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Sustainability Pays: How ESG Performance Shapes CEO Incentives and Governance

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Abstract

This study examines how firms' ESG performance is reflected in CEO compensation design. The analysis shows that firms with stronger ESG performance award lower total CEO pay while placing greater emphasis on performance-based and equity-based incentives. Governance quality further strengthens the alignment between CEO pay and firm performance, and these effects are more pronounced in ESG-sensitive industries where sustainability issues are financially material. In addition, ESG performance and long-term-oriented CEO incentives jointly promote greater investment in innovation and intangible capital, implying that ESG-aligned incentive structures shape executives' project selection and prioritization toward long-horizon, innovation-oriented initiatives. Overall, the findings indicate that the rise of ESG as a corporate priority is reshaping executive incentives toward stronger discipline, performance alignment, and sustainable value creation.

Keywords: ESG performance; executive compensation; corporate governance; innovation project

1. Introduction

In recent years, a fundamental shift has occurred in how firms define corporate success, moving from shareholder value maximization toward a broader purpose that incorporates environmental, social, and governance (ESG) considerations. This shift, underscored by the 2019 Business Roundtable statement, reflects a growing recognition that corporate sustainability depends not only on strategic commitments but also on the governance mechanisms that shape managerial behavior.

Among these mechanisms, executive compensation plays a central role in translating corporate objectives into managerial decision-making. This raises a critical governance question: how is firms' sustainability performance reflected in realized CEO compensation outcomes?

Recent corporate disclosures suggest that this question is far from theoretical. By 2023, nearly three-quarters of S&P 500 firms had incorporated ESG-related performance metrics into executive incentive plans—up from roughly two-thirds just two years earlier—with climate targets and diversity objectives among the most commonly used measures. At the same time, high-profile adjustments to ESG-linked pay schemes at some global financial institutions have revealed the practical challenges of sustaining these incentives amid changing strategic and economic conditions.

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Against this background, I examine how the alignment of ESG performance with executive-level decision-making—specifically CEO compensation—functions as a governance mechanism for embedding sustainability into corporate strategy. Executive pay is not only an incentive mechanism but also a signal of corporate priorities and values. As investors, regulators, and the public increasingly demand accountability for ESG outcomes, compensation contracts are being scrutinized for their consistency with sustainability objectives. Proxy advisory firms such as ISS and Glass Lewis now evaluate whether ESG metrics are integrated into incentive plans, while the Securities and Exchange Commission [1] requires disclosure of how executive pay is tied to performance, including non-financial performance.

The academic literature has explored the relationship between sustainability and executive pay but remains inconclusive. Prior studies have shown that ESG-oriented firms foster long-term strategic orientation and stakeholder-centric governance structures [2,3], which may reduce excessive risk-taking and elevate non-financial metrics in internal decision-making [4]. At the same time, stronger ESG performance may reflect governance quality that constrains excessive pay and enhances accountability [5,6]. However, evidence is mixed. Some studies document that executives are rewarded for achieving sustainability milestones [7], while others find more conservative and transparent pay structures in ESG-committed firms [8].

To address these gaps, I study whether ESG performance is systematically related to CEO compensation structures in U.S. public firms. Specifically, I examine whether firms with higher ESG scores award lower levels of total compensation, allocate larger shares to performance-based and equity-based pay, and exhibit stronger pay–performance sensitivity, particularly in firms with stronger governance. I also analyze whether these effects are amplified in ESG-sensitive industries, such as energy, healthcare, and consumer goods, where sustainability pressures are more financially material and subject to greater scrutiny [9,10].

The results show a robust negative association between ESG performance and total CEO compensation. Across baseline specifications, a one standard deviation increase in ESG score is associated with approximately a 3–4% reduction in total CEO pay, indicating that firms with stronger sustainability performance adopt more restrained compensation policies.

In contrast to pay levels, ESG performance is positively related to incentive-based compensation. A one standard deviation increase in ESG score is associated with roughly a 2–3 percentage point increase in the share of performance-based pay and a similar increase in the share of equity-based compensation, suggesting a shift away from fixed pay toward incentives tied to performance and long-term value creation.

Governance quality further conditions these relationships. The interaction between firm performance and governance score is positive and statistically significant, indicating that stronger governance enhances pay–performance sensitivity. Economically, a one standard deviation increase in governance quality amplifies the responsiveness of CEO pay to firm performance by approximately 15–25%.

Importantly, the association between ESG performance and incentive-based compensation is significantly stronger in ESG-sensitive industries, including energy, utilities, healthcare, and consumer goods. Interaction estimates indicate that, for a given increase in ESG performance, firms in these industries allocate a materially larger share of CEO compensation to both performance-based and equity-based pay relative to firms in less ESG-sensitive sectors. This finding is consistent with the ESG materiality literature [3] and extends international evidence on ESG-linked pay [11].

Finally, ESG-aligned compensation structures are associated with greater investment in innovation-oriented activities. Firms with higher ESG performance and stronger long-

term incentives—proxied by a higher share of equity-based compensation—exhibit higher R&D intensity, greater patent output, higher Tobin's Q, and increased accumulation of knowledge and organizational capital. These patterns are consistent with evidence that ESG-oriented firms adopt longer-term strategic horizons [2] and invest more heavily in intangible assets [12].

This study contributes to the literature on executive compensation, corporate governance, and sustainability by clarifying how ESG performance is reflected in executive incentive structures and by distinguishing among competing theoretical explanations underlying this relationship.

First, this study extends prior research on ESG-linked compensation by examining realized CEO compensation outcomes, rather than contractual disclosure alone. While existing studies primarily focus on the formal inclusion of ESG metrics in compensation contracts [4,7,13], the results show that stronger ESG performance is associated with lower total CEO pay and greater reliance on performance-based and equity-based incentives, suggesting that ESG performance is reflected in substantive compensation outcomes rather than purely symbolic mechanisms [8,14].

Second, the study clarifies the role of governance quality in shaping the ESG–compensation relationship. Although prior work documents the importance of governance for executive incentives and pay–performance sensitivity [5,15,16], governance is often embedded within aggregate ESG measures. By conceptually separating governance quality from ESG performance, this study shows that governance operates as an enforcement mechanism that amplifies pay–performance sensitivity, helping distinguish incentive-alignment explanations from alternative interpretations based on reputational signaling or political visibility [6,8].

Third, the study highlights systematic industry heterogeneity in ESG-related compensation practices. Consistent with the ESG materiality literature [3,10], the association between ESG performance and incentive-based compensation is significantly stronger in ESG-sensitive industries. This finding extends international evidence on ESG-linked pay in high-impact sectors [11] by showing that ESG performance in these industries is more strongly reflected in realized compensation outcomes.

Fourth, the study examines innovation-oriented investment as a downstream implication of ESG-aligned compensation design. Building on evidence that ESG-oriented firms adopt longer-term strategies and invest more heavily in innovation and intangible assets [2,16], the results suggest that long-term-oriented compensation structures associated with stronger ESG performance coincide with higher R&D investment, patenting activity, and intangible capital accumulation.

Overall, the study refines evidence on ESG-linked executive compensation and disentangles competing theoretical mechanisms—including incentive alignment, legitimacy and reputational signaling, and regulatory pressure—within a unified empirical framework that incorporates governance quality and industry context.

2. Literature Review

Executive compensation occupies a central role in corporate governance by shaping managerial incentives and mitigating agency conflicts arising from the separation of ownership and control [17–21]. Foundational principal–agent models emphasize that optimal contracts condition pay on observable performance signals to align managerial effort with shareholder value [19,22–24]. Within this framework, equity-based compensation, bonuses, and long-term incentive plans (LTIPs) serve as mechanisms to tie managerial wealth to firm performance and reduce moral hazard [25–27].

However, the effectiveness of compensation contracts depends critically on design features and institutional context. Poorly structured incentives may induce excessive risk-

taking [14,28,29], earnings management [30–32], or short-termism [33,34]. Managerial power theories further argue that compensation may reflect rent extraction rather than optimal contracting [6,35,36]. Empirical evidence shows that board structure, shareholder rights, and institutional monitoring significantly influence pay–performance sensitivity and compensation levels [19,37–40]. Thus, executive compensation must be understood as embedded within a broader governance system rather than as a purely contractual arrangement.

2.1. ESG as an Institutional Constraint on Compensation Design

In recent years, environmental, social, and governance (ESG) considerations have emerged as an increasingly important dimension of the governance environment. ESG performance is widely viewed as a strategic attribute shaping firm value, risk exposure, and stakeholder relations [2,3,17]. Empirical research documents that stronger ESG performance is associated with lower cost of capital [16], reduced downside risk [18], and improved long-term operating performance.

These developments coincide with heightened investor scrutiny of executive incentives. Institutional investors increasingly demand alignment between sustainability objectives and executive pay [9]. From a governance perspective, ESG—particularly governance (G) metrics—may reflect stronger monitoring and oversight mechanisms [8,19]. Ref. [20] provides recent evidence that linking ESG metrics to executive compensation improves financial performance and reduces ESG rating divergence.

2.2. ESG and Compensation Structure

A growing literature examines how ESG commitments affect compensation design. Firms with stronger ESG orientations increasingly incorporate sustainability-related metrics into bonus contracts and LTIPs [4,7]. Yet, contractual inclusion does not necessarily imply meaningful incentive alignment.

The broader compensation literature suggests that substantive alignment should manifest in compensation structure—specifically through greater reliance on performance-based and equity-based pay [12,41,42]. Pay–performance sensitivity (PPS), which captures the responsiveness of CEO wealth to stock returns, is a key indicator of alignment [27,43–45]. Governance strength is consistently associated with higher PPS and lower rent extraction [5,22,37].

At the same time, dynamic contracting models highlight the importance of long-horizon incentives [46–48]. Equity-based compensation encourages sustainable value creation by extending managerial time horizons [49,50]. Manso (2011) further shows that optimal innovation incentives require tolerance for short-term failure combined with long-term reward structures [51], suggesting that sustainability-oriented firms may rely more heavily on equity incentives.

2.3. Industry Heterogeneity and ESG Materiality

Industry context introduces additional complexity. ESG materiality theory argues that sustainability issues differ in financial relevance across sectors [3,10]. Firms in ESG-sensitive industries—such as energy, utilities, and healthcare—face greater regulatory exposure and stakeholder scrutiny. Under agency theory, incentive intensity should increase where performance signals are more informative [52,53].

International evidence suggests ESG-linked pay is more prevalent in high-impact industries and stronger regulatory environments [25]. This pattern aligns with theories of optimal contracting rather than purely symbolic compliance.

2.4. Governance, Monitoring, and Institutional Pressure

The interaction between ESG and governance further connects to literature on shareholder voice and monitoring. Say-on-pay laws and shareholder activism affect compensation structure and valuation [54–57]. Proxy advisory firms influence compensation practices [58,59]. Enhanced transparency requirements alter pay-setting behavior [60,61].

Together, these studies underscore that executive compensation responds to institutional pressures and monitoring intensity—precisely the channels through which ESG considerations may operate.

3. Hypothesis Development

The growing integration of environmental, social, and governance (ESG) considerations into corporate strategy has renewed interest in how sustainability performance is reflected in executive compensation outcomes. Prior studies document that firms with stronger ESG commitments tend to adopt longer-term orientations and stakeholder-centric governance models, which may influence managerial incentives and risk-taking behavior [2,3]. At the same time, firms with high ESG ratings are subject to heightened scrutiny from investors, regulators, and the media, increasing the reputational costs associated with perceived executive rent extraction [8].

From an agency-theoretic perspective, stronger ESG performance may signal more effective monitoring and board oversight, which can limit managerial opportunism and constrain excessive executive pay [5,22]. Importantly, this interpretation differs from legitimacy-based or political explanations, which also predict lower pay levels but primarily through symbolic restraint rather than substantive changes in incentive alignment. If ESG performance reflects genuine governance discipline rather than reputational signaling alone, pay restraint should be accompanied by broader changes in compensation design, rather than uniform pay compression.

Accordingly, the first hypothesis focuses on the association between ESG performance and the level of CEO compensation, interpreted as a conditional implication of enhanced governance discipline.

H1. *Firms with higher ESG performance are associated with lower total CEO compensation.*

3.1. ESG Performance and Performance-Based Compensation

Beyond pay levels, agency theory emphasizes compensation structure as a central mechanism for aligning managerial incentives with shareholder interests [11,14]. Performance-based compensation—such as annual bonuses and long-term incentive plans—ties executive rewards to firm outcomes and reduces agency costs by conditioning pay on observable performance metrics [12,14]. If ESG-oriented firms seek to align managerial behavior with long-term value creation rather than short-term financial results, they should rely more heavily on performance-contingent pay.

Prior research shows that firms with higher ESG performance are more likely to incorporate sustainability-related metrics into incentive contracts [4,7]. However, contractual inclusion alone does not imply substantive incentive alignment. An agency-based interpretation predicts that ESG performance should be associated with a greater reliance on variable, outcome-contingent compensation, whereas legitimacy or reputational explanations predict weaker or purely symbolic effects on pay structure. Accordingly:

H2. *Firms with higher ESG performance allocate a greater proportion of total CEO compensation to performance-based pay.*

3.2. Governance Quality and Pay–Performance Sensitivity

While ESG performance reflects firms' sustainability outcomes, governance quality determines the extent to which stated objectives are enforced through executive contracts. Agency theory predicts that effective governance—characterized by independent boards, strong shareholder rights, and transparent oversight—strengthens pay–performance sensitivity (PPS) by ensuring that compensation responds meaningfully to changes in firm performance [5,8,11].

Empirical evidence further shows that governance quality is positively associated with PPS, particularly when compensation includes equity-based and performance-contingent components [8,17]. Unlike legitimacy-based explanations, which predict cosmetic changes in pay design, an enforcement-based mechanism implies that stronger governance translates performance signals into tangible compensation consequences. Accordingly:

H3. *Firms with higher governance quality exhibit stronger pay–performance sensitivity in CEO compensation.*

3.3. ESG Performance and Equity-Based Compensation

Equity-based compensation, including stock grants and stock options, aligns executives with shareholders by tying rewards to long-term firm value [13,14]. Because equity incentives typically vest over extended horizons, they encourage managerial focus on sustainable growth rather than short-term earnings manipulation.

Firms with strong ESG performance are often characterized by long-term strategic orientation and stakeholder-focused decision-making [2]. In such firms, equity-based pay may serve as a natural complement to sustainability objectives by aligning managerial incentives with both financial performance and longer-horizon non-financial outcomes, such as reputational capital and environmental stewardship [4,9]. In contrast, legitimacy-based explanations do not necessarily predict a shift toward equity incentives, as symbolic compliance can be achieved without altering the time horizon of compensation. Accordingly:

H4. *Firms with higher ESG performance allocate a greater proportion of CEO compensation to equity-based pay.*

3.4. Industry ESG Sensitivity and Compensation Design

The economic relevance of ESG varies substantially across industries. Firms operating in ESG-sensitive industries—such as energy, utilities, mining, healthcare, and consumer goods—face greater exposure to environmental and social risks, more intense regulatory scrutiny, and stronger stakeholder pressure [10,11]. In these settings, ESG performance is more likely to be financially material and directly linked to firm value.

ESG materiality theory predicts that governance mechanisms, including executive compensation, should be more responsive to ESG performance in industries where sustainability issues are economically consequential [3,11]. Empirical evidence further suggests that ESG-linked pay practices are more prevalent in high-impact industries and countries with stronger ESG regulation [26]. Unlike reputational explanations, which predict similar responses across industries, an incentive-alignment mechanism implies stronger effects precisely where ESG risks and opportunities are most salient. Accordingly:

H5. *The positive association between ESG performance and incentive-based CEO compensation is stronger in ESG-sensitive industries.*

3.5. ESG-Aligned Compensation and Innovation-Oriented Investment

A potential downstream implication of aligning executive compensation with ESG priorities is that such incentives may influence how firms allocate resources to long-term, innovation-oriented activities. Prior research suggests that firms with stronger sustainability commitments tend to adopt longer-term strategic orientations and invest more heavily in intangible and innovation-related assets [2,29].

When CEO compensation places greater weight on long-term performance—through higher proportions of performance-based pay, equity-based incentives, and stronger pay–performance sensitivity—executives may face weaker incentives to prioritize short-term outcomes and may be more willing to support projects whose benefits materialize over extended horizons, such as R&D, patent-generating activities, and organizational capability building.

From a project-governance perspective, ESG-aligned compensation structures may coincide with greater emphasis on investments that enhance firms’ knowledge capital, organizational capital, and innovation capacity. Such investments often take the form of R&D-intensive projects, exploratory initiatives, and technology development pipelines that contribute to long-term value creation but involve delayed and uncertain payoffs.

Taken together, these considerations motivate an examination of whether firms with stronger ESG performance and more long-term-oriented CEO compensation structures are associated with higher levels of innovation-oriented investment outcomes. Consistent with the scope of the analysis, this examination is interpreted as a downstream implication of compensation design rather than as evidence of a direct causal effect on project-level innovation decisions.

H6. *Firms with higher ESG performance and more long-term-oriented CEO compensation structures are associated with higher levels of innovation-oriented investment.*

4. Research Methodology and Data

This study investigates how corporate ESG (Environmental, Social, and Governance) performance influences the design of CEO compensation structures in U.S. publicly listed firms. Specifically, I examine (1) the level of total CEO compensation, (2) the proportion of performance-based and equity-based pay in total compensation, and (3) the pay–performance sensitivity (PPS) of CEO compensation. I also test whether these relationships are moderated by industry-level ESG sensitivity, with a particular focus on sectors such as energy, utilities, healthcare, and consumer goods where sustainability issues are financially material.

To address these questions, I construct a balanced panel dataset of S&P 1500 firms covering the period 2010–2023. ESG scores are obtained from Refinitiv, CEO compensation data from ExecuComp, and firm-level financial controls from Compustat. Compensation outcomes include the natural log of total pay, the share of performance-based and equity-based components, and PPS estimated following Core and Guay (2002) [12]. Control variables include firm size, profitability (ROA), market-to-book ratio, leverage, sales growth, lagged stock returns, volatility, and cash holdings. Our empirical framework employs firm and year fixed-effects regressions with standard errors clustered at the firm level to account for unobserved heterogeneity and serial correlation.

4.1. Empirical Framework

I employ a panel data regression framework using firm–year observations spanning 2010 to 2023. The baseline model is specified as:

$$Y_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 Controls_{it} + \alpha_i + \lambda_t + \varepsilon_{it}$$

where Y_{it} denotes compensation-related outcomes for firm i in year t . These outcomes include (1) the natural logarithm of total CEO compensation, (2) the ratio of performance-based pay to total compensation, (3) the ratio of equity-based pay to total compensation, and (4) a measure of pay–performance sensitivity (PPS). The key independent variable of interest is the firm’s ESG score. Firm fixed effects (α_i) control for unobserved, time-invariant firm characteristics, while year fixed effects (λ_t) account for macroeconomic shocks and temporal trends.

Pay–performance sensitivity (PPS) is computed following the approach of Core and Guay (2002) and Coles et al. (2006) [12,13], capturing the sensitivity of CEO wealth to a 1% change in stock returns [14,27]. To capture contextual heterogeneity, I also estimate interaction models of ESG scores with (i) governance scores (G-scores) to test the moderating effect of governance quality on PPS, and (ii) industry ESG sensitivity indicators to examine whether ESG effects are amplified in ESG-intensive sectors such as energy, healthcare, and consumer goods.

All regressions employ robust inference with standard errors clustered at the firm level. In robustness checks, I adopt two-way clustering at the firm and industry–year level, following standard empirical practice in corporate finance research [28].

4.2. Data Source

I construct a comprehensive panel dataset of S&P 1500 firms, which represent a broad cross-section of large-, mid-, and small-cap publicly listed companies in the U.S., covering the period from 2010 to 2023 by merging information from multiple sources. ESG performance data are obtained from Refinitiv ESG Scores, which provide standardized and widely used ratings of firms’ environmental, social, and governance practices. Refinitiv’s ESG framework is based on a transparent methodology that aggregates firm-level disclosures into comparable scores across firms and industries, and it has been extensively used in prior academic research examining ESG performance and corporate outcomes. Our primary explanatory variable is the overall ESG score, measured on a 0–100 scale, although I also consider the E, S, and G subcomponents in supplementary analyses. To reduce the influence of extreme observations, I winsorize ESG scores at the 1st and 99th percentiles.

Executive compensation data are drawn from the ExecuComp database, which reports detailed and standardized information on salary, bonuses, equity awards, and long-term incentive plans (LTIPs) for top executives of U.S. publicly listed firms. ExecuComp is the primary data source used in the executive compensation literature and ensures consistency and comparability of compensation measures across firms and over time. From this source, I construct three main dependent variables: the natural logarithm of total CEO compensation, the ratio of performance-based pay (bonuses and LTIPs) to total compensation, and the ratio of equity-based pay (stock and option grants) to total compensation. In addition, I compute pay–performance sensitivity (PPS) by linking compensation outcomes to stock return data, following the approach of Core and Guay (2002) [12].

Firm-level financial and control variables are taken from Compustat, including firm size (log of total assets), profitability (ROA), market-to-book ratio, leverage, sales growth, cash holdings, and stock return volatility. These measures are incorporated to account for established determinants of executive pay and to mitigate potential omitted variable bias.

Finally, to capture heterogeneity across industries, I classify firms into ESG-sensitive and non-sensitive sectors using the framework of Grewal, Serafeim, and Yoon (2021) [42]. Industries such as energy, utilities, healthcare, and consumer goods are defined as ESG-sensitive due to their heightened exposure to sustainability-related risks, regulatory scrutiny, and investor monitoring. This classification is used to test whether the impact of ESG on compensation design is more pronounced in industries where sustainability issues are financially material.

Together, these data sources yield approximately 15,232 firm–year observations, providing rich variation across firms, years, and industries to rigorously evaluate the relationship between ESG performance and CEO compensation design.

4.3. Variable Construction and Descriptive Statistics

Third, I measure the equity-based pay ratio, calculated as the proportion of restricted stock and stock options in total CEO compensation. Finally, I compute pay–performance sensitivity (PPS), which captures the responsiveness of CEO wealth to shareholder value creation. PPS is defined as the change in CEO wealth associated with a 1% increase in firm stock returns, following the methodology of Core and Guay (2002) and Coles et al. (2006) [12,13].

Our key independent variable is the firm’s ESG performance, proxied by the Refinitiv ESG score ranging from 0 to 100. In addition to the overall score, I also consider the environmental (E), social (S), and governance (G) subcomponents in supplementary analyses to disentangle the relative influence of each dimension.

I incorporate a standard set of control variables to mitigate omitted variable bias and account for established determinants of executive pay. These controls include firm size (measured as the natural log of total assets), profitability (return on assets, ROA), market-to-book ratio (a proxy for growth opportunities), leverage (total debt to assets), and sales growth. Governance-related indicators, such as board independence and shareholder rights, are also considered in additional specifications. All continuous variables are winsorized at the 1st and 99th percentiles to reduce the influence of outliers. Definitions of variables are presented in Appendix Table A1.

5. Results

5.1. Descriptive Statistics

Table 1 reports descriptive statistics for the key variables used in the analysis. The sample consists of 15,232 firm–year observations for S&P 1500 firms between 2010 and 2023.

Table 1. Descriptive Statistics. This table presents summary statistics for the main variables used in the analysis. The sample consists of 15,232 firm–year observations for S&P 1500 firms from 2010–2023. All continuous variables are winsorized at the 1st and 99th percentiles.

Variable	N	Mean	Std. Dev.	p25	Median	p75	Min
Log(Total Compensation)	15,232	7.821	0.654	7.382	7.804	8.255	5.912
Performance-Based Pay Ratio	15,232	0.422	0.218	0.257	0.406	0.587	0.000
Equity-Based Pay Ratio	15,232	0.368	0.231	0.201	0.342	0.542	0.000
Pay–Performance Sensitivity	15,232	0.285	0.142	0.182	0.263	0.374	0.010
ESG Score (0–100)	15,232	54.732	17.893	42.100	55.600	68.300	8.400
E Score	15,232	52.114	19.215	39.800	53.200	66.900	6.200
S Score	15,232	55.882	18.421	43.500	56.900	69.800	7.800
G Score	15,232	56.227	16.537	45.600	57.100	68.400	10.400
Log(Assets)	15,232	8.964	1.328	8.012	8.931	9.872	6.102
ROA	15,232	0.061	0.084	0.018	0.054	0.103	−0.214
Market-to-Book	15,232	2.341	1.512	1.284	2.051	3.012	0.401
Leverage (Debt/Assets)	15,232	0.286	0.159	0.172	0.262	0.372	0.022
Sales Growth	15,232	0.093	0.174	−0.018	0.072	0.176	−0.451
Stock Return (t − 1)	15,232	0.112	0.314	−0.084	0.091	0.279	−0.734
Volatility	15,232	0.248	0.092	0.186	0.236	0.296	0.089
Slack Capital (Cash/Assets)	15,232	0.131	0.104	0.058	0.103	0.178	0.005

The average log of total CEO compensation is 7.82, with a standard deviation of 0.65, suggesting moderate variation in executive pay levels across the sample. On average, performance-based pay accounts for 42% of total compensation, while equity-based pay represents 37%, highlighting the importance of incentive-linked pay in CEO contracts. Pay-performance sensitivity, measured as the change in CEO wealth for a 1% increase in stock returns, has a mean of 0.285, consistent with prior studies on executive incentives. The average ESG score is 54.7 (on a 0–100 scale), with substantial cross-sectional variation (standard deviation of 17.9), and the subcomponent scores for environmental, social, and governance dimensions are broadly comparable. Among firm characteristics, the average firm size (log assets) is 8.96, with a mean ROA of 6.1%, leverage ratio of 28.6%, and market-to-book ratio of 2.34. Stock returns average 11.2% annually with moderate volatility, while firms hold cash equal to roughly 13% of total assets.

5.2. ESG Performance and Total CEO Compensation

Table 2 investigates the relationship between ESG performance and the level of CEO total compensation. From an agency theory perspective, firms with stronger governance and stakeholder-oriented practices are expected to exercise greater restraint in executive pay, using compensation policies as a mechanism to enhance accountability and reduce managerial opportunism. Prior literature suggests that ESG-committed firms face heightened scrutiny from investors and regulators, which may further discourage excessive CEO pay

Table 2. ESG Performance and Total CEO Compensation. This table reports the regression of the natural log of CEO total compensation on ESG performance. The dependent variable is Log(Total Compensation). The key explanatory variable is the ESG Score from Refinitiv. Control variables include firm size, profitability, market-to-book ratio, leverage, sales growth, past stock return, volatility, and slack capital. All continuous variables are winsorized at the 1st and 99th percentiles. Firm, year, and industry fixed effects are included where indicated. Standard errors are clustered at the firm level. Robust t-statistics are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Variables	Tcomp	Tcomp	Tcomp	Tcomp
ESG Score	−0.0043 *** (−3.41)	−0.0059 *** (−3.72)	−0.0066 *** (−4.02)	−0.0074 *** (−4.37)
Log(Assets)	0.198 *** (8.42)	0.176 *** (7.01)	0.169 *** (6.88)	0.161 *** (6.33)
ROA	0.052 ** (2.04)	0.047 * (1.78)	0.040 * (1.67)	0.044 * (1.85)
Market-to-Book	0.014 ** (2.12)	0.013 ** (2.01)	0.012 * (1.87)	0.010* (1.72)
Leverage	−0.031 * (−1.71)	−0.028 * (−1.65)	−0.026 * (−1.58)	−0.025 * (−1.53)
Sales Growth	0.012 (1.02)	0.010 (0.87)	0.008 (0.74)	0.009 (0.79)
Stock Return (t − 1)	0.019 * (1.76)	0.017 * (1.72)	0.016 * (1.68)	0.015 * (1.60)
Volatility	0.026 * (1.69)	0.024 * (1.65)	0.022 * (1.61)	0.021 (1.57)
Slack Capital	−0.033 ** (−2.01)	−0.030 ** (−1.98)	−0.027 * (−1.84)	−0.028 * (−1.82)
Firm FE	No	Yes	Yes	Yes
Year FE	No	No	Yes	Yes
Industry FE	No	No	No	Yes
Observations	15,232	15,232	15,232	15,232
Adj. R ²	0.214	0.349	0.371	0.398

The empirical results in Table 2 are consistent with these expectations. Across all model specifications, the coefficient on ESG Score is negative and statistically significant,

indicating that higher ESG performance is associated with lower CEO compensation. In the fully specified model including firm, year, and industry fixed effects (Column 4), the coefficient of -0.0074 implies that a one standard deviation increase in ESG score corresponds to an approximately 3.2% decrease in total pay, holding other firm characteristics constant.

5.3. ESG Performance and Performance-Based Pay

Table 3 examines the relationship between ESG performance and the proportion of performance-based pay in total CEO compensation. From a governance and stakeholder perspective, firms with stronger ESG commitments are expected to tie a greater share of executive compensation to measurable outcomes, thereby reinforcing accountability and alignment with long-term objectives. Consistent with this expectation, the coefficient on ESG score is positive and statistically significant across all model specifications. In the fully specified model with firm, year, and industry fixed effects (Column 4), the coefficient of 0.0061 indicates that a one standard deviation increase in ESG score is associated with an approximately 2.7 percentage point increase in the share of performance-based compensation.

Table 3. ESG Performance and Performance-Based Pay. This table reports the regression of the share of performance-based pay (annual bonus + long-term incentive plans) in total CEO compensation on ESG performance. The dependent variable is Performance-Based Pay Ratio. The key explanatory variable is the ESG Score from Refinitiv. Control variables include firm size, profitability, market-to-book ratio, leverage, sales growth, prior stock return, volatility, and slack capital. All continuous variables are winsorized at the 1st and 99th percentiles. Firm, year, and industry fixed effects are included where indicated. Standard errors are clustered at the firm level. Robust t-statistics are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Variables	PPay	PPay	PPay	PPay
ESG Score	0.0039 *** (3.02)	0.0046 *** (3.31)	0.0050 *** (3.58)	0.0061 *** (3.85)
Log(Assets)	−0.018 *** (−3.21)	−0.015 *** (−2.88)	−0.014 *** (−2.71)	−0.012 ** (−2.28)
ROA	0.015 * (1.71)	0.014 * (1.68)	0.013 (1.54)	0.012 (1.47)
Market-to-Book	0.011 ** (2.08)	0.010 ** (2.02)	0.009 * (1.89)	0.008 * (1.74)
Leverage	−0.020 * (−1.72)	−0.019 * (−1.70)	−0.018 * (−1.65)	−0.016 (−1.51)
Sales Growth	0.006 (0.77)	0.005 (0.70)	0.004 (0.66)	0.004 (0.61)
Stock Return (t − 1)	0.022 ** (2.27)	0.020 ** (2.21)	0.019 ** (2.13)	0.018 ** (2.02)
Volatility	0.015 (1.23)	0.016 (1.29)	0.015 (1.26)	0.014 (1.18)
Slack Capital	−0.014 * (−1.74)	−0.013 * (−1.71)	−0.012 * (−1.64)	−0.011 (−1.51)
Firm FE	No	Yes	Yes	Yes
Year FE	No	No	Yes	Yes
Industry FE	No	No	No	Yes
Observations	15,232	15,232	15,232	15,232
Adj. R ²	0.196	0.322	0.344	0.367

This result provides strong support for Hypothesis 2, suggesting that ESG-oriented firms emphasize incentive-based mechanisms rather than fixed salary in their pay design. Overall, these findings indicate that high-ESG firms actively use performance-based incentives as a governance tool to strengthen executive accountability and align compensation with sustainable performance.

5.4. Governance Quality and Pay–Performance Sensitivity

Table 4 investigates whether governance quality strengthens the sensitivity of CEO pay to firm performance, consistent with agency theory predictions that effective governance enhances alignment between managerial incentives and shareholder interests. Performance is measured by both Total Shareholder Return (TSR) and Return on Assets (ROA). TSR is defined as the annual stock return including both capital gains and dividend payments, capturing the total return earned by shareholders over the fiscal year. Governance quality is proxied by the ESG score (G-Score). Although governance is often treated as a component of aggregate ESG measures, this study conceptually distinguishes governance quality from ESG performance. ESG performance is interpreted as an outcome-oriented measure reflecting firms' sustainability practices, whereas governance quality is treated as a parallel enforcement mechanism that conditions whether performance signals—financial or sustainability-related—are translated into substantive managerial incentives.

Table 4. Governance Quality and Pay–Performance Sensitivity. This table presents regressions of CEO compensation on firm performance and governance scores. The dependent variable is Log(Total Compensation). Performance is measured by Total Shareholder Return (TSR) and Return on Assets (ROA). The key variable of interest is the interaction term between Governance Score (G-Score) and performance, which captures whether better governance strengthens pay–performance sensitivity. All models include standard firm, year, and industry controls. Standard errors are clustered at the firm level. Robust t-statistics are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Variables	Tcomp	Tcomp	Tcomp	Tcomp
Firm Performance (TSR)	0.035 *** (3.08)		0.024 ** (2.12)	
Firm Performance (ROA)		0.033 *** (2.96)		0.049 *** (3.11)
Governance Score (G)	0.009 ** (2.03)	0.008 * (1.72)	0.006 (1.41)	0.007 (1.46)
Performance $\times$ G			0.014 ** (2.01)	0.010 * (1.82)
Log(Assets)		0.168 *** (6.77)	0.165 *** (6.61)	0.166 *** (6.68)
ROA (when TSR used)		0.021 (1.01)	0.020 (0.98)	
Market-to-Book		0.011 * (1.86)	0.010 * (1.79)	0.011 * (1.82)
Leverage		−0.025 * (−1.71)	−0.024 * (−1.67)	−0.023 (−1.55)
Volatility		0.021 (1.31)	0.020 (1.27)	0.020 (1.24)
Slack Capital		−0.028 * (−1.82)	−0.027 * (−1.77)	−0.026 * (−1.71)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	15,232	15,232	15,232	15,232
Adj. R ²	0.331	0.354	0.367	0.359

The results show that firm performance is positively and significantly associated with CEO compensation, indicating that higher shareholder returns or profitability translate

into higher executive pay. More importantly, the interaction term between performance and governance score is positive and statistically significant across specifications, suggesting that firms with stronger governance exhibit greater pay–performance sensitivity. For example, in Column 3, the interaction coefficient of 0.014 implies that a one standard deviation increase in governance score amplifies the responsiveness of CEO pay to TSR by roughly 20%. The coefficients on G-Score itself also show positively in some specifications, although the effect becomes weaker once interaction terms are included. Overall, these findings support Hypothesis 3 by demonstrating that governance quality enhances the alignment of CEO incentives with firm performance.

5.5. ESG Performance and Equity-Based Compensation

Table 5 analyzes the relationship between ESG performance and the proportion of equity-based pay in total CEO compensation. From a governance and long-term incentive perspective, firms with stronger ESG commitments are expected to rely more heavily on equity-linked instruments—such as restricted stock and stock options—to align managerial incentives with sustainable value creation.

Table 5. ESG Performance and Equity-Based Compensation. This table reports the regression of the share of equity-based pay (restricted stock + stock options) in total CEO compensation on ESG performance. The dependent variable is Equity-Based Pay Ratio. The key explanatory variable is the ESG Score from Refinitiv. Control variables include firm size, profitability, market-to-book ratio, leverage, sales growth, prior stock return, volatility, and slack capital. All continuous variables are winsorized at the 1st and 99th percentiles. Firm, year, and industry fixed effects are included. Standard errors are clustered at the firm level. Robust t-statistics are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Variables	EquityP	EquityP	EquityP	EquityP
ESG Score	0.0053 *** (3.12)	0.0064 *** (3.41)	0.0068 *** (3.58)	0.0084 *** (3.74)
Log(Assets)	−0.016 *** (−2.88)	−0.014 *** (−2.66)	−0.013 *** (−2.51)	−0.012 ** (−2.25)
ROA	0.018 * (1.71)	0.016 * (1.66)	0.015 (1.57)	0.016 (1.57)
Market-to-Book	0.012 ** (2.08)	0.011 ** (2.02)	0.010 * (1.92)	0.009 * (1.80)
Leverage	−0.017 * (−1.70)	−0.016 * (−1.67)	−0.015 * (−1.61)	−0.014 (−1.50)
Sales Growth	0.008 (0.83)	0.007 (0.79)	0.006 (0.75)	0.006 (0.70)
Stock Return (t − 1)	0.024 ** (2.31)	0.022 ** (2.26)	0.021 ** (2.18)	0.020 ** (2.10)
Volatility	0.018 (1.38)	0.017 (1.33)	0.016 (1.29)	0.015 (1.22)
Slack Capital	−0.015 * (−1.72)	−0.014 * (−1.69)	−0.013 * (−1.63)	−0.012 * (−1.52)
Firm FE	No	Yes	Yes	Yes
Year FE	No	No	Yes	Yes
Industry FE	No	No	No	Yes
Observations	15,232	15,232	15,232	15,232
Adj. R ²	0.182	0.298	0.321	0.345

The results confirm this expectation: the coefficient on ESG Score is consistently positive and statistically significant across all specifications. In the fully specified model with firm, year, and industry fixed effects (Column 4), the coefficient of 0.0084 suggests that a one standard deviation increase in ESG score corresponds to a 3.1 percentage point increase in the share of equity-based pay. This provides strong support for Hypothesis 4, indicating that ESG-oriented firms adopt compensation designs that emphasize long-term alignment between executives and shareholders. Overall, the findings underscore the role of ESG performance in shaping equity-based compensation structures and highlight equity incentives as a mechanism through which sustainability considerations are embedded into executive pay.

5.6. ESG Performance, Industry Sensitivity, and CEO Compensation Structure

Panel A of Table 6 reports baseline results using a binary classification of ESG-sensitive industries, consistent with Hypothesis 5. Across all specifications, ESG scores are positively and significantly associated with both equity-based and performance-based pay ratios, indicating that firms with stronger ESG performance rely more heavily on incentive-based compensation. More importantly, the interaction between ESG score and the ESG-sensitive industry indicator is positive and statistically significant. This finding suggests that the relationship between ESG performance and compensation design is amplified in traditionally ESG-sensitive industries—such as energy, utilities, healthcare, and consumer goods—where sustainability issues are more financially material and subject to heightened stakeholder and regulatory scrutiny.

Table 6. ESG Performance, Industry Sensitivity, and CEO Compensation Structure. This table examines whether industry-level ESG sensitivity moderates the relationship between ESG performance and CEO compensation structure. Panel (A) reports baseline results using a indicator for ESG-sensitive industries, while Panel (B) reports results using a continuous, SASB-based measure of industry ESG materiality. The dependent variables are the Equity-Based Pay Ratio (Columns 1–2) and the Performance-Based Pay Ratio (Columns 3–4). ESG performance is measured by the firm-level ESG Score. All regressions include standard firm-level control variables, firm fixed effects, year fixed effects, and industry fixed effects, as indicated. Standard errors are clustered at the firm level. Robust t-statistics are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Panel (A). ESG-Sensitive Industries				
Variables	Equity	Equity	Perf	Perf
ESG Score	0.0048 *** (2.89)	0.0062 *** (3.36)	0.0034 *** (2.62)	0.0047 *** (3.15)
ESG-Sensitive Ind.	0.010 (1.01)	0.008 (0.86)	0.007 (0.78)	0.005 (0.63)
ESG × ESG-Sensitive Ind.	0.0086 ** (2.03)	0.0118 ** (2.22)	0.0068 * (1.72)	0.0075 * (1.84)
Log(Assets)	−0.012 *** (−3.02)	−0.011 *** (−2.82)	−0.014 *** (−3.41)	−0.013 *** (−3.17)
ROA	0.015 (1.41)	0.014 (1.34)	0.011 (1.28)	0.010 (1.22)
Market-to-Book	0.011 * (1.88)	0.009 * (1.76)	0.009 * (1.71)	0.008 * (1.59)
Leverage	−0.016 * (−1.69)	−0.014 (−1.55)	−0.017 * (−1.74)	−0.015 (−1.62)
Stock Return (t − 1)	0.021 ** (2.16)	0.020 ** (2.09)	0.023 ** (2.26)	0.021 ** (2.17)
Firm FE	No	Yes	No	Yes

Year FE	No	Yes	No	Yes
Industry FE	No	Yes	No	Yes
Observations	15,232	15,232	15,232	15,232
Adj. R ²	0.179	0.306	0.191	0.317
Panel (B). SASB-Based Industry ESG Sensitivity				
Variables	Equity	Equity	Perf	Perf
ESG Score	0.0039 *** (2.74)	0.0051 *** (3.08)	0.0028 *** (2.33)	0.0039 *** (2.91)
SASB ESG Sensitivity	0.0060 (1.12)	0.0040 (0.88)	0.0050 (1.01)	0.0030 (0.74)
ESG × SASB Sensitivity	0.0124 *** (2.61)	0.0149 *** (2.83)	0.0091 ** (2.05)	0.0106 ** (2.24)
Log(Assets)	−0.011 *** (−2.89)	−0.010 *** (−2.74)	−0.013 *** (−3.22)	−0.012 *** (−3.06)
ROA	0.014 (1.39)	0.013 (1.32)	0.010 (1.27)	0.009 (1.20)
Market-to-Book	0.010 * (1.81)	0.009 * (1.74)	0.008 * (1.69)	0.007 * (1.58)
Leverage	−0.015 * (−1.67)	−0.013 (−1.52)	−0.016 * (−1.71)	−0.014 (−1.59)
Stock Return (t − 1)	0.020 ** (2.14)	0.019 ** (2.07)	0.022 ** (2.21)	0.020 ** (2.13)
Firm FE	No	Yes	No	Yes
Year FE	No	Yes	No	Yes
Industry FE	No	Yes	No	Yes
Observations	15,232	15,232	15,232	15,232
Adj. R ²	0.181	0.309	0.193	0.320

For example, in Column 2, the interaction coefficient of 0.0118 implies that ESG-oriented firms operating in ESG-sensitive industries allocate a substantially larger share of CEO compensation to equity-based pay relative to firms in non-sensitive sectors. Similarly, the interaction terms in Columns 3 and 4 indicate that industry sensitivity strengthens the association between ESG performance and the use of performance-based pay.

Panel B extends this analysis by replacing the binary industry classification with a continuous, SASB-based measure of industry ESG sensitivity that captures cross-industry variation in the financial materiality of environmental and social issues. Specifically, industry ESG sensitivity is constructed following the SASB (IFRS) materiality framework as the proportion of environmental and social sustainability topics identified as financially material for each industry. Firms are assigned this industry-level measure based on their primary Global Industry Classification Standard (GICS) industry, which is mapped to the corresponding SASB industry classification.

Consistent with Panel A, the interaction between ESG performance and SASB-based industry sensitivity is positive and statistically significant for both equity-based and performance-based pay ratios. Importantly, the interaction effects are stronger and more precisely estimated when industry sensitivity is measured using the SASB materiality framework. This pattern indicates that the moderating role of industry context is not an artifact of a coarse binary classification but reflects economically meaningful differences in ESG materiality across industries.

Taken together, the results in Panels A and B provide robust support for Hypothesis 5. They demonstrate that ESG performance is more strongly reflected in executive compensation structures in industries where sustainability issues are financially material. By showing that this pattern holds under both a baseline binary classification and a refined,

SASB-based measure, the findings underscore the importance of industry context in shaping how ESG considerations are translated into executive incentives.

5.7. ESG, Long-Term Incentives, and Innovation Outcomes

Table 7 reports the results from firm- and year-fixed-effects regressions examining the relationship between ESG performance, long-term-oriented CEO incentives, and firms' investment in innovation-related activities. Across all five dependent variables—R&D intensity, patent production, Total Q, knowledge capital (KK), and organizational capital (OK)—ESG performance is positively and significantly associated with greater innovation output. The coefficients on ESG Score range from 0.0038 to 0.0114, indicating that within-firm improvements in sustainability performance are accompanied by increases in both innovation effort and intangible value creation.

Table 7. ESG, CEO Incentives, and Innovation-Oriented Project Investment. This table reports regressions examining whether firms with higher ESG performance and long-term-oriented CEO incentives invest more in innovation-oriented projects. Dependent variables include R&D intensity, patent output, Total Q, knowledge capital (KK), and organizational capital (OK). Continuous variables are winsorized at the 1st and 99th percentiles. Firm, year and industry fixed effects included. Standard errors clustered at the firm level. Robust t-statistics are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Variables	R&D	Patent	Total Q	KK	OK
ESG Score	0.0038 *** (3.21)	0.0114 ** (2.19)	0.0072 *** (3.08)	0.0095 *** (2.89)	0.0061 ** (2.17)
LT CEO Incentives	0.052 *** (5.11)	0.124 *** (3.36)	0.087 *** (3.92)	0.071 *** (3.02)	0.056 ** (2.49)
ESG × Incentives	0.0061 ** (2.44)	0.0140 * (1.83)	0.0092 ** (2.36)	0.0123 ** (2.41)	0.0078 * (1.76)
Firm Size	−0.012 ** (−2.31)	−0.021 * (−1.71)	0.057 *** (6.01)	0.042 *** (4.81)	0.030 *** (3.31)
Profitability (ROA)	0.018 * (1.72)	0.041 * (1.95)	0.066 *** (3.09)	0.052 ** (2.47)	0.031 * (1.89)
Market-to-Book	0.005 * (1.94)	0.009 * (1.86)	0.018 *** (4.02)	0.014 *** (2.79)	0.010 ** (2.02)
Leverage	−0.011 * (−1.72)	−0.017 * (−1.66)	−0.022 ** (−2.41)	−0.015 * (−1.78)	−0.013 (−1.54)
Sales Growth	0.007 (1.43)	0.017 * (1.73)	0.004 (0.39)	0.008 (1.32)	0.006 (0.89)
Slack Capital	−0.014 * (−1.84)	−0.024 * (−1.92)	−0.020 * (−1.88)	−0.017 * (−1.74)	−0.015 * (−1.68)
Stock Return (t − 1)	0.008 * (1.67)	0.026 ** (2.21)	0.013 ** (1.98)	0.011 * (1.71)	0.010 (1.47)
Volatility	−0.014 * (−1.79)	−0.010 (−0.91)	−0.020 * (−1.88)	−0.015 * (−1.69)	−0.013 (−1.52)
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	15,232	15,232	15,232	15,232	15,232
Adj. R ²	0.41	0.25	0.52	0.45	0.38

Long-term CEO incentives, measured as the share of equity-based compensation in total CEO pay, show consistently positive and economically meaningful effects across all specifications. Because equity-based awards tie executive wealth to future firm value, a higher equity pay ratio reflects stronger long-horizon incentives. Firms whose CEOs

receive a greater proportion of equity-based compensation invest more aggressively in innovation-oriented activities and generate higher innovative output, as indicated by the sizable positive coefficients on LTI across all columns.

The interaction term between ESG performance and long-term incentives is positive and statistically significant in each model, suggesting that ESG and incentive structures operate as complementary governance mechanisms. This indicates that the innovation-enhancing effect of ESG performance is amplified when CEOs face stronger long-term incentive alignment; conversely, long-term incentives have a larger impact in firms with higher ESG standing. These findings provide strong empirical support for the hypothesis that ESG performance and long-term incentives jointly encourage firms to engage in innovation-oriented investment and intangible asset accumulation.

6. Discussion and Limitations

This study examines how ESG performance is reflected in CEO compensation design in U.S. publicly listed firms. The results show that firms with stronger ESG performance award lower levels of total CEO compensation while allocating a greater share of pay to performance-based and equity-based components. These findings are broadly consistent with prior evidence that stronger governance and stakeholder oversight constrain excessive executive pay and rent extraction [5,6,40]. They also align with the broader optimal contracting literature, which predicts that incentive intensity increases when monitoring improves and performance signals become more informative [2,7,52,53]. However, this study extends the existing literature by showing that ESG performance is not merely associated with pay restraint, but is systematically linked to a reconfiguration of compensation structure toward incentive-based mechanisms, suggesting a more substantive form of governance discipline.

This evidence complements and extends recent studies documenting the growing prevalence of ESG-linked compensation contracts [36–38]. Whereas prior work has primarily focused on whether ESG metrics are formally incorporated into compensation plans, the present findings suggest that realized ESG performance is reflected in actual compensation outcomes, including pay levels and incentive intensity. In this sense, the results go beyond symbolic adoption and are more consistent with an agency-based incentive-alignment interpretation than with purely reputational or symbolic explanations [35,39]. At the same time, stakeholder capitalism arguments suggest that ESG-linked compensation may serve both efficiency and legitimacy functions, particularly in environments characterized by heightened investor and societal scrutiny [34,43].

The analysis further highlights governance quality as a key mechanism conditioning the ESG–compensation relationship. The finding that governance quality strengthens pay–performance sensitivity is consistent with the classic agency literature, which emphasizes the role of effective boards and shareholder rights in enforcing incentive alignment and limiting managerial opportunism [5,24,27,28]. Importantly, this result clarifies the distinct role of governance in a sustainability context: governance does not merely overlap with ESG performance, but conditions whether ESG considerations are translated into substantive compensation discipline. This distinction helps reconcile mixed findings in prior studies that treat governance as a component of aggregate ESG measures without explicitly modeling its enforcement role [30,35].

Industry-level heterogeneity provides additional insight into the mechanisms underlying ESG-linked compensation. The stronger effects observed in ESG-sensitive industries are consistent with the ESG materiality literature, which shows that sustainability issues are more financially consequential in industries facing greater environmental and social exposure [30,42]. This finding extends prior international evidence documenting greater adoption of ESG-linked pay in high-impact industries and stronger regulatory

environments [44]. It also resonates with theories of incentive informativeness, which predict that compensation contracts respond more strongly when performance signals are economically meaningful [52,53].

At the same time, alternative interpretations of these findings warrant consideration. From a legitimacy or stakeholder-signaling perspective, ESG-oriented compensation practices may partly reflect firms' efforts to manage external perceptions rather than purely substantive changes in incentive alignment [35,39]. Managerial power theories further suggest that compensation structures may reflect rent extraction or symbolic compliance rather than optimal contracting [21–23]. Moreover, disclosure and transparency regimes may themselves influence compensation design by altering public scrutiny and reputational risk [60,61]. While the evidence on compensation structure and pay–performance sensitivity is more consistent with an incentive-alignment mechanism, these alternative explanations cannot be fully ruled out.

Beyond compensation design, the findings also speak to the broader literature on ESG and long-term strategic orientation. Prior studies show that ESG-oriented firms tend to invest more heavily in innovation and intangible assets [29,45]. The dynamic contracting literature emphasizes that long-horizon incentives mitigate managerial myopia and support sustainable value creation [46,49,50]. In addition, models of innovation incentives suggest that optimal compensation structures combine tolerance for short-term volatility with long-term reward mechanisms [51]. The present results complement this evidence by identifying executive compensation as a potential upstream governance channel linking ESG performance to downstream investment behavior. By associating ESG-aligned, long-term incentive structures with greater innovation-oriented investment, the analysis suggests that compensation design may help embed sustainability priorities into managerial decision-making.

Several limitations merit consideration. First, ESG scores—while widely used—are subject to measurement heterogeneity and rating divergence across providers [31,32]. Such divergence has been shown to influence capital allocation and firm behavior, raising important questions about construct validity and comparability [35]. Second, the analysis focuses on U.S. publicly listed firms operating within a relatively strong governance and disclosure regime [1], which may limit generalizability to other institutional environments. Third, future research could employ quasi-experimental designs—such as regulatory shocks, disclosure mandates, or say-on-pay reforms—to further strengthen causal inference [54–57].

Overall, the findings suggest that the growing prominence of ESG considerations is associated with meaningful changes in executive compensation design, particularly in settings where sustainability concerns are economically salient. By situating the results within the broader studies on optimal contracting, managerial power, ESG materiality, innovation incentives, and disclosure regulation, this study provides a more integrated theoretical foundation for understanding how ESG performance may shape internal incentive structures without overstating causal claims.

7. Conclusions

As sustainability has become a core strategic concern for firms, this study examines how ESG performance is reflected in the design of CEO compensation among U.S. public companies. Rather than reiterating the empirical results in detail, the concluding discussion emphasizes the governance and managerial implications of the findings.

From a governance perspective, the evidence suggests that boards can operationalize sustainability objectives not only by incorporating explicit ESG-linked performance metrics, but also by structuring executive compensation to emphasize performance-based and equity-based incentives. Compensation structure—through incentive intensity and pay–

performance alignment—emerges as a key mechanism for reinforcing managerial accountability and encouraging a long-term orientation. This insight is particularly relevant for firms seeking to move beyond symbolic ESG adoption toward more substantive implementation.

The findings further indicate that the governance role of compensation design is especially important in ESG-sensitive industries, where sustainability risks and stakeholder scrutiny are more financially material. In these settings, stronger long-term incentive alignment may help ensure that sustainability considerations are credibly embedded in managerial decision-making rather than treated as peripheral or transitory objectives.

More broadly, the results highlight that executive compensation functions as an upstream governance lever that shapes managerial attention, strategic priorities, and resource allocation. By aligning executive incentives with ESG performance, firms may be better positioned to support long-horizon investments, including innovation-oriented and intangible asset development, that are central to sustainable value creation.

Overall, the study underscores that aligning executive incentives with sustainability performance offers a viable pathway for embedding ESG considerations into corporate strategy. As stakeholder expectations regarding environmental and social responsibility continue to evolve, governance systems—particularly executive compensation—will play an increasingly critical role in balancing financial performance with broader societal goals over the long term.

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Conflicts of Interest: The author declares no conflicts of interest.

Appendix A

Table A1. Variable Definitions.

Variable	Definition
Log(Total Compensation)	Natural log of total CEO annual compensation, including salary, bonus, equity awards, and LTIPs
Performance-Based Pay Ratio	Ratio of performance-contingent pay (bonuses + LTIPs) to total CEO compensation
Equity-Based Pay Ratio	Ratio of stock grants and stock options to total CEO compensation
Pay–Performance Sensitivity (PPS)	Change in CEO wealth (options + stock holdings) per 1% increase in firm stock return (Core & Guay, 2002) [12]
ESG Score	Composite ESG performance score (0–100)
E Score	Environmental subcomponent of ESG score (0–100)
S Score	Social subcomponent of ESG score (0–100)
G Score	Governance subcomponent of ESG score (0–100)
Firm Size (Log Assets)	Natural log of total assets
Profitability (ROA)	Return on assets = Net Income/Total Assets

Market-to-Book	Ratio of market value of equity to book value of equity
Leverage	Total debt/Total assets
Sales Growth	Annual percentage change in net sales
Stock Return ($t - 1$)	Firm's annual stock return in year $t - 1$
Volatility	Standard deviation of monthly stock returns in year t
Slack Capital (Cash/Assets)	Cash and short-term investments/Total assets
ESG-Sensitive Industry	Dummy = 1 if firm belongs to industries with high ESG materiality (energy, utilities, healthcare, consumer goods)
Total Shareholder Return (TSR)	annual stock return including both capital gains and dividend payments, capturing the total return earned by shareholders over the fiscal year.

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