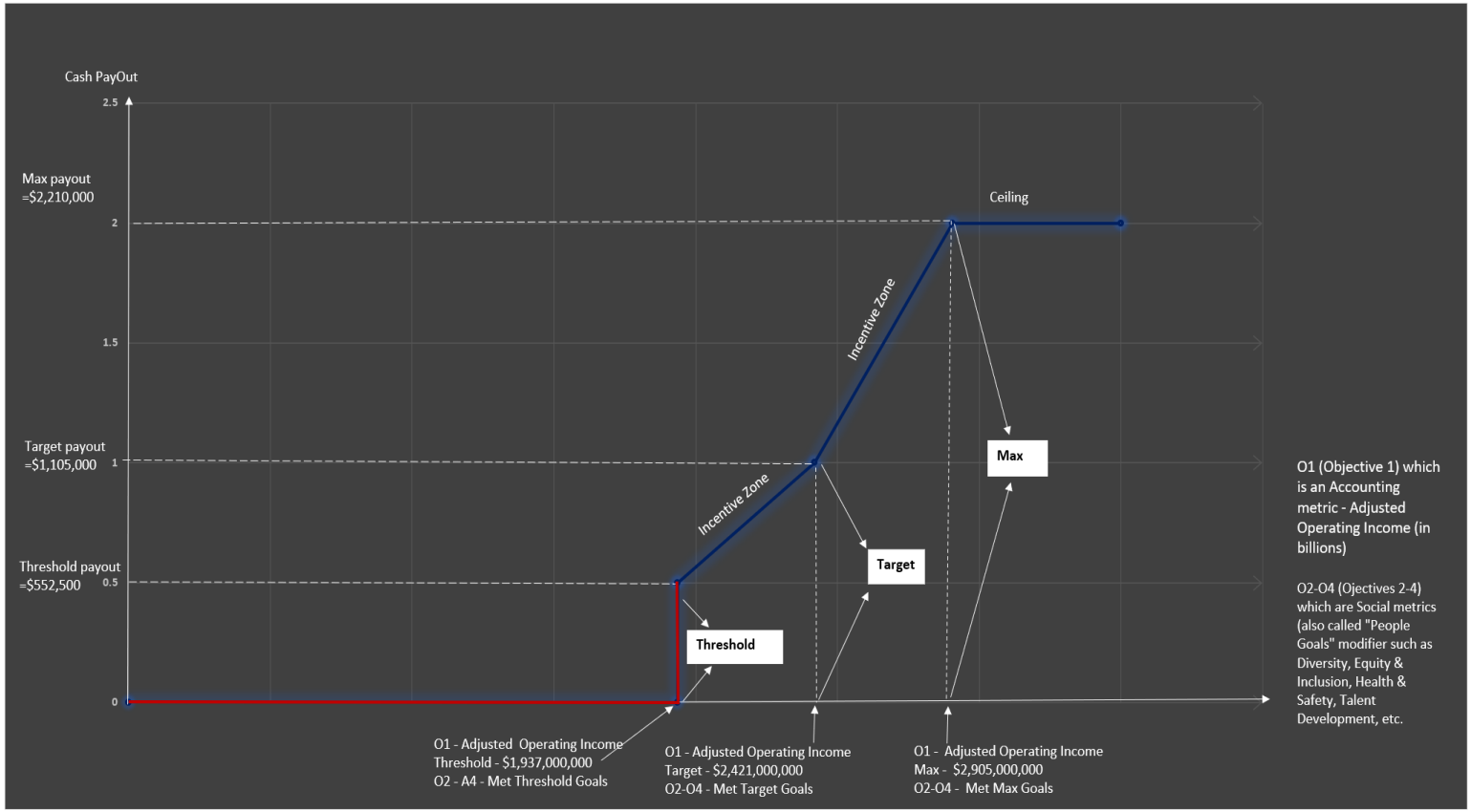
Notes: This appendix provides detail on the construction of one of the main variables of interest (*CEOPC ESG*), following the methodology outlined in Philip et al. (2023), we utilize three key variables from the IL database: "metric type", "metric," and "other metric". The broadest category, "metric type," captures high-level information such as "Environment," "CSR," or "Social," while the "metric" field provides further details such as "climate change" or "staff health and safety," and the "other metric" field offers additional specifics, such as "reduction in greenhouse gas emissions" or "10% reduction in OSHA recordable rate". Since there are many variations in the "other metric", we use a wildcard ("*") to denote strings following it. We use the following sources for classification: (1) Environmental, Social & Governance: What's it all about? by PWC (2021) at https://www.pwc.com/mt/en/publications/sustainability/esg-what-is-it-all-about.htmland and (2) Lins, Servaes, and Tamayo (2017), for more details on CSR related categories that map into ESG. When details provided in the "metric type," "metric" or "other metric" are insufficient to classify a metric unambiguously, those metrics are not included in the calculation.

Figure 1
Performance-based Grant with ESG Metrics (as a percentage weight)



Notes: This figure outlines a performance-based cash grant paid to Mr. John Kilroy, CEO of Kilroy Realty Corporation. The target payout of this grant is $3,000,000 which vests based on the firm achieving 13 different predetermined performance goals over a one-year period. These performance goals include several ESG goals such as maintaining and enhancing diversity, equity, and inclusion (DEI) in their workforce, achieving carbon neutral operations, meeting Environmental Protection Agency (EPA) standards. In addition to these ESG goals, the firm also has to meet several financial metrics, such as adjusted Funds from Operation (FFO) per share, debt to EBITDA ratio, equity financing, and debt financing. The Compensation Committee evaluates the firm's actual performance in each category against the preset goals and accesses each executive's individual contribution to the actual performance. Based on this assessment, payouts are allocated according to six criteria: 1) extraordinary (150 percent of target), 2) superior (125 percent of target), 3) on target (100 percent of target), 4) in-line (75 percent of target), 5) below target (50 percent of target), and 6) well below target (0 percent of target). Each performance metric is assigned a specific weighting, which the committee uses to calculate the final payout. For this particular grant, ESG goals accounts for 15 percent of the total grant payout, which is equivalent to $450,000 calculated as $3,000,000*0.15, where $3,000,000 is total grant dollar value and 0.15 is the performance weighting for ESG goals, provided in the proxy statement (DEF 14A filing). Please refer to Appendix B for excerpts from annual proxy statement for details of this grant.

Figure 2
Performance-based Grant with ESG Metrics (as a modifier)



Notes: This figure reports a performance-based cash grant given to Mr. Donnie King, President and CEO of Tyson Food Inc., in 2021. This grant vests contingent on the firm meeting an accounting performance objective and three different ESG metrics over a one-year performance period. The main accounting objective (O1) is based on adjusted operating income. In addition to adjusted operating income metric, the Compensation Committee includes three ESG goals (referred to as "People Goals" modifier (O2-O4) in the proxy statement): 1) diversity, equity, and inclusion, 2) health, safety, and wellness and 3) talent development. Each of these three ESG metrics modify the actual payout by plus or minus 5 percent of the performance incentive payout, therefore the maximum weighting (positive or negative adjustment) of ESG metrics in this grant is 15 percent. A positive modifier of 15 percent is applied if the company meets or exceeds their ESG goals, while a negative modifier of 15 percent is applied if the company maintains a status quo or sees a decrease in these ESG goals. The potential impact on payout based on meeting or not meeting the ESG goals is $165,750 which is calculated as $1,105,000*0.15, where $1,105,000 is grant target dollar value and 0.15 is the performance weighting for ESG goals. Please refer to Appendix C for excerpts from annual proxy statement for details on this grant.

Table 1

Panel A: Sample Reconciliation

Observations in ISS Incentive Lab database	10,131
Less observations that could not be merged with the following databases:	
Compustat	(20)
Execucomp	(347)
CRSP	(331)
ISS Directors	(1,262)
Compustat Business Segment	(294)
Final sample (firm-year observations)	**7,877**
Unique firms (GVKEYs) in the sample	**473**

Panel B: Firm-Year Distribution

Year	Freq.	Percent	Cum	Year	Freq.	Percent	Cum
1998	221	2.81	2.81	2010	359	4.56	47.66
1999	235	2.98	5.79	2011	367	4.66	52.32
2000	250	3.17	8.96	2012	376	4.77	57.09
2001	269	3.42	12.38	2013	385	4.89	61.98
2002	258	3.28	15.65	2014	394	5.00	66.98
2003	275	3.49	19.14	2015	394	5.00	71.98
2004	283	3.59	22.74	2016	415	5.27	77.25
2005	289	3.67	26.41	2017	433	5.50	82.75
2006	301	3.82	30.23	2018	437	5.55	88.30
2007	319	4.05	34.28	2019	453	5.75	94.05
2008	345	4.38	38.66	2020	469	5.95	100.00
2009	350	4.44	43.10	**Total**	**7,877**		**100.00**

Panel C: Firm-Year Industry Distribution

Two Sic Industry No.	Industry	Freq.	Percent
73	Business Services	759	9.64
49	Electric, Gas, & Sanitary Services	670	8.51
38	Instruments & Related Products	644	8.18
28	Chemical & Allied Products	620	7.87
36	Electronic & Other Electrical Equipment	430	5.46
35	Industrial Machinery & Equipment	421	5.34
63	Insurance Carriers	415	5.27
67	Holding And Other Investment Offices	359	4.56
20	Food & Kindred Products	348	4.42
13	Oil & Gas Extraction	255	3.24
62	Security & Commodity Brokers & Services	239	3.03
37	Transportation Equipment	225	2.86
-	Other Industries	2492	31.62
Total		**7,877**	**100.00**

Notes: This table reports the reconciliation of the S&P 500 firms sample comprised of firm-year observations over the period of 1998 to 2020 (Panel A), the year distribution (Panel B), and the industry distribution (Panel C). Industry categories are based on the two-digit SIC industry classification.

Table 2

Panel A: Descriptive Statistics

Variables	N	Mean	Median	Std. Dev	Q1	Q3
Operating Earnings$_{it}$	7877	0.2097	0.1757	0.1429	0.0637	0.4256
ESG Comp$_{it}$ ($)	7877	81,933	0.0000	300,101	0.0000	207,000
ESG Comp Prop$_{it}$	7877	0.0131	0.0000	0.0428	0.0000	0.0417
Acct Comp Prop$_{it}$	7877	0.3545	0.2187	0.3773	0.0000	1.0000
Stk Prc Comp Prop$_{it}$	7877	0.1398	0.0000	0.2604	0.0000	0.5699
CEO Delta$_{it-1}$	7861	6.2700	6.2651	1.4969	4.5120	8.0383
CEO Vega$_{it-1}$	7861	3.7886	4.6672	2.4693	0.0000	6.3896
Assets$_{it-1}$	7877	2.5932	1.4772	3.4755	0.5791	5.2191
R&D Intensity$_{it-1}$	7877	0.0358	0.0000	0.0687	0.0000	0.1323
σ(Operating Earnings)$_{it-1}$	7863	0.0356	0.0196	0.0526	0.0058	0.0734
Cash Comp$_{it-1}$	7863	0.0011	0.0006	0.0016	0.0001	0.0027
Size$_{it-1}$	7877	8.8612	8.8796	1.3990	7.0339	10.7247
Book to Market$_{it-1}$	7865	0.5719	0.5623	0.2471	0.2419	0.9236
Cash Constraint$_{it-1}$	7832	-0.1676	-0.1571	0.1011	-0.3007	-0.0477
Dividend Constraint$_{it-1}$	7877	0.1299	0.0000	0.3362	0.0000	1.0000
Tax Loss Carry Fwd$_{it-1}$	7877	0.4738	0.0000	0.4993	0.0000	1.0000
Return$_{it}$	7868	0.1025	0.0908	0.3286	-0.2985	0.4787
Leverage$_{it-1}$	7799	0.3609	0.2013	0.4912	0.0113	0.8451
E Index$_{it-1}$	7877	0.7946	1.0000	0.4040	0.0000	1.0000
CEO Chair$_{it-1}$	7877	0.7547	1.0000	0.4303	0.0000	1.0000
On Board$_{it-1}$	7863	0.3454	0.4000	0.1653	0.2000	0.6000
Interlock Directors$_{it-1}$	7863	0.0032	0.0000	0.0249	0.0000	0.0000
Board Meetings$_{it-1}$	6890	1.2563	1.0000	1.7326	1.0000	1.0000
Prior Ownership$_{it-1}$	7854	0.0005	0.0001	0.0013	0.0000	0.0009

Panel B: Correlation Matrix for Baseline Estimation Variables

	Operating Earnings$_{it}$	ESG Comp Prop$_{it, t-3}$	(ESG Comp Prop$_{it, t-3}$)^2	CEO Delta$_{it-1}$	Assets$_{it-1}$	R&D Intensity$_{it, t-3}$
Operating Earnings$_{it}$	1.0000					
ESG Comp Prop$_{it, t-3}$	0.0123	1.0000				
(ESG Comp Prop$_{it, t-3}$)^2	**0.0269**	**0.9095**	1.0000			
CEO Delta$_{it-1}$	**0.0960**	**-0.0690**	**-0.0426**	1.0000		
Assets$_{it-1}$	**0.2816**	**0.0272**	**0.0209**	**-0.0362**	1.0000	
R&D Intensity$_{it, t-3}$	**0.5154**	0.0104	**0.0322**	**0.0614**	**-0.0898**	1.0000

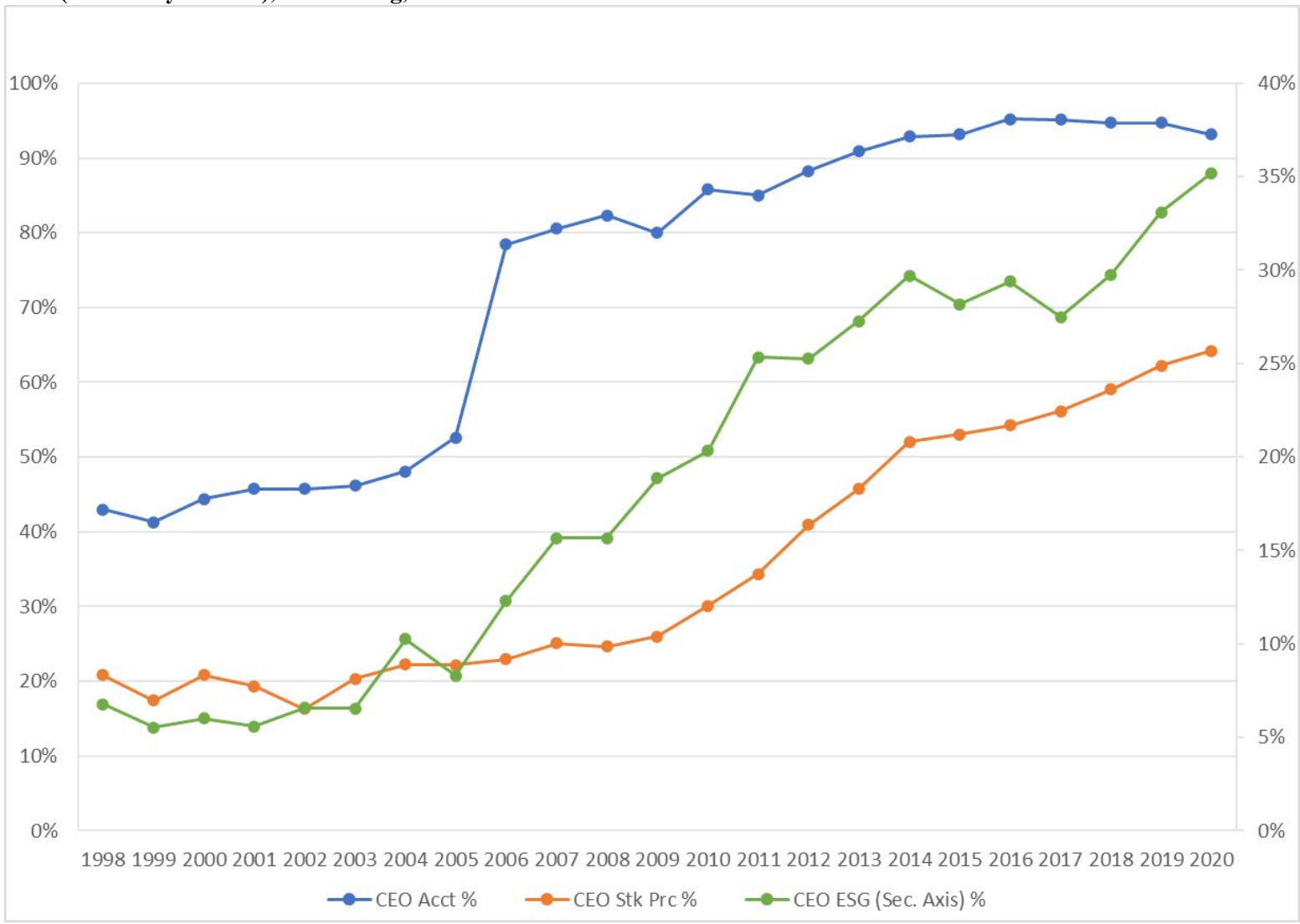
Notes: This table reports descriptive statistics of firm-year observations over the period 1998 to 2020 (Panel A) and the pairwise Pearson correlation matrix between the dependent and independent variables of interest used in the baseline estimation models where numbers in bold are statistically significant at 10% or better (Panel B). All variables are defined in detail in Appendix A. We winsorize continuous variables at the 1st and 99th percentile to avoid the effects of outliers.

Table 3
ESG-, Accounting-, and Stock Price-based Awards to CEOs over the Years

	Firms that Grant Awards to CEO's:			% of Firms that Grant Awards to CEOs:			Total Firm-Years
Year	ESG-based Awards	Accounting-based Awards	Stock Price-based Awards	ESG-based Awards	Accounting-based Awards	Stock Price-based Awards	Total-based Awards
1998	15	95	46	7%	43%	21%	221
1999	13	97	41	6%	41%	17%	235
2000	15	110	52	6%	44%	21%	250
2001	15	123	52	6%	46%	19%	269
2002	17	118	42	7%	46%	16%	258
2003	18	127	56	7%	46%	20%	275
2004	29	136	63	10%	48%	22%	283
2005	24	152	64	8%	53%	22%	289
2006	37	236	69	12%	78%	23%	301
2007	50	257	80	16%	81%	25%	319
2008	54	284	85	16%	82%	25%	345
2009	66	280	91	19%	80%	26%	350
2010	73	308	108	20%	86%	30%	359
2011	93	312	126	25%	85%	34%	367
2012	95	332	154	25%	88%	41%	376
2013	105	350	176	27%	91%	46%	385
2014	117	366	205	30%	93%	52%	394
2015	111	367	209	28%	93%	53%	394
2016	122	395	225	29%	95%	54%	415
2017	119	412	243	27%	95%	56%	433
2018	130	414	258	30%	95%	59%	437
2019	150	429	282	33%	95%	62%	453
2020	165	437	301	35%	93%	64%	469
Tot/Avg	**1,633**	**6,137**	**3,028**	**21%**	**78%**	**38%**	**7,877**

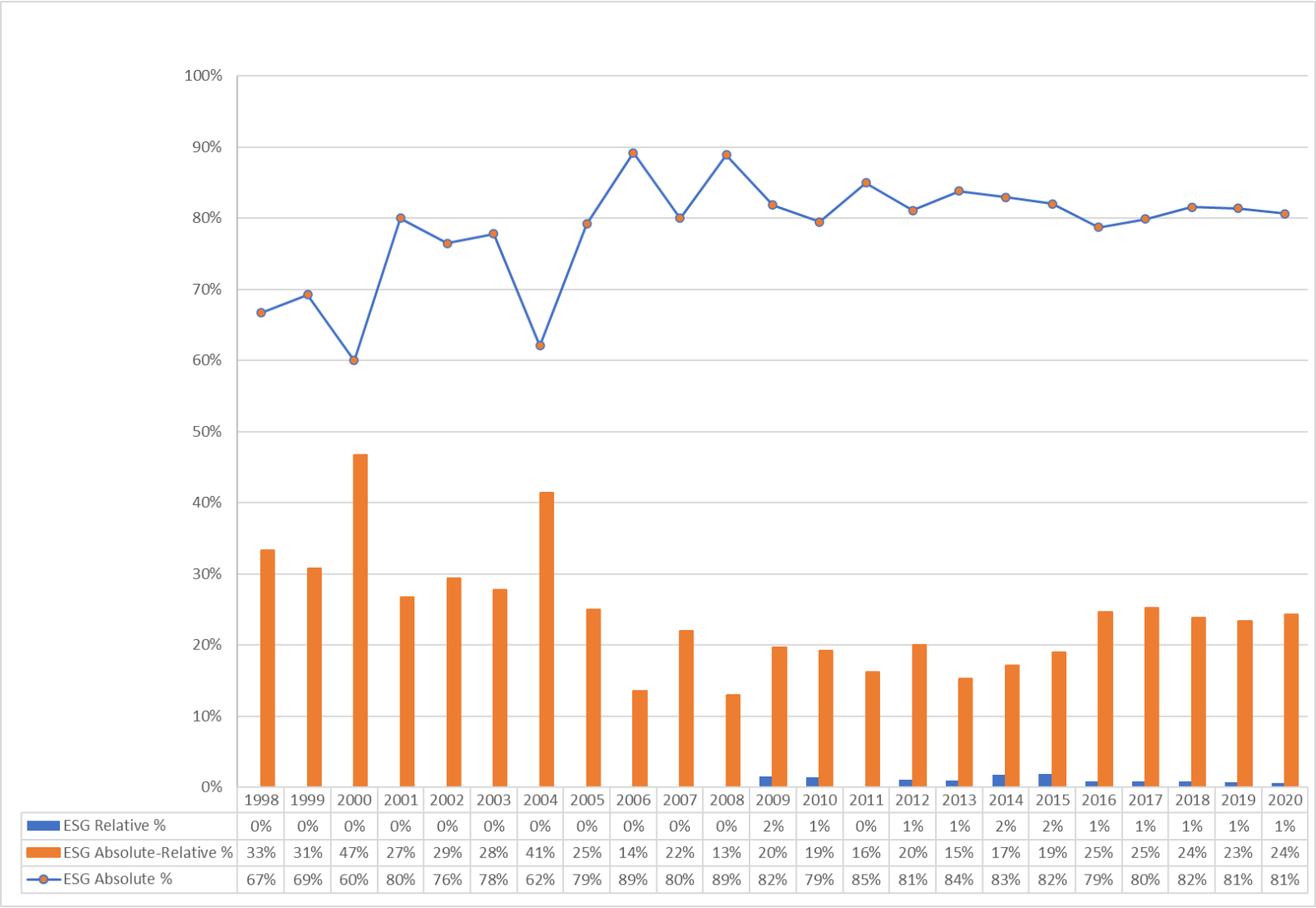
Notes: This table reports firm-year distribution of CEO ESG-based awards. ESG (includes environmental, social, governance, or CSR-based awards) and accounting (includes earnings and sales-based) awards. Stock price primarily includes total shareholder return (TSR) metrics. This full sample consists of 473 unique S&P 500 firms over the period of 1998 to 2020. Some firms grant more than one type of award in a given year.

Figure 3
ESG (Secondary Axis %), Accounting, and Stock Price-based Awards to CEOs Over Time



Notes: This figure reports the ESG (secondary axis %), accounting, and stock price-based awards to CEOs over time. ESG includes environmental, social, and governance, or CSR-based awards, while accounting includes earnings and sales-based awards, and stock price primarily includes metrics based on total shareholder return (TSR). The full sample consists of 473 unique S&P 500 firms over the period of 1998 to 2020. Some firms grant more than one type of award in a given year.

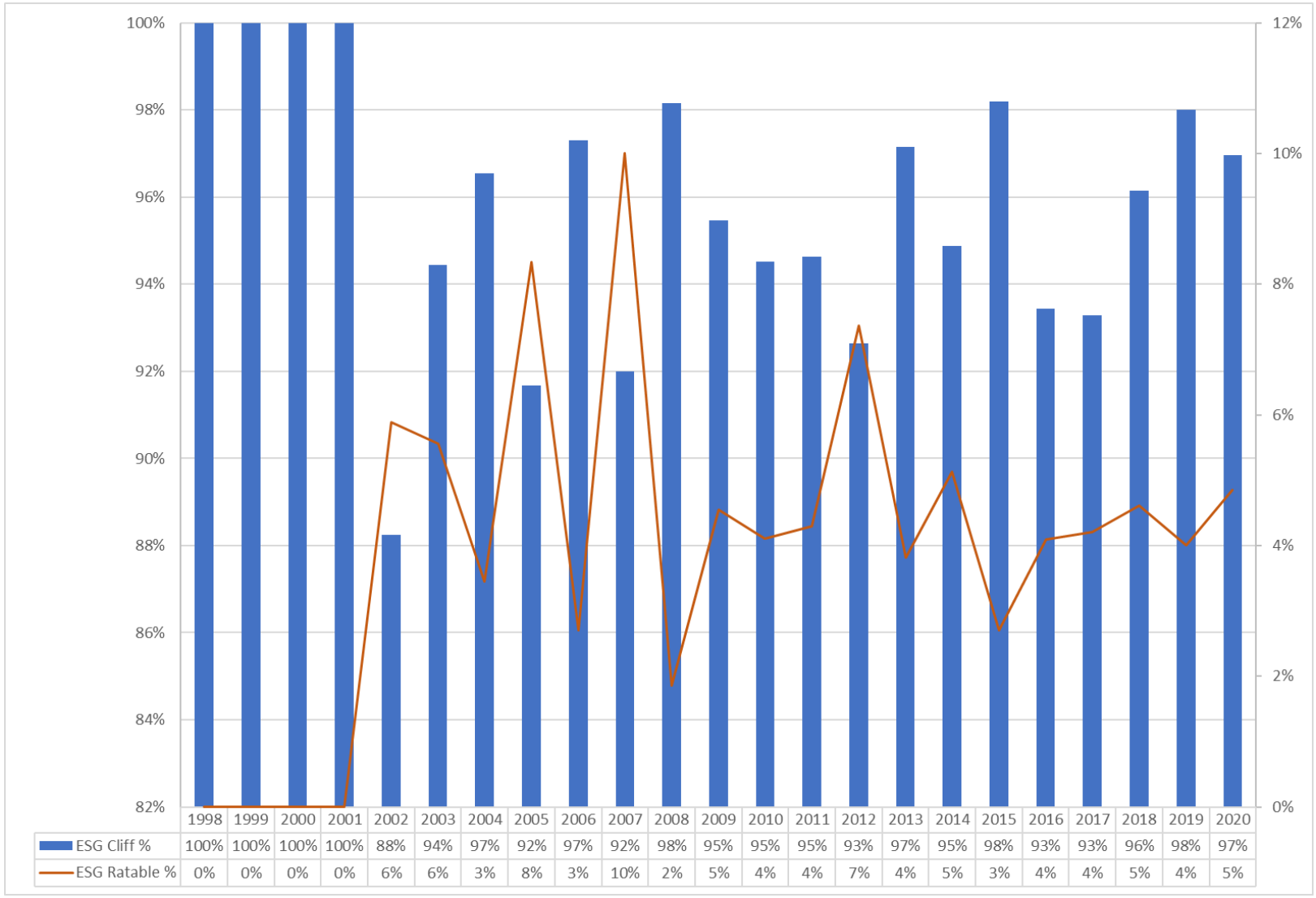
Figure 4
ESG-based Absolute, Relative, or Absolute-Relative Awards to CEOs Over Time



	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
ESG Relative %	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	1%	0%	1%	1%	2%	2%	1%	1%	1%	1%	1%
ESG Absolute-Relative %	33%	31%	47%	27%	29%	28%	41%	25%	14%	22%	13%	20%	19%	16%	20%	15%	17%	19%	25%	25%	24%	23%	24%
ESG Absolute %	67%	69%	60%	80%	76%	78%	62%	79%	89%	80%	89%	82%	79%	85%	81%	84%	83%	82%	79%	80%	82%	81%	81%

Notes: This figure reports the firm-year distribution of ESG-based absolute, relative, and absolute-relative awards to CEOs. Some firms make more than one type of grants in a given year. Absolute awards are performance-based grants that vest contingent on a firm meeting an absolute (firm-specific) performance metric (such as 10% reduction in OSHA recordable rate) while relative awards vest based on a firm's performance relative to its industry or peer-firms. Absolute-relative awards use a combination of absolute and relative vesting provisions in the same grant.

Figure 5
ESG-based Cliff and Ratable Awards to CEOs Over Time



	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
ESG Cliff %	100%	100%	100%	100%	88%	94%	97%	92%	97%	92%	98%	95%	95%	95%	93%	97%	95%	98%	93%	93%	96%	98%	97%
ESG Ratable %	0%	0%	0%	0%	6%	6%	3%	8%	3%	10%	2%	5%	4%	4%	7%	4%	5%	3%	4%	4%	5%	4%	5%

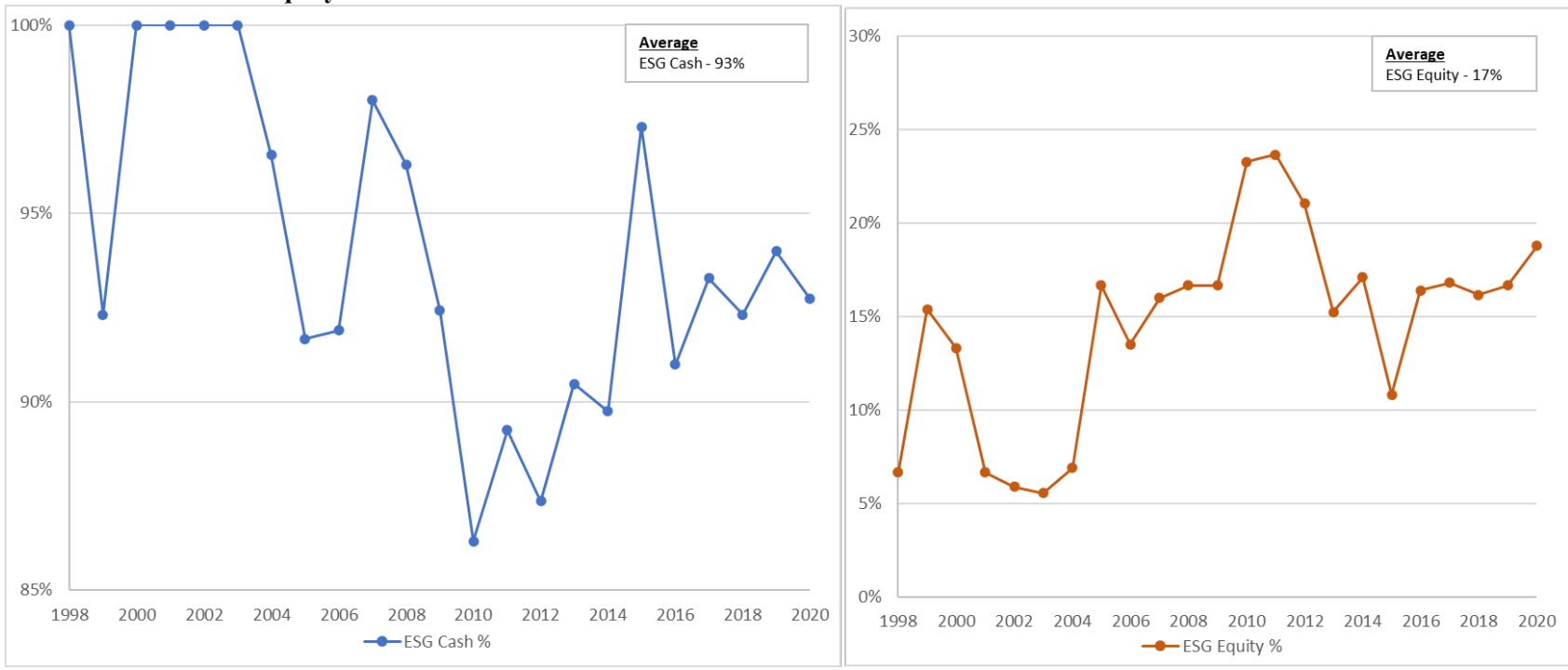
Notes: This figure reports the firm-year distribution of ESG-based cliff and ratable awards to CEOs. Cliff awards are performance-based grants that vest all at once as soon as the performance goal is met, while ratable grants vest uniformly over a period.

Table 4
ESG-based Cash and Equity Awards to their CEOs Over Time

	Firms that Grant:		% of Firms that Grant:		Total Firm-Years
Year	ESG-based Cash Awards to their CEOs	ESG-based Equity Awards to their CEOs	ESG-based Cash Awards to their CEOs	ESG-based Equity Awards to their CEOs	Total ESG-based Awards to CEOs
1998	15	1	100%	7%	15
1999	12	2	92%	15%	13
2000	15	2	100%	13%	15
2001	15	1	100%	7%	15
2002	17	1	100%	6%	17
2003	18	1	100%	6%	18
2004	28	2	97%	7%	29
2005	22	4	92%	17%	24
2006	34	5	92%	14%	37
2007	49	8	98%	16%	50
2008	52	9	96%	17%	54
2009	61	11	92%	17%	66
2010	63	17	86%	23%	73
2011	83	22	89%	24%	93
2012	83	20	87%	21%	95
2013	95	16	90%	15%	105
2014	105	20	90%	17%	117
2015	108	12	97%	11%	111
2016	111	20	91%	16%	122
2017	111	20	93%	17%	119
2018	120	21	92%	16%	130
2019	141	25	94%	17%	150
2020	153	31	93%	19%	165
Total/Average	**1,511**	**271**	**93%**	**17%**	**1,633**

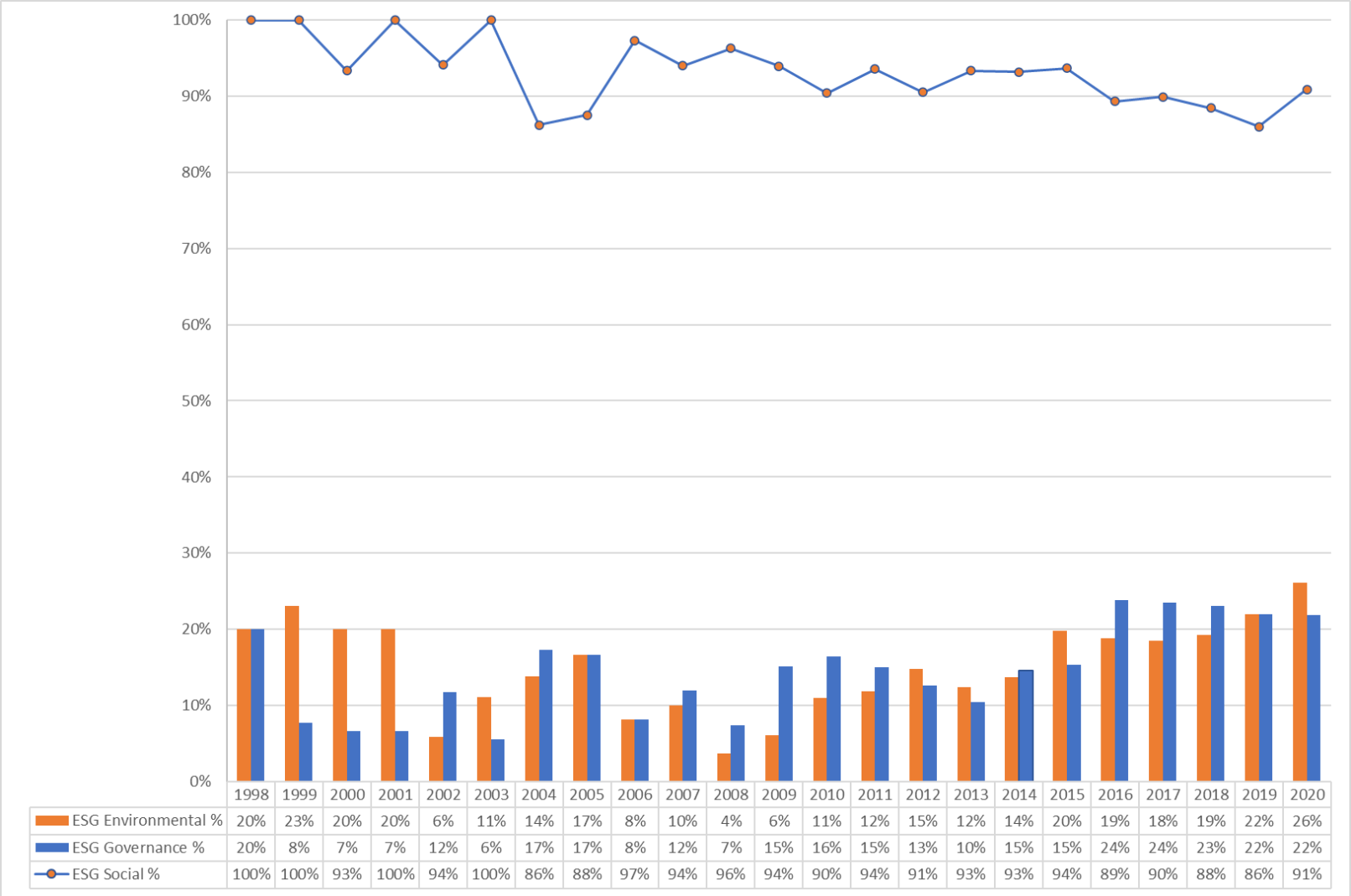
Notes: This table reports firm-year distribution of ESG-based cash and equity awards (equity awards include stock and option awards) to CEOs. Some firms grant more than one type of award in a given year.

Figure 6
ESG-based Cash and Equity Awards to CEOs Over Time



Notes: This figure reports firm-year distribution of ESG-based cash and equity awards (equity awards include stock and option awards) to CEOs. Some firms grant more than one type of award in a given year. On average, 93% of sample firms award ESG grants in the form of cash, while only 17% of the sample firms award ESG grants in equity.

Figure 7
ESG-based Environmental, Social, or Governance Awards to CEOs Over Time



	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
ESG Environmental %	20%	23%	20%	20%	6%	11%	14%	17%	8%	10%	4%	6%	11%	12%	15%	12%	14%	20%	19%	18%	19%	22%	26%
ESG Governance %	20%	8%	7%	7%	12%	6%	17%	17%	8%	12%	7%	15%	16%	15%	13%	10%	15%	15%	24%	24%	23%	22%	22%
ESG Social %	100%	100%	93%	100%	94%	100%	86%	88%	97%	94%	96%	94%	90%	94%	91%	93%	93%	94%	89%	90%	88%	86%	91%

Notes: This figure reports the firm-year distribution of ESG-based environmental, social, and governance awards to CEOs. Some firms grant more than one type of award in a given year. On average 91 percent of sample firms grant ESG Social-based awards while only 16 percent of the sample firms grant ESG Environmental-based awards and 17 percent of the sample firms grant ESG Governance-based awards.

Table 5

Panel A: CEO ESG-based Awards Characteristics

	Full Sample				Restricted Sample (ESG-based Award = 1)			
Variables	**N**	**Mean**	**Median**	**Std. Dev**	**N**	**Mean**	**Median**	**Std. Dev**
ESG $Comp_{it}$	7877	$81,933	$0	$300,101	1633	$395,217	$194,400	$557,440
ESG $Metrics_{it}$	7877	0.5262	$0.0000	$1.3695	1633	2.5383	2.0000	1.9852
ESG $Comp\ Prop_{it}$	7877	0.0131	$0.0000	$0.0428	1633	0.0634	0.0395	0.0751
ESG $Environmental_{it}$	7877	0.0339	$0.0000	$0.1810	1633	0.1635	0.0000	0.3699
ESG $Social_{it}$	7877	0.1897	$0.0000	$0.3921	1633	0.9149	1.0000	0.2791
ESG $Governance_{it}$	7877	0.0355	$0.0000	$0.1852	1633	0.1715	0.0000	0.3770

Panel B: Magnitude of ESG-based Awards to CEOs Over Time

	Full Sample		Restricted Sample (ESG-based Award = 1)	
Year	**Dollar Value of ESG-based Awards to CEOs Calculated Using Metric Weights**	**Dollar Value of ESG-based Awards Over Total Performance-based Awards to CEOs**	**Dollar Value of ESG-based Awards to CEOs Calculated Using Metric Weights**	**Dollar Value of ESG-based Awards Over Total Performance-based Awards to CEOs**
(1)	(2)	(3)	(4)	(5)
1998	$1,495.86	0.1%	$22,039.07	1.9%
1999	$565.15	0.1%	$10,216.12	1.3%
2000	$1,086.78	0.1%	$18,112.94	2.3%
2001	$584.67	0.1%	$10,485.00	1.0%
2002	$1,796.73	0.1%	$27,268.04	2.1%
2003	$2,960.58	0.1%	$45,231.00	2.2%
2004	$11,396.63	0.4%	$111,215.30	3.6%
2005	$12,370.51	0.3%	$148,961.60	3.3%
2006	$27,862.86	0.8%	$226,668.10	6.3%
2007	$45,433.51	1.2%	$289,865.80	7.4%
2008	$49,797.84	1.2%	$318,152.90	7.6%
2009	$50,322.08	1.2%	$266,859.50	6.2%
2010	$53,650.91	1.4%	$263,844.90	6.9%
2011	$94,601.77	1.9%	$373,320.90	7.4%
2012	$93,488.13	1.8%	$370,016.20	7.0%
2013	$93,449.47	1.8%	$342,648.10	6.5%
2014	$105,813.50	1.7%	$356,329.10	5.8%
2015	$110,984.60	1.6%	$393,945.40	5.8%
2016	$142,383.10	1.9%	$484,335.90	6.3%
2017	$140,668.50	1.8%	$511,844.20	6.7%
2018	$160,564.40	2.1%	$539,743.40	7.2%
2019	$184,913.10	2.4%	$558,437.60	7.2%
2020	$201,039.90	2.4%	$571,440.70	6.9%
Tot/Avg	**$81,933.40**	**1.3%**	**$395,217.00**	**6.3%**

Notes: This table reports the characteristics of CEO ESG-based awards (Panel A) and the magnitude of these awards (Panel B) over time for both the full sample and a restricted sample (where ESG-based awards=1). In Panel A, we report the characteristics of ESG-based awards including the dollar value of ESG-based compensation, the number of ESG metrics used, the proportion of ESG compensation relative to total performance-based compensation, and the presence of environmental, social, and governance metrics within these awards. Panel B reports the dollar values, and the percentage of ESG-based awards granted to CEOs. Columns 2 and 3 report the dollar value and percentages of CEO ESG-based awards calculated using metric weights from annual proxy statements for the full sample. While Columns 4 and 5 present the dollar value and percentages of CEO ESG-based awards restricted to firms where ESG-based awards are actually granted (i.e., ESG-based awards=1).

Table 6
Panel A: Baseline Estimation - ESG-based Compensation on Operating Earnings

Dependent Variable	***Operating Earnings$_{it}$***		
	(1)	(2)	(3)
Independent Variables	*Full sample*	*Full sample*	*Restricted Sample ESG Comp Prop > 0*
ESG Comp Prop$_{it}$	-0.1764	-0.3057	***0.7966****
	(0.5409)	(0.2903)	***(0.0475)***
ESG Comp Prop$_{it-1}$	***-0.5055*****	***-0.5683*****	***-0.4855****
	(0.0091)	***(0.0034)***	***(0.0721)***
ESG Comp Prop$_{it-2}$	***-0.3628****	***-0.4037****	0.2161
	(0.0607)	***(0.0399)***	(0.4525)
ESGComp_PVComp$_{it-3}$	-0.2306	-0.2980	-0.2917
	(0.2893)	(0.1667)	(0.2714)
(ESG Comp Prop)$^2_{it}$	3.0303	3.8882	-2.7430
	(0.2327)	(0.1215)	(0.3220)
(ESG Comp Prop)$^2_{it-1}$	***5.7811*****	***6.2952*****	***6.5159*****
	(0.0007)	***(0.0002)***	***(0.0037)***
(ESG Comp Prop)$^2_{it-2}$	***3.4515****	***3.7591****	-2.3369
	(0.0533)	***(0.0359)***	(0.3489)
(ESG Comp Prop)$^2_{it-3}$	2.3130	2.7035	2.1867
	(0.2378)	(0.1621)	(0.2689)
Acct Comp Prop$_{it}$		-0.0019	-0.0219
		(0.9316)	(0.7218)
Acct Comp Prop$_{it-1}$		0.0135	***0.0992****
		(0.3037)	***(0.0270)***
Acct Comp Prop$_{it-2}$		-0.0028	0.0070
		(0.8506)	(0.8689)
Acct Comp Prop$_{it-3}$		0.0171	0.0512
		(0.3672)	(0.2654)
(Acct Comp Prop)$^2_{it}$		-0.0071	0.0101
		(0.7358)	(0.8637)
(Acct Comp Prop)$^2_{it-1}$		-0.0227	***-0.1266*****
		(0.1008)	***(0.0069)***
(Acct Comp Prop)$^2_{it-2}$		-0.0004	-0.0175
		(0.9806)	(0.6848)
(Acct Comp Prop)$^2_{it-3}$		-0.0193	-0.0373
		(0.3233)	(0.4673)
Stk Prc Comp Prop$_{it}$		***0.0743****	0.0046
		(0.0103)	(0.9374)
Stk Prc Comp Prop$_{it-1}$		-0.0077	-0.0194
		(0.7085)	(0.7391)
Stk Prc Comp Prop$_{it-2}$		-0.0008	-0.0293
		(0.9647)	(0.5224)
Stk Prc Comp Prop$_{it-3}$		-0.0242	0.0041
		(0.3639)	(0.9443)
(Stk Prc Comp Prop)$^2_{it}$		***-0.0727****	-0.0569
		(0.0202)	(0.4856)
(Stk Prc Comp Prop)2$_{it-1}$		0.0137	0.0053
		(0.5362)	(0.9322)
(Stk Prc Comp Prop)$^2_{it-2}$		0.0049	0.0129
		(0.8166)	(0.7945)
(Stk Prc Comp Prop)$^2_{it-3}$		0.0078	0.0121
		(0.7945)	(0.8487)
CEO Delta$_{it-1}$	0.0104***	0.0110***	0.0074
	(0.0003)	(0.0001)	(0.2008)

Table 6 (*continued*)

CEO $Vega_{it-1}$	-0.0044***	-0.0043**	-0.0013
	(0.0073)	(0.0110)	(0.5719)
$Assets_{it-1}$	0.0129***	0.0125***	0.0144***
	(0.0000)	(0.0000)	(0.0000)
Σ R&D $Intensity_{it, t-3}$	1.1994***	1.1845***	1.5196***
	(0.0000)	(0.0000)	(0.0000)
σ(Operating $Earnings)_{it-1}$	-0.1415	-0.1501	-0.1267
	(0.2791)	(0.2520)	(0.1951)
Σ First & Second Order Terms			
Σ ESG Comp $Prop_{it,t-3}$	***-1.2753****	***-1.5757****	***0.2355****
	(0.0744)	***(0.0343)***	***(0.0407)***
Σ (ESG Comp $Prop)^2_{it,t-3}$	***14.5759****	***16.646*****	***3.6227****
	(0.0151)	***(0.0058)***	***(0.0108)***
Σ Acct Comp $Prop_{it,t-3}$		0.0259	0.1355
		(0.6163)	(0.1671)
Σ (Acct Comp $Prop)^2_{it,t-3}$		-0.0495	***-0.1713****
		(0.3866)	***(0.0903)***
Σ Stk Prc Comp $Prop_{it,t-3}$		***0.0416****	-0.04
		(0.0487)	(0.9602)
Σ (Stk Prc Comp $Prop)^2_{it, t-3}$		-0.0463	-0.0266
		(0.1042)	(0.9440)
Intercept	0.0934***	0.0951***	0.0485
	(0.0000)	(0.0000)	(0.2178)
Number of observations	6156	6156	1028
Adj R^2	0.390	0.394	0.578
Fixed Effects: Industry	No	No	No
Fixed Effects: Year	No	No	No
Clustering: Firm	Yes	Yes	Yes

Panel B: Economic Effects Evaluated at Percentiles of the CEO ESG-based Compensation Distribution

Distribution Cutoff	ESG Comp Prop	Estimated Effect on Operating Earnings	Implied Sensitivity
Percentile - 50%	0.0000	0.0000	0.0000
Percentile - 90%	0.0417	-0.0078	-0.1865
Percentile - 95%	0.0948	0.1497	2.9690
Percentile - 100%	0.2766	2.1108	10.7875

Panel C: CEO ESG-based Compensation on Operating Earnings - Convexity Minimum Point

First Order Coef.	Second Order Coef.	Convexity Minimum Point
-1.5757	16.6460	-0.0473

Notes: This table reports the baselines estimation of CEO ESG-based compensation on operating earnings (Panel A), the economic effects evaluated at different percentiles of the CEO ESG-based compensation distribution (Panel B) and reports the convexity minimum point of CEO ESG-based compensation on operating earnings (Panel C). In Panel A, *Operating* $Earnings_{it}$ is the annual operating income, before R&D expenses and after SGA, scaled by sales. The main independent variable is *ESG Comp* $Prop_{it}$, which is the metric weighted dollar value of ESG grants to the CEO scaled by total performance-based compensation. The fitted ESG instrumental variable (IV) is used in columns 1-3, where industry and year dummies are excluded as the IV is constructed at the industry-year average of ESG grants. In columns 2-3, we report the results after controlling for first-orders and second-orders of *Acct Comp* $Prop_{it}$ and *Stk Prc Comp* $Prop_{it}$. The sample period is from 1998 to 2020. OLS regression is used. Continuous variables are winsorized at the 1st and 99th percentile and cluster errors by firm. All variables are defined in detail in Appendix A. P-values, reported in parentheses, are two-tailed; *** = $p < 0.01$, ** = $p < 0.05$, * = $p < 0.10$ indicate statistical coefficient significance at 1%, 5%, and 10%, respectively. Panel B, reports the economic effects at different percentiles of performance-based ESG compensation on operating earnings where implied sensitivity refers to the change in *Operating* $Earnings_{it}$ predicted by the ESG IV first- and second-order (non-linear) estimates from Column 2, Panel A. Panel C, reports the value of ESG-based compensation over performance-based compensation (*ESG Comp* $Prop_{it}$) at which operating earnings (*Operating* $Earnings_{it}$) reaches its minimum and turns around, indicating the turning point of convexity.

Table 7

Determinants of ESG-based Awards

Dependent Variable	***ESG Comp Prop$_{it}$***		
	OLS		
Independent Variables	(1)	(2)	(3)
ESG Comp$_{it-1}$	***0.0050******		***0.0049******
	(0.0000)		***(0.0000)***
Cash Comp$_{it-1}$	-0.4173		-0.4711
	(0.3655)		(0.3993)
Size$_{it-1}$	-0.0001		-0.0002
	(0.8688)		(0.7993)
Book to Market$_{it-1}$	***0.0066****		***0.0088****
	(0.0403)		***(0.0215)***
R&D Intensity$_{it-1}$	***0.0360****		***0.0348****
	(0.0374)		***(0.0615)***
Cash Constraint$_{it-1}$	-0.0040		-0.0044
	(0.5600)		(0.5811)
Dividend Constraint$_{it-1}$	-0.0014		-0.0009
	(0.6149)		(0.7740)
Tax Loss Carry Fwd$_{it-1}$	0.0001		0.0001
	(0.9467)		(0.9521)
Return$_{it}$	-0.0021		***-0.0028****
	(0.1213)		***(0.0759)***
Return$_{it-1}$	-0.0019		***-0.0024****
	(0.1212)		***(0.0810)***
Leverage$_{it-1}$	-0.0003		0.0002
	(0.8457)		(0.9282)
σ(Operating Earnings)$_{it-1}$	0.0061		0.0096
	(0.5896)		(0.4720)
E Index$_{it-1}$		0.0009	0.0006
		(0.3227)	(0.2941)
CEO Chair$_{it-1}$		0.0027	***0.0027****
		(0.2346)	***(0.0956)***
On Board$_{it-1}$		0.0206	0.0286
		(0.4091)	(0.2554)
Interlock Directors$_{it-1}$		-0.0070	-0.0037
		(0.1457)	(0.2500)
Board Meetings$_{it-1}$		-0.0002	-0.0001
		(0.3728)	(0.5342)
Prior Ownership$_{it-1}$		0.1561	-0.0996
		(0.7172)	(0.7110)
Intercept	-0.0042	0.0126	-0.0067
	(0.7364)	(0.1953)	(0.6128)
Number of observations	7479	6833	6550
Adj R^2	0.344	0.130	0.346
Fixed Effects: Industry	Yes	Yes	Yes
Fixed Effects: Year	Yes	Yes	Yes
Clustering: Firm	Yes	Yes	Yes

Notes: This table reports the determinants of *ESG Comp Prop$_{it}$*, the proportion of dollar grant-date value of ESG-based awards to CEO with vesting provisions that has been calculated using metric weights from proxy statements relative to the total CEO performance-based compensation in a given year. The sample period is from 1998 to 2020. OLS regression is used. Continuous variables are winsorized at the 1st and 99th percentile. We include industry and year fixed effects and cluster errors by firm. All variables are defined in detail in Appendix A. P-values, reported in parentheses, are two-tailed; *** = $p < 0.01$, ** = $p < 0.05$, * = $p < 0.10$ indicate statistical coefficient significance at 1%, 5%, and 10%, respectively.

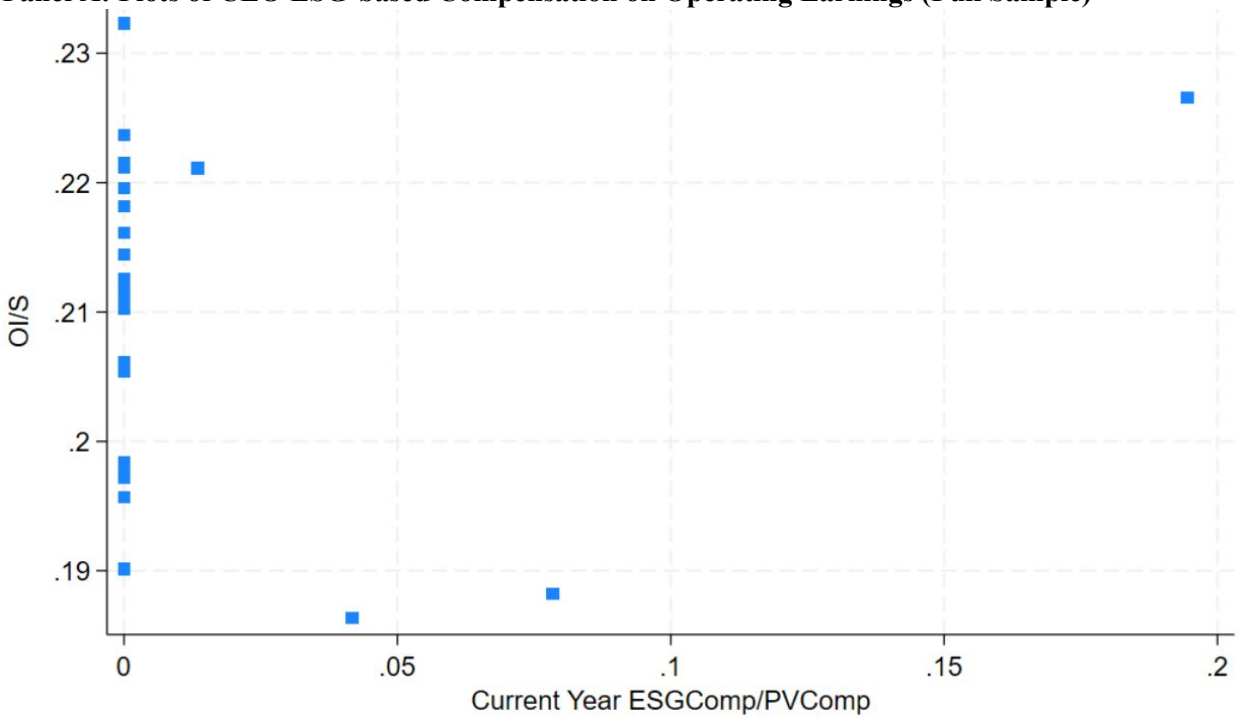
Table 8
Predicted and Residual Values of ESG-based Awards on Operating Earnings

Dependent Variable	***Operating Earnings$_{it}$***				
			OLS		
	(1)	(2)	(3)	(4)	(5)
Independent Variables	*Predicted ESG Economic*	*Predicted ESG Governance*	*Residual ESG Grant*	*Full Model*	*Full Model*
Σ Predicted ESG Comp Prop Economic$_{it,t-3}$	***-2.8684******			***-2.9446*****	***-3.0691*****
	(0.0002)			***(0.0002)***	***(0.0001)***
Σ (Predicted ESG Comp Prop Economic)$^2_{it,t-3}$	***31.9414*****			***35.87*****	***36.8434*****
	(0.0002)			***(0.0000)***	***(0.0000)***
Σ Predicted ESG Comp Prop Governance$_{it,t-3}$		-2.5419		-2.4165	-2.3988
		(0.6096)		(0.6596)	(0.6537)
Σ (Predicted ESG Comp Prop Governance)$^2_{it,t-3}$		-2.3629		-23.3385	***-26.6856****
		(0.6721)		(0.1186)	***(0.0897)***
Σ Residual ESG Comp Prop$_{it,t-3}$			0.3780	-0.1003	-0.1226
			(0.3536)	(0.8410)	(0.8375)
Σ (Residual ESG Comp Prop)$^2_{it,t-3}$			-2.8079	-0.5408	-0.5203
			(0.2004)	(0.5655)	(0.5766)
Σ Acct Comp Prop$_{it,t-3}$					0.0457
					(0.5449)
Σ (Acct Comp Prop)$^2_{it,t-3}$					(0.0688)
					(0.2963)
Σ Stk Prc Comp Prop$_{it,t-3}$					0.0026
					(0.5927)
Σ (Stk Prc Comp Prop)$^2_{it,\ t-3}$					(0.0115)
					(0.7256)
CEO Delta$_{it-1}$	0.0119***	0.0121***	0.0115***	0.0114***	0.0120***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
CEO Vega$_{it-1}$	-0.0022	-0.0020	-0.0020	-0.0015	-0.0015
	(0.1093)	(0.1384)	(0.1258)	(0.2459)	(0.2523)
Assets$_{it-1}$	0.0039*	0.0022	0.0027	0.0028	0.0027
	(0.0804)	(0.3224)	(0.2453)	(0.2208)	(0.2456)
Σ R&D Intensity$_{it,t-3}$	1.173***	1.0697***	1.1125***	1.1476***	1.1298***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
σ(Operating Earnings)$_{it-1}$	-0.1247	-0.2049	-0.2013	-0.1767	-0.1764
	(0.4088)	(0.2390)	(0.2444)	(0.3154)	(0.3135)
Intercept	0.1498***	0.1759***	0.1469***	0.1865***	0.1870***
	(0.0001)	(0.0003)	(0.0001)	(0.0002)	(0.0002)
Number of observations	5780	5171	4889	4889	4889
Adj R^2	0.558	0.570	0.576	0.582	0.583
Fixed Effects: Industry	Yes	Yes	Yes	Yes	Yes
Fixed Effects: Year	Yes	Yes	Yes	Yes	Yes
Clustering: Firm	Yes	Yes	Yes	Yes	Yes

Notes: This table reports the predicted and residual values of CEO ESG-based awards on operating margin. The dependent variable, *Operating Earnings$_{it}$*, is the annual operating income, before R&D expenses and after SGA, and scaled by sales. The sample period is from 1998 to 2020. OLS regression is used. Continuous variables are winsorized at the 1st and 99th percentile. We include industry and year fixed effects and cluster errors by firm. All variables are defined in detail in Appendix A. P-values, reported in parentheses, are two-tailed; *** = p < 0.01, ** = p < 0.05, * = p < 0.10 indicate statistical coefficient significance at 1%, 5%, and 10%, respectively.

Figure 8

Panel A: Plots of CEO ESG-based Compensation on Operating Earnings (Full Sample)



Panel B: Plots of CEO ESG-based Compensation on Operating Earnings (Restricted Sample)

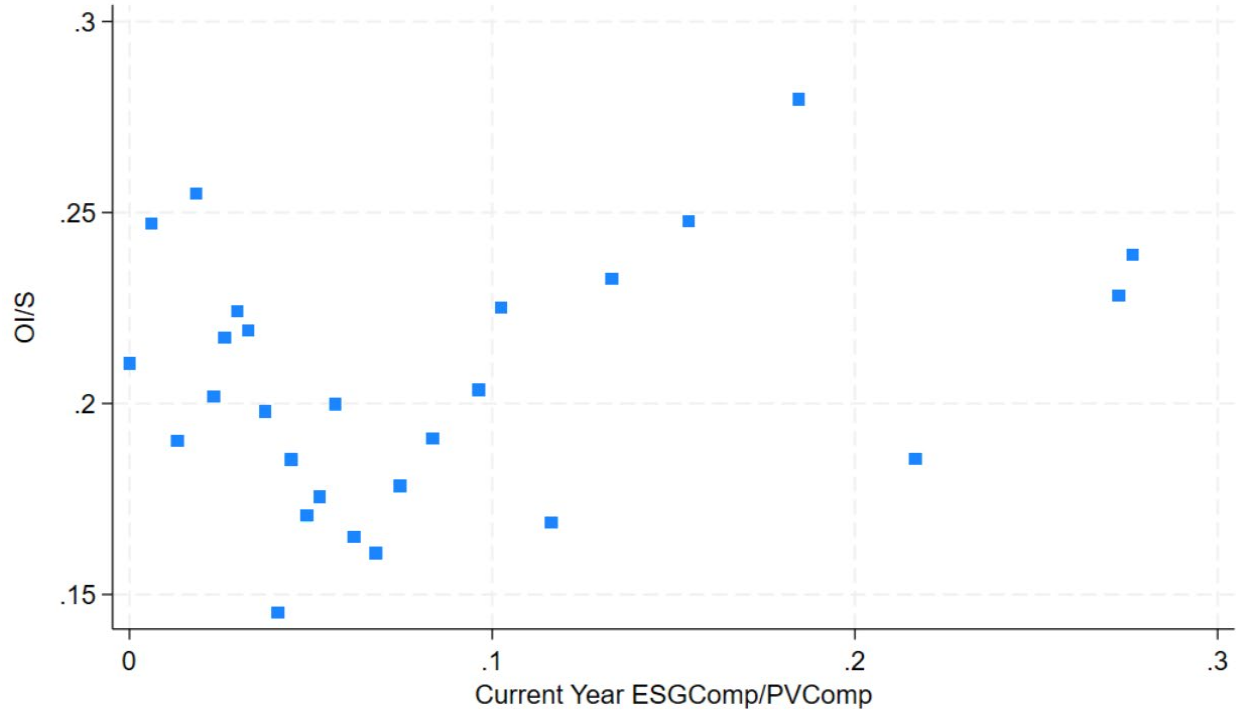
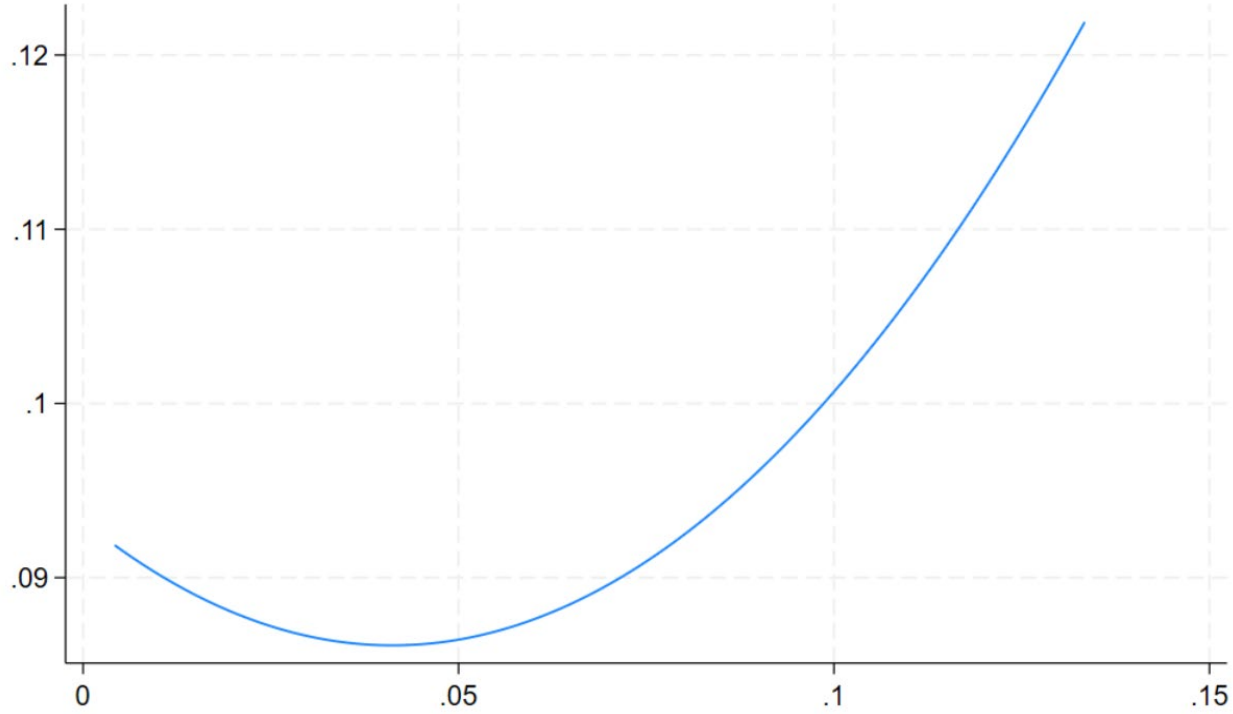


Figure 8 (*continued*)
Panel C: Post-regression Estimation of CEO ESG-based Compensation on Operating Earnings (Full Sample)



Notes: These figures plot CEO ESG-based compensation on operating earnings for the unrestricted sample (Panel A), the restricted sample (Panel B), and the post-regression estimation of CEO ESG-based compensation on operating earnings (Panel C). In Panel A, the Operating Earnings$_{it}$ on the Y-axis, is the operating income scaled by sales. ESG Comp Prop$_{it}$ is the metric weighted dollar value of CEO ESG-based compensation scaled by total performance-based compensation. We group the sample into 25 portfolios based on ESG Comp Prop$_{it}$, then calculate the portfolio means of Operating Earnings$_{it}$ and ESG Comp Prop$_{it}$, and lastly, plot the graph using the portfolio means. Panel B shows the plot of CEO ESG-based compensation on operating earnings for a restricted sample where ESG Comp Prop$_{it}$ > 0. Panel C shows the graph by plotting the post-regression results examining the magnitude of ESG Comp Prop$_{it}$ on operating earnings from Column 2 of Table 6 (Panel A).