Human Capital Metrics and CEO Pay

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Abstract

Using a hand-coded sample of over 45,000 CEO compensation performance plans from 1998 to 2023, we provide a pioneering analysis of human capital-based (HC) performance metrics in CEO pay setting. In our large and comprehensive sample, the percentage of firms adopting HC-based plans rose from 4% in 1998 to 57% in 2023. We classify HC-plans into three types: Health and Safety (HS), Talent and Culture (TC), and Diversity, Equity and Inclusion (DEI). We find notable jumps in the prevalence of TC-based plans in 2018 and in DEI-based plans in 2021, aligning with shifts in investor perspectives and preferences. HC plans exist in all industries, and most firms adopt just one type. About two-thirds of HS plans use quantitative metrics, but only 18% of TC plans do. The magnitude of HC plan payouts has also increased dramatically from around 0.1 times salary in 1998 to over 1.8 times in 2023. Firms with larger workforces and greater reliance on human capital are more likely to adopt HC plans and offer larger plan payouts. Interestingly, CEOs with DEI plans based on qualitative metrics receive significantly higher payouts without delivering better firm performance than CEOs without HC plans. This raises concerns about the credibility of non-quantitative, non-financial metrics in providing performance incentives. Overall, our findings challenge the common practice of lumping E, S, and G metrics together and highlight the need to analyze each type of incentive metric separately.

JEL Classification: M12; M14; G30; J24

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1. Introduction

Corporate governance and compensation experts have noted an interesting trend: executive compensation programs increasingly include non-financial aspects of performance, especially environmental, social and governance (ESG) performance, in incentive compensation contracts (Badawi and Bartlett, 2024; Bebchuk and Tallarita, 2022; Flammer et al., 2019; Gantchev et al., 2025; Rajan et al., 2023). And while there is consensus that this is happening, there is less agreement as to why. Some commentators point to external forces such as societal expectations (Cohen et al., 2023), investor preferences (Dikolli et al., 2023; Wiersema and Koo, 2022), and regulatory pressure (Carter et al., 2023; Kimbro and Xu, 2016). Others emphasize internal forces such as employee activism (Foss and Klein 2023) or managerial rent-seeking (Hong et al 2016). There is also ongoing and vigorous disagreement over whether paying executives for non-financial performance is value creating or value destroying. Some argue the practice unfairly privileges some stakeholders over others (Bebchuk and Tallarita, 2022), adds unnecessary complexity to contracts (Albuquerque et al 2025; Burkert et al 2024), and undermines financial performance (Homroy et al 2023). Others emphasize the expanded role of the corporation in society, the importance of broader societal goals, and the need to prioritize stakeholders beyond shareholders (Magill, Quinzii, and Rochet, 2015; Flammer et al., 2019).

Our paper contributes to conversations and debates in the growing literature on ESG-based executive compensation (e.g., Cai, Jo and Pan, 2011; Flammer et al., 2019; Cohen et al., 2023; Tsang et al., 2021; Hazarika et al., 2022), but makes a distinctive contribution by focusing on a specific sub-category of ESG, human capital. Prior studies often lump environmental, social, and governance metrics together, despite the significant differences in their nature, implications, and

the firm outcomes they influence. This broad grouping complicates the development of clear hypotheses and hinders focused empirical analysis. In this paper, we focus exclusively on human capital metrics, a type of non-financial performance that falls broadly under the umbrella of corporate social responsibility (CSR) or environmental, social and governmental (ESG) performance, but can be distinguished from others. Human capital (HC) metrics encompass all of the factors related to attracting, retaining, and developing the people who comprise the workforce. This includes things like workforce demographics, engagement, health and safety, turnover, training investments and compensation practices.

Evidence suggests that for many years, the stock market largely overlooked the value of human capital (Edmans, 2011). In more recent years, the tide seems to have turned. Investors now increasingly recognize the growing significance of human capital (Yang 2023), particularly in sectors such as technology and services, where skilled labor is a key driver of competitive advantage (Regier and Rouen 2023). As further testimony to the importance of human capital for investment decisions, in July 2017, a group of institutional investors that collectively manage over 2.8 trillion in assets petitioned the SEC to increase human capital management disclosures (HCM Coalition, 2017). The SEC subsequently included a new rule in the 2020 Regulation S-K amendments, mandating that public companies in the U.S. describe their human capital resources in annual reports (Form 10-K).

We focus on HC metrics for two key reasons: 1) the ability to mobilize and motivate talent to achieve firm objectives has long been understood as an important driver of long-term firm financial performance (e.g., Becker, 1964; Zingales, 2000); and 2) managing human capital is clearly under the purview of firm leadership and necessarily the ultimate responsibility of the CEO.

Importantly, whether human capital performance should be a component of at-risk CEO compensation remains an open question. On the one hand, to the extent that effective human capital management is associated with firm financial outcomes, incentives based on financial performance should induce actions and behaviors consistent with effective human capital management. In this way, under an efficient contracting framework, there would be no need to explicitly compensate for human capital performance. Indeed, Badawi and Bartlett (20224) argue that paying for ESG performance is associated with inadequate corporate governance. On the other hand, specifically calling out human capital management as something for which executives are being held accountable can have powerful signaling effects and can be a relatively inexpensive way for firms to broadcast human capital-related commitments (Cohen et al., 2023).

Thus, we have four goals in studying CEO compensation plans that include HC metrics: (i) to provide a comprehensive description of these plans and their evolution over time, (ii) to analyze the characteristics of the firms that adopt HC performance plans for their CEOs, (iii) to examine the magnitude and importance of HC plan payouts on CEO incentives and total pay, and (iv) to examine the relationship between the adoption of HC performance plans and subsequent firm financial performance. To our knowledge, we are the first to analyze HC plans in such a detailed and comprehensive way. By doing so, we respond to Starks's (2023) call for more granular analysis of firms' individual E, S, and G policies.

We are particularly interested in assessing the extent to which the pattern of HC metrics in CEO compensation is evidence of efficient contracting versus executive rent-seeking. We are keen to explore whether the apparent uptick in HC-based compensation plans can be explained by changes in the industry and size mix of the large publicly-traded companies, and/or by recent shifts

in investor preferences. Lastly, we hope to shed light on the implications of HC metric adoption by examining how HC metrics relate to CEO pay levels and subsequent firm financial performance.

Our sample consists of 45,585 CEO performance plans from 1998 to 2023 that covers over 2,100 large publicly traded U.S. firms. To identify HC-based plans, we manually code through nearly 11,000 non-financial metrics attached to these CEO plans and classify a plan as HC-based if at least one of its performance metrics pertains to the firm's human capital. For deeper analysis, we further classify HC plans into three subcategories: i) employee health and safety (HS) plans, ii) diversity, equity, and inclusion (DEI) plans, and iii) talent and culture (TC) plans. Across the sample period, 12.3% of all CEO performance plans are HC-based and 20.3% of firms (48% after 2017) have adopted an HC plan at least once. In contrast, other non-HC ESG metrics account for only 3.9% of performance plans. This difference underscores the prevalence of HC performance metrics among non-financial measures in CEO performance plans. The average payout size of HC plans also grew substantially over time, rising from $91k in 1998 to $2.3 million in 2023.

After describing our sample in more detail, we begin our analysis descriptively. We first explore the time series trends of the HC plans. The percentage of firms granting HC plans rose gradually from 4 % in 1998 to 17 % in 2017, then jumped to 41 % in 2018 and to 52 % in 2021. The timing of these jumps aligns nicely with the 2017 HCM Coalition petition and the 2020 SEC rule change, which suggests that firms respond to shifting investor demands. This finding supports Edmans, Gosling, and Jenter's (2023) argument that boards are willing to revise pay designs to avoid backlash from stakeholders and the public. The 2018 jump is largely driven by new TC plans, while the 2021 jump is primarily driven by more DEI plans.

We then show that HC plans appear in every industry, and in most industries more than half of the firms have adopted them. Interestingly, the industries with low adoption rate include both

labor-intensive and capital-intensive industries, and the ones with the largest increases in HC plans also span both types. This suggests that a firm's use of human-capital metrics is influenced by factors beyond traditional considerations of labor or capital intensity.

We also explore how firms combine the three subcategories of HC metrics in their CEO performance plans in the post-2018 period. Among HC-granting firms, 80% adopt metrics from only one HC subcategory, with TC metrics being the most common (63%), followed by HS (12%) and DEI (5%). When firms incorporate metrics from two subcategories, they typically pair TC with another category; only about 3% combine HS and DEI. About 3% of firms include metrics from all three HC subcategories. The prevalence of single-subcategory plans suggests that individual firms pursue relatively focused human capital objectives.

Our detailed data allow us to distinguish between quantitative and qualitative metrics. A quantitative metric specifies a clear numerical target and a qualitative metric lacks a quantifiable hurdle and uses descriptive language. Among the three HC subcategories, 62% of the HS plans use quantitative metrics, compared to 43% for DEI plans and less than 18% for TC plans (Table 1.a). The percentage of HC plans using quantitative metrics increases over time, reaching 80% for HS plans, 59% for DEI plans, and 21% for TC plans by 2023.

In the second part of our paper, we conduct regression analyses to better understand who adopt HC plans and why. In the first phase of this work, we analyze the determinants of a firm's decision to adopt an HC performance plan. We primarily draw on matching theory (Gabaix and Landier, 2008) and incentive contracting theory (Holmstrom, 1979) to identify key determinants. Gabaix and Landier (2008) posit that the most talented executives are paired with the largest firms, and their pay therefore rises in proportion to firm size. Building on this logic, we expect CEOs with stronger human capital management abilities to be matched with firms with larger workforces, and

these firms, in turn, should incorporate HC metrics into CEO performance plans to reward the productive use of that talent.

Holmstrom (1979) suggests that CEO pay should be tied to observable outcomes to align managers' incentives with shareholders' interests. Firms with strong performance may see little need to add non-financial HC metrics to their CEO compensation plans. Cheng, Hong and Shue (2023) also show that CEOs whose pay is more tightly linked to stock performance are less likely to spend on CSR initiatives. By contrast, firms with weaker performance may be more inclined to adopt HC metrics either to keep CEO pay competitive for retention or because better human capital management has been identified as an area for improvement to drive future performance. Accordingly, we expect the likelihood of adopting HC plans to be negatively related to firm performance.

Holmstrom (1979) further argues that when a CEO is responsible for multiple dimensions of firm performance (e.g., financial performance and human capital management), tying CEO pay to a broader range of observable outcomes can better align the CEO's incentives with the firm's diverse objectives, reducing the risk of distorted incentives. Moreover, if human capital is a key long-term value driver for firms, as argued by Becker (1964), incorporating HC metrics into CEO incentive contract would guide CEOs to focus on this value-enhancing mechanism. Based on these arguments, we expect firms that rely more on human capital to be more likely to adopt HC plans and use measures of this characteristic as explanatory variables.

Based on the above discussions, we group explanatory variables into three sets. The first includes common firm characteristics, such as firm size, firm age, investment, and risk, that have been shown to influence compensation design by prior studies (e.g., Aggarwal and Samwick, 1999; Gaver and Gaver, 1993; Core, Holthausen, and Larcker, 1999). The second set consists of firm

performance measures, ROA and annual stock return. The third set includes proxies for human capital dependence, such as the disclosure of R&D expenditures and revenue per employee. We find the first set of variables alone can explain 17% of the variation in HC plan adoption. Adding performance variables barely changes the model's explanatory power, but adding the third set of human-capital variables raises it to just over 19 %, a 12 % increase, a 12% increase. The loadings on the variables match our expectations: human capital dependence is positively related to the likelihood of HC plan adoption, while performance is negatively related to the adoption likelihood.

We next consider the relation between investor influence and HC plan adoption. We confirm the sharp increases in 2018 and 2021, corresponding to the 2017 HCM Coalition petition and the 2020 SEC rule change, is statistically significant in a multivariate setting. We also find that firms are more likely to adopt HC plans after Say-on-Pay votes with lower shareholder support. These patterns hold when we add industry fixed effects using alternative classification schemes. Notably, once industry fixed effects are included, workforce size becomes positive and significant, suggesting that firms with workforces larger than their industry average, which may signal a greater reliance on human capital, drive their demand for HC-based CEO incentives.

We next provide more nuanced evidence on the determinants of plan design. Across the three HC subcategories, only three variables—workforce size, revenue per employee, and the Say-on-Pay (SOP) voting outcome—consistently predict the adoption of any specific HC metric. Within the subset of firms that already use HC metrics in CEO compensation, larger workforces, older firm age, higher risk, greater revenue per employee, and higher institutional ownership are all tied to larger HC-based payouts. Average HC-linked CEO pay rose by about 17 % after 2018 and by another 2.4 % after 2021, indicating that both adoption rates and payout sizes experienced two distinct jumps. When we analyze payout size by HC type, workforce size and revenue per

employee remain positive predictors for all three metric categories. Collectively, these findings support human-capital dependence as the key determinant of HC-plan adoption and size.

Lastly, we examine how HC-plan adoption relates to CEO pay size and subsequent firm performance. Because 95 % of HC plans are short-term, we compare short-term CEO pay in firms with HC plans to that in firms without them. Overall, we find no significant difference. Breaking the analysis into HC subcategories shows no association between CEO short-term pay and either HS or TC plans. In contrast, DEI plans are significantly positively related to short-term CEO pay. Further analysis reveals that the positive relation is driven by qualitative DEI plans rather than quantitative DEI plans. The short-term pay premium for qualitative DEI plans is economically significant as well–13.7% higher than in firms without HC plans. These findings remain robust when we use an entropy-balanced sample to address selection bias and are even stronger in first-time adoptions. We also observe higher pay premiums when plans contain multiple HC metric hurdles or span more than one HC metric type. Taken together, these results raise concerns about managerial rent-seeking, as the pay premium appears only in plans that are inherently harder for shareholders to monitor.

To examine whether the pay premium is associated with value creation, we compare firm performance after HC-metric adoption with that of firms without such metrics. Overall, post-adoption performance is similar across the two groups. In some cases, DEI metrics for operating performance and HS metrics for stock returns are even associated with weaker performance. These findings, coupled with higher CEO pay observed for DEI metrics, point to potential rent seeking behavior in some HC-adopting firms.

Our paper contributes to the long-standing literature on the importance of human capital (e.g., Becker, 1964; Berk et al., 2010l Carlin and Gervais, 2009; Zingales, 2000). Previous studies have

highlighted the role of human capital in driving firm value and competitive advantage. For example, Chemmanur, Cheng, and Zhang (2013) find that firms investing in human capital experience better innovation outcomes, while Eisfeldt and Papanikolaou (2013) demonstrate that firms with higher human capital exhibit stronger performance in terms of growth and asset productivity.

Recent studies focus on mandated Human Capital Management (HCM) disclosures and document their complexity and significant cross-sectional variation (Bourveau et al., 2023). They also find significant stock and bond market reactions to such disclosures, which support the importance of HCM (e.g., Regier and Rouen, 2023; Arif et al., 2023; Mayew and Zhang, 2024). Adding to these studies, we demonstrate significant cross-sectional and time-series variation in how firms adopt HC plans, suggesting that firms place varying levels of emphasis on different dimensions of human capital management. Our findings underscore the need to carefully examine the design of HC metrics, which can be essential for understanding their broader impact on firms. In particular, compared to TC and HS metrics, investors should pay closer attention to DEI metrics, especially the qualitative metrics that are more difficult to measure credibly and objectively.

2. Sample and Variable Construction

2.1. Sample

Our sample contains performance-based compensation plans granted to CEOs in the ISS Incentive Lab dataset from 1998 to 2023. We obtain plan participant data from the participant data table. CEO compensation variables (salary, bonus, etc.) are from the summary compensation table in Incentive Lab. Our sample consists of 45,585 CEO performance plans. Each performance plan could have more than one performance metric/goal (*absID*), which could be evaluated in one or multiple periods (*periodID*).

To obtain firm financial and stock return data from Compustat and CRSP, respectively, we merge the Incentive Lab dataset with the CRSP/Compustat merged database using each firm's Central Index Key (CIK). Information on institutional holdings is from the Thomson Reuters Institutional (13f) Holdings database. We obtain data on SOP voting outcomes from the ISS Voting Analytics database. We require all firm-year observations have non-missing values of stock return, total assets, and return on assets. The final sample includes 22,053 firm-year combinations *from 1998 to 2023*.

2.2. Classification of human-capital (HC) based plans

We start by downloading all performance metrics in ISS for the CEO performance plans in our sample. We separate financial vs. non-financial metrics based on ISS Incentive Lab variable "metrictype" and classify metrics as non-financial if "metrictype" is "CSR", "Environment", "Non-Financial", "Social", or "Other". However, only relying on this variable would omit many non-financial metrics. Therefore, we manually code the keywords to complement non-financial metrics. In total, we identified 10,853 absolute, non-financial performance metrics. We do not include plans that use relative performance metrics because only 1.5% of such plans have human capital metrics.

To identify HC plans, we manually code through the non-financial metrics following the procedure outlined in Appendix C. Once a metric is classified as HC-based, we further classify it into three non-mutually exclusive sub-categories: health and safety (HS), diversity, equity and inclusion (DEI), and talent and culture (TC). We do so by focusing on the ISS variable "metricother", an excerpt from firms' proxy statements about what performance metrics are. To classify a HC metric to as HS, DEI, or TC, the metric's description must contain one or more keywords from the relevant list, subject to a few noted exceptions. After the HC categories are

assigned, we tag all remaining non-financial metrics as environmental, broad ESG, governance, or other, again using their respective keywords. Because a single metric can match multiple keyword sets, these non-financial categories are not mutually exclusive. Appendix C provides the keywords and the procedure we followed to classify each of these metric types.

We classify each metric as either quantitative or qualitative. A quantitative metric specifies a clear numerical target, such as achieving "workforce diversity of 60.6%" (Verizon Communications, 2023 DEI plan). In contrast, a qualitative metric lacks a quantifiable hurdle and uses descriptive language, such as "improve safety and resiliency capabilities" (Edison International, 2021 HS plan). For the classification, we rely on Incentive Lab variables "metrictargetvalue" and "metricgrowthvalue", and the description of "metricother". To start, if either one of "metrictargetvalue" or "metricgrowthvalue" is not missing, then the metric is quantitative, otherwise it is qualitative. Nevertheless, classifying quantitative/qualitative metrics just from the first step is not good enough as firms are not required to provide the metric details to protect their proprietary information and many choose not to disclose. For these firms, we carefully screen "metricother" to determine if the description indicates a quantitative metric. Specifically, a metric is classified as quantitative when its description contains keywords that imply measurable quantities. Examples of such quantitative keywords include "measure", "reduction", "index", "record", "rate", and "result". As the final step, we manually verify the uncertain metrics to ensure accuracy. After the quantitative metrics have been identified, the remaining metrics are considered qualitative.

At the plan level, we consider a plan as an HC plan if at least one of its metrics is classified as HC. Similarly, a plan is classified as a HS, DEI, or TC plan if any of its metrics fall into the HS, DEI, or TC category, respectively. At the firm-year level, a company is classified as having an

HC-plan year if it adopts at least one HC plan during the fiscal year. Among these HC firm-years, a separate indicator is set for HS, DEI, or TC if the firm includes at least one plan of the corresponding type in that year. Similarly, a HC plan is classified as quantitative when it contains at least one quantitative HC metric. A firm-year is coded as having a quantitative HC plan if, during that year, the firm adopts at least one HC plan that contains a quantitative HC metric. The sample rule is applied to each of the three HC sub-categories when determining whether they are quantitative.

2.3. Variables for CEO performance plans

For each firm-year, we construct two sets of variables to capture the magnitudes of HC-based CEO pay and short-term CEO pay, respectively.

We calculate HC-based pay values according to the following rules. For cash HC plans, we primarily use the ISS variable "nonequitytarget" as the plan value and use the variable "grantdatefv" when available to make up missing "nonequitytarget" observations. As for equity HC plans, we use "grantdatefv". Next, for a firm-year, we sum up all HC plans' values to obtain the total HC-based pay value. Finally, we scale the total HC-based pay value of a firm-year by the CEO's base salary in that year. We follow the same approach to construct pay values for all three sub-categories.

We measure the total short-term CEO pay values for all plans, including both HC and non-HC plans, as follows. For the equity part of short-term plans, defined as those with a horizon of less than 16 months), we value it using the "grantdatefv".[1] For the cash part, we collect values for "short term" plans marked with award type "cashShort". Because SEC reporting rules changed in 2006, the values for cash plans differ by period. For fiscal years before 2006, we use CEOs' bonus

[1] We set 16 months as the cutoff because there are some plans with horizons of 13–15 months, which we also classify as short-term.

amounts as the short-term cash plan value. For 2006 and later, we use the "nonequitytarget" amount for short-term cash plans. In the transition year 2006, "nonequitytarget" is used when available; if it is missing, the bonus amount is substituted. Each short-term plan's value equals the sum of its equity component and its cash component. Summing these plan values across all short-term plans in a given firm-year produces the firm-year's total short-term pay value, which is then scaled by the CEO's base salary.

2.4. Variables for firm characteristics

We construct three sets of firm-level variables for our regression analyses: (i) basic firm characteristics (number of employees, firm age, capital expenditure, and stock volatility), (ii) performance measures (stock return and adjusted return on assets), and (iii) human-capital-related variables (R&D dummy and employee productivity). Specifically, firm age is measured as the number of years since 1920 (the start of CRSP data) or since the firm's initial public offering, whichever is later. Capital expenditures are scaled by total assets to account for differences in firm size. Stock volatility measures the overall firm risk level, which is the standard deviation of daily stock returns over the firm's fiscal year. Stock return is computed as the cumulative monthly returns over the firm's fiscal year. Adjusted return on assets (ROA) measures the firm's operating performance and is calculated as the industry-median adjusted operating income over assets. Nonmissing R&D equals one if a firm-year has non-missing R&D expense, and zero otherwise. Firms with non-missing R&D expense are considered to rely more on human capital. Lastly, the employee productivity is measured by revenue per employee with a higher value indicating that the firm relies more on its employees to generate revenue. All variable definitions are summarized in Appendix B.

To capture institutional investors' influence on CEO pay design, we construct two variables. The first is the total institutional ownership (*InstOwnPct*), which is the percentage of shares owned by all institutional shareholders. The second variable, SOP *vote support (VotedForPct)*, captures shareholder approval in the most recent Say-on-Pay (SOP) vote held before the start of the fiscal year in which the HC plans are granted. It is calculated as the ratio of the number of "for" votes to the total number of votes cast. Higher SOP vote support suggests that shareholders are more satisfied with the firm's executive compensation design. Since SOP voting began in 2011, the analysis involving this variable can only be conducted from 2011 onward.

2.5. Summary statistics for key variables

Plan-level summary statistics are shown in Table 1 Panel A. About 12.3% of CEO compensation plans in our sample include at least one HC metric, whereas only 3.9% are linked to ESG metrics. Of the 5,600 HC plans, 95.2% are short-term with an average (median) pay value for 1.6 (1.3) times the CEO's base salary. Plans with HS, DEI, and TC metrics account for 37.6%, 14.3%, and 6.82% of all HC plans, respectively. DEI plans have the highest pay value (2 times base salary), followed by TC plans (1.7 times) and HS plans (1.4 times). About 36% of HC plans include quantitative metrics. HS plans are most likely to have quantitative metrics (62.4%), DEI plans fall in the middle (43.1%), and TC plans are the least likely (17.6%).

Table 1 Panel B present summary statistics at the firm-year level. When aggregated at the firm-year level, 20.3% of CEO pay packages include HC metrics: 7.9% include HS metrics, 3.2% have DEI metrics, and 13.9% have TS metrics. Across all firm years, 7.5% of CEO pay packages include quantitative HC metrics and HC-based pay is 31.5% of base salary. On average, total short-term CEO pay equals about 1.8 times base salary, which implies that roughly one-sixth of CEO short-term pay is tied to HC metrics. It is worth noting that these firm-year estimates understate the

prevalence of HC plans, since they average across all firm-years, including those without any HC plans.

The last part of Panel B presents summary statistics for firm characteristics. The average (median) number of employees for our sample firms is 23,513 (9,200). Sample firms have an average (median) CRSP age of 27.7 (25). The CAPEX-to-asset ratio has a mean (median) of 0.046 (0.031). In line with overall market trends, the average (median) annual stock return is 15.3% (15.8%). Industry-median adjusted ROA shows a mean (median) of 0.009 (0.000), suggesting that the operating performance of our sample firms closely tracks that of their industry peers. About 44.1% of sample firms report R&D expenditures. Finally, revenue per employee averages $415,000, with a median of $238,000.

3. Empirical analysis

We begin by presenting comprehensive descriptive statistics on HC plans to understand their time-series trends, cross-sectional distribution, and adoption patterns. We then turn to multivariate regression analysis to address three key questions. First, which firms adopt HC plans, and why? Second, how does CEO pay differ between firms with and without HC plans. Third, what is the relation between HC plans and subsequent firm performance?

3.1. Descriptive statistics

Figure 1.a presents the time series trend of HC metric adoption. The percentage of firms including HC metrics in CEO pay increases gradually from 4% in 1998 to 17% in 2027, with many years seeing only marginal increases of 1% or less. Then, in 2018, there is a significant jump, from 17% to 41%. In 2021, there is a second, smaller jump, from 46% to 52%. The timing of these jumps aligns with the 2017 HCM Coalition petition and the 2020 SEC rule change, which suggests shifts in investor preferences as a potential driver for HC plan adoptions. To further understand

time trends in HC plan grants, we classify them into three subcategories: plans that include i) employee health and safety measures (HS plans), ii) diversity, equity, and inclusion measures (DEI plans), and iii) talent and culture measures (TC plans). Figure 1.b. presents the yearly adoption rates for the three HC metric types – HS, DEI, and TC. The figure shows that the 2018 jump is mostly driven by a surge in TC plans (orange bars), while the 2021 jump is mostly attributable to a rise in DEI plans (blue bars). Growth in HS plans, by contrast, is more gradual and steady.

Next, in Figure 2.a., we present the percentage of firms adopting HC metrics in CEO compensation by industry using the Fama/French 12-industry sector classifications. In seven of the twelve industry sectors, over 50% of firms have adopted HC metrics. The sectors with the highest percentage of adoptions are oil, gas, and coal extraction and products, and utilities (76%). The sectors with the lowest percentage of adoptions are wholesale, retail, and some services (36%), along with telephone and television transmission (40%). The former sector is generally considered to be labor-intensive while the latter is capital-intensive. The lower adoption rates in both sectors highlight the unique nature of human capital that is distinct from traditional notions of labor or capital intensity.

We then compare the adoption rates of HC metrics before and after 2018 in Figure 2.b. to identify which industries contributed most to the significant post-2018 increase. The industries that saw the largest increases in HC plans after 2017 are consumer nondurables, business equipment, telephone and television transmission, and finance. Again, these industry sectors represent a mix of sectors that are traditionally considered both labor- and capital-intensive.

In Figure 3, we further break down the pre- and post-2018 comparison by HC subcategories. We find that the utilities and oil, gas, and coal extraction sectors have the largest increases in HS metric adoptions, suggesting them as the primary drivers of the increase in HS metric adoption

post-2018 (Figure 3.a). All industries experienced a significant rise in DEI metrics from 2018 onward (Figure 3.b), with many recording adoption rates several times higher than their pre-2018 levels. Figure 3.c shows that TC metrics saw the largest growth in consumer nondurables and finance, rising to more than three times their pre-2018 levels. Nearly every industry more than doubled its adoption of TC metrics, with the exception of utilities and healthcare sectors.

To gain insight into how firms adopt HC plans, we explore the combinations of HS, DEI, and TC metrics in their CEO compensation plans (Figure 4). Given that TC and DEI metrics gained popularity mostly after 2018, we restrict this analysis to the post-2018 period. Among 48% of firms that include at least one HC metric in their CEO plans, 80% adopt metrics from only one HC subcategory. TC metrics are most common, used by 63% among HC-granting firms (30% of all firms), followed by HS metrics (12% of HC firms; 6% overall) and DEI metrics (5% of HC firms; 2% overall). When firms incorporate metrics from two subcategories, it is typically a TC metric combined with another, while only about 3% of HC-granting firms use both HS and DEI metrics. Less than 3.2% of HC-adopting firms (1.5% of all firms) include metrics from all three HC subcategories. The prevalence of single-subcategory plans suggests that individual firms pursue relatively focused human capital objectives.

Our detailed data allow us to analyze two main features of HC plans: metric design and payout magnitude. For metric design, we distinguish between quantitative and qualitative metrics. A quantitative metric specifies a clear numerical target, such as achieving "workforce diversity of 60.6%" (Verizon Communications, 2023 DEI plan). In contrast, a qualitative metric lacks a quantifiable hurdle and uses descriptive language, such as "improve safety and resiliency capabilities" (Edison International, 2021 HS plan). Figure 5 presents the time series trend of the adoption rates of quantitative HC metrics. The percentage of CEO compensation including

quantitative HC metrics increases over time, reaching 80% for HS metrics, 59% for DEI metrics, and 21% for TC metrics by 2023. The average payout size of plans with HC metrics also grew substantially over time, rising from $91k in 1998 to $2.3 million in 2023. Figure 6 shows that all three subcategories show significant growth in payout size, measured as multiples of CEO salary, with DEI metrics seeing the largest increases.

3.2. Multivariate analysis

3.2.1. Empirical model and motivation for determinants

We use the following multivariate model to examine which firms adopt HC metrics in CEO compensation plans:

$$HC\ Metric\ (0/1)_{it} = \alpha + \sum_{k=1}^{a}\beta_k Firm\ Characteristics_{k,it-1} + \sum_{k=a+1}^{b}\beta_k Firm\ Performance_{k,it-1} + \sum_{k=b+1}^{c}\beta_k HC\ Dependence_{k,it-1} + \sum_{k=c+1}^{d}\beta_k InvestorInfluence_{k,it-1} + \gamma_j + \mu_t + \varepsilon_{it} \quad (1)$$

For firm *i* in year *t*, the dependent variable, $HC\ Metric\ (0/1)_{it}$, is an indicator variable that equals one if the CEO pay package for that year contains HC-based performance metrics. Firm-level determinants are grouped into four categories as discussed in Section 2.4. To attenuate the reverse causality concern, we measure independent variables in the year prior. γ_j stands for industry fixed effects, and μ_t represents year fixed effects. To control for potential serial correlation and heteroskedasticity in the error term within firms, we cluster standard errors at the firm level.

It is important to note that the determinant analysis is descriptive rather than causal, aiming to reveal the characteristics of firms that adopt HC metrics in CEO performance plans. We follow the compensation literature to identify basic firm characteristics that have been shown to matter for CEO compensation design (e.g., Aggarwal and Samwick, 1999; Core et al., 1999; Gaver and Gaver, 1993). These include firm size, firm age, investment, risk, and performance. Given our

focus on human capital, we measure firm size using the number of employees. However, our results are robust to using total assets as the size measure.

To measure firm performance, we use annual stock return and industry-adjusted return on assets. Firms with strong performance may see less need to include non-financial HC metrics in their CEO compensation plans. In contrast, firms with weaker performance may be more inclined to adopt HC metrics either to keep CEO pay competitive for retention[2] or to incentivize CEOs to enhance human-capital management – an area identified as critical for driving future performance. Thus, we expect the likelihood of adopting HC metrics to be negatively correlated with firm performance.

We draw on matching theory (Gabaix and Landier, 2008) and incentive contracting theory (Holmstrom, 1979) to identify determinants that are unique for HC metric adoptions. Gabaix and Landier (2008) posit that CEOs are matched with firms in a competitive labor market based on their talent and compensation design reflects the matching. Supporting CEO-firm matching, Pan (2017) show that firms with specific characteristics – such as high R&D intensity – achieve greater productivity and offer higher CEO pay when paired with CEOs whose skills best fit those needs. Holmstrom (1979) further suggests that tying CEO pay to a broader range of observable outcomes (beyond financial metrics) can better align the CEO's effort with the firm's diverse objectives, reducing incentive distortions. Moreover, if human capital is a key long-term value driver for firms, as argued by Becker (1964), incorporating HC metrics into CEO incentive contracts focuses executive attention on managing this critical resource. Building on these insights, we hypothesize that firms whose success depends more on human capital will be more likely to grant HC-based

[2] From conversations with practitioners, we learned that firms may augment poor financial performance – especially when it is largely beyond the CEO's control – with non-financial metrics to keep CEO compensation competitive. In these situations, relying exclusively on financial targets could lead to low pay that spur unwanted turnovers.

compensation plans to both attract CEOs with higher HC management abilities and to reinforce that match through targeted incentives. To capture firms' reliance on human capital, we use an R&D-expenditure indicator as an input proxy and revenue per employee as an output proxy in our regressions. We expect both measures to be positively associated with firms' dependence on human capital and, in turn, with the likelihood of adopting HC metrics.

Lastly, the sharp upticks in HC metric adoption in 2018 and 2021 point to rising public and investor attention on human capital management as key drivers of post-2008 HC metric rollouts. The literature has long recognized the importance of institutional investors in shaping compensation design (e.g., Hartzell and Starks, 2003). The SEC's 2011 mandate of SOP advisory votes further facilitates investors' influence on executive pay. To capture institutional investor influence, we use two proxies: (i) the percentage of shares owned by all institutional shareholders, *InstOwnPct*, and the percentage of support firms receive in their most recent SOP vote, *VotedforPct*.

We report the correlations between the regression variables in Table 2. Consistent with their relevance, all correlations between the *HC Metric* indicator and the determinant variables are significant, except for firm size, *Ln (Employees)*. The inclusion of HC metric in CEO compensation is positively correlated with firm age, CapEx/Total Assets, and revenue per employee, and negatively correlated with firm risk, performance, and the presence of R&D expenditures. Pairwise correlations among the determinant variables all fall below 0.3, suggesting that multicollinearity is unlikely to be a concern for our regression estimates.

3.2.2. Which firms include HC metrics in CEO compensation plans?

Table 3 presents the estimations for Equation (1). To assess the incremental contribution of each determinant group to HC metric adoption, we introduce the four groups one at a time. In

Table 3 Panel A, we first include only basic firm characteristics in column 1, then add performance measures in column 2, and add employee dependence measures in column 3. Year fixed effects are included in all three models to control for market-wide shocks that may influence HC metric adoption. Consistent with the findings in the correlation table, the coefficients of firm age and CapEx/Total Assets are positive and significant, suggesting that older firms and firms with more capital investments are more likely to include HC metric in CEO compensation. Larger firms, however, are less likely to add HC metrics. The four basic firm characteristics alone can explain 17.1% of the variation in HC metric adoption. In column 2, both performance variables have significantly negative coefficients, which supports our expectation that good-performing firms are less likely to add HC metrics. Adding the performance variables, however, barely change the exploratory power of the model, with a R^2 of 17.2%. In contrast, adding the HC dependence variables in column 3 increases the R^2 to 19.1%, an 11.7% increase. The coefficient of the employee output variable, *Ln(Revenue/Employees)*, is positive and significant, which is consistent with the matching theory that firms are more likely to use HC metrics to incentivize CEOs when human capital is more important for the firm. The negative coefficient on the R&D reporting indicator, however, suggests that firms with R&D expenditure are less likely to adopt HC metrics.

In column 4, to assess the influence of investor attention in a multivariate setting, we add institutional ownership as a determinant and replace year fixed effects with two time indicators, a post-2018 indicator and a post-2021 indicator that equal to one for firm-year observations from 2018 and 2021 onward, respectively. The coefficient of *InstOwnPct* is insignificant, but the coefficients of the two time indicators are both positive and significant, which confirms the sharp increases in HC metric adoption in 2018 and 2021 observed in our trend analysis earlier. In column 5, we add the SOP outcome variable, *VotedForPct* and repeat the analysis for 2011 onward, when

the vote variable is available. The coefficient of the variable is significantly negative, suggesting that firms are less likely to include HC metrics when shareholders are already satisfied with executive compensation. Columns 6 and 7 present the full specification with all four groups of determinants, excluding and including the SOP variable, respectively. In both columns, *CapEx/Total Assets*, *Adj. ROA*, *Ln(Revenue/Employee)*, *VotedForPct*, and the time dummies continue to be significant determinants for the likelihood of including HC metrics in CEO compensation.

In Table 3 Panel B, we repeat the determinant analysis after including industry fixed effects. The first two columns are based on the whole sample and the last two columns are based on the SOP sample. In columns 1 and 3, we add industry fixed effects based on the Fama-French 12 industry classification. Adding industry fixed effects increases the model's R^2 from 19.1% in column 6 of Panel A to 23.1%, a 21% increase. For the SOP sample, the increase in R^2 is even larger, from 17.3% in column 7 of Panel A to 22%, a 27% increase. When using a finer industry classification that is based on the Fama-French 49 industry classification, the R^2 further increases by 1.1%, an 5% increase, and 2.8%, 12.7% increase, for the whole sample and SOP sample, respectively. After adding industry fixed effects, the coefficient of *CapEx/Total Assets* loses statistical significance, which suggests that the impact of capital expenditure on HC metric adoption as shown in Panel A largely reflects industry-specific factors. Interestingly, the coefficient of *Ln(Employees)* becomes significant and positive, which shows that firms with workforces larger than their industry peers are more likely to include HC metrics in CEO compensation. A firm's positive deviation from its industry's average employee size likely signals greater reliance on human capital, driving its demand for HC-based CEO incentives.

3.2.2. How firms choose between different types of HC metrics?

We use the same model specification as in Equation (1) to explore the determinants of each of the three HC metric types. Table 4 presents the regression results. The dependent variable is HS metric, DEI metric, and TC metric in columns 1-3, respectively. For each model, the sample includes firm-year observations that either include the specific HC metric type or include no HC metrics at all. In other words, the control group (firm-year observations without HC metrics) is identical across all three models, while the treated group differs according to the HC metric under study. The models all include industry fixed effects based on the Fama-French 12 industry classification. Post-2018 and post-2021 dummies are included in place of year fixed effects. Our results remain qualitatively similar if we use year fixed effects instead.

As shown in Table 4, firm size and *Ln(Revenue/Employees)* are the only two determinants that are significantly positively correlated with the inclusion of all three types of metrics in CEO compensation, supporting the importance of human capital reliance across all HC metric adoptions. Stock volatility is positively correlated with the likelihood of including HS metrics, suggesting that equity market risk proxies labor safety and health concerns. Stock returns show no significant relation with any HC metric type, whereas operation performance, industry-adjusted ROA, is negatively correlated with both HS and DEI metric adoptions. TC metric adoption is unrelated to all performance and risk measures. Interestingly, institutional ownership relates positively to the inclusion of HS and TC metrics but not DEI metrics. As shown in the last three columns for the SOP sample, higher SOP vote support is negatively related to all three HC metrics. This result suggests that firms are less likely to adopt any HC metric when shareholders already appear satisfied with executive pay design.

3.2.2. Determinants of HC-based pay levels

Within the sample of firms that include HC metric in CEO compensation, we further analyze what drives the size of HC-based pay. The model follows the specification in Equation (1), except that the dependent variable is the natural logarithm of pay levels. Table 5 presents the results. Column 1 includes all firm years with HC metrics in CEO pay and the dependent variable is the total value of plans with any HC metric, scaled by CEO base salary. The estimated coefficients show that larger firms (by workforce size), older firms, riskier firms, those with higher revenue per employee, and those with higher institutional ownership grant more HC-based CEO pay. In contrast, firms with higher capital expenditures grant less HC-based pay. The coefficients of both time indicators are positive and significant, indicating HC-based CEO pay rose about 17% after 2018 and then another 2.4% after 2021.

We then analyze pay size separately for each HC metric type in columns 2-4. Each specification includes only firm-year observations with the respective HC metric, resulting in sample sizes varying from 703 observations for DEI metrics to 3,039 observations for TC metrics. The coefficients of *Ln(Employees)* and *Ln(Revenue/Employees)* are consistently positive and significant across all three types of metrics, which supports the importance of human capital in determining the size of all HC-based pay. Institutional ownership also has a positive and significant coefficient across all three columns. In addition to these common determinants, HS-based pay level is also significantly related to firm age, risk, stock return, and R&D presence, while TC-based pay levels are negatively associated with capital expenditures.

While the coefficient of the post-2018 indicator remains positive and significant for all three HC metric types, the post-2021 indicator does not relate significantly to the size of metric-based pay. DEI-based pay had the most significant increase in size after 2018 (21.2%), followed by TC-based pay (17.7%), and then by HS-based pay (12.9%). Together, these results suggest that HC

metrics adoptions in 2018 are associated with larger pay plans, whereas the 2021 adoptions are not linked to higher pay plans.

In sum, Tables 3-5 demonstrate that employee count and revenue per employee are the most robust determinants of HC metric adoption and HC-based pay levels. These results align with matching theory, which posits that firms that depend heavily on human capital pair with CEOs who excel in human capital management, and reward them accordingly through HC-linked compensation.

3.4. The relation between human capital metrics and CEO pay

To assess the impact of HC metrics on CEO compensation, we compare the size of CEOs' short-term pay packages that include HC metrics with those that do not. We focus on short-term pay since over 95% of HC-linked plans fall into this category. Table 6 presents the results. The dependent variable is the natural logarithm of CEO short-term pay scaled by base salary plus one. The HC metric indicators are the primary independent variables of interest. Each model also controls for basic firm characteristics and performance variables, and includes industry and year fixed effects to account for cross-industry differences and market-wide trends in CEO short-term compensation.

In Panel A Column 1, the coefficient of *HC Metric* is positive but insignificant. When HC metrics are disaggregated into subcategories, the coefficient of the DEI metric indicator is positive and significant in column 3 when included alone and in column 5 when included alongside HS and TC metrics. The economic significance appears to be large too: CEO short-term pay is approximately 10% higher when DEI metrics are included than when they are not.

To address the possibility that firms adopt HC metrics differ fundamentally from firms that do not, we use an entropy balancing approach which ensures close to exact co-variant balance

between the treated and control observations without losing observations (Hartzmark, 2015; Heimer and Simsek, 2019). To apply entropy balancing, we first match observations with HC metric with observations without HC metric on industry, year, the four basic firm characteristics and two firm performance variables. We then use the matching estimates to re-weigh the sample observations. Regression results based on the entropy-balanced sample are presented in Table 6 Panel B. The coefficient of the *DEI* metric indicator continues to be positive with both economic and statistical significance similar to those in Panel A, which suggests that our findings are unlikely drive by self-selection bias.

In Panel C of Table 6, we repeat the analysis using only each firm's first HC metric adoption. This approach mitigates potential serial correlations in HC adoptions by excluding all subsequent firm years with HC metrics. Results in Panel C echo those in Panels A and B. Only the coefficient of first DEI adoptions is positive and significant. The economic significance, however, is higher than that found in earlier panels. CEO short-term pay is nearly 15% higher when DEI metric is first added to CEO pay. The amplified effect for first-time adoptions confirms that the inclusion of DEI metrics is a driving factor behind the higher short-term CEO pay.

To better understand why DEI metrics are associated with higher CEO pay, we further classify HC metrics into quantitative or qualitative categories. Table 7 Panel A presents the results. The model specification is the same as that for Table 6 except that we each HC metric indicator is replaced by two separate indicators – one for quantitative metrics and one for qualitative metrics. Among all HC indicators, only the qualitative DEI indicator has a positive and significant coefficient. This result implies that our findings on the DEI indicator in Table 6 are driven by qualitative DEI metrics. Because qualitative metrics are inherently harder to monitor, the associated higher pay may reflect managerial rent seeking.

Motivated by the insight that qualitative metrics are harder to monitor, we next analyze whether including multiple types of HC metrics, which further complicates monitoring, is likewise associated with higher CEO pay. In Table 7 Panel B, we find that it does. As shown in column 1, the coefficient of the multi-type HC metric indicator, which equals one if more than one types of HC metrics is included in CEO pay and zero otherwise, is positive and significant. In column 2, we use the count variable to substitute the indicator variables and again find a positive and significant coefficient. In column 3, we include separate counts for HS, DEI, and TC metrics. The coefficients of the DEI and TC counts are positive and significant, with the DEI coefficient being the largest in economic and statistical terms.

Together, Tables 6 and 7 show that CEO short-term pay is significantly higher when qualitative DEI metrics are included and when more HC metrics are added. These results raise the concern for managerial rent-seeking, since the pay premium appears only in plans that are inherently harder to monitor. To shed light on whether this higher pay reflects value creation or merely rent extraction, we next analyze firm performance following the adoption of HC metrics.

3.5. The relation between human capital metrics and firm outcomes

In this section, we analyze firm performance following the adoption of HC metrics in CEO compensation. On the one hand, if HC metrics motivate CEOs to improve human capital management, we should observe improvements in both operating performance and stock returns. On the other hand, if firms include HC metrics merely to signal alignment with market trends and investor preferences, we would expect no meaningful impact on performance. Moreover, given the difficulty of monitoring these metrics, they may serve as a tool for CEOs to secure higher pay. Results in Table 6 and 7 appear to be consistent with this concern.

To examine the relation between firm performance and HC metric adoption, we regress firm performance in the one, two, and three years following HC metric adoption on the HC metric indicators. Table 8 presents results for operating performance, *ROA*, while Table 9 reports results for stock performance, *BHAR*, measured as buy-and-hold market adjusted returns over the same one, two, and three-year periods. All models include the same set of controls and fixed effects as in Table 6. We also include lagged ROA and BHAR to control for the potential reversal or momentum in performance.

As shown in Table 8 Panel A, the coefficient of *HC metric* is insignificant in the first three columns, suggesting no association between HC metric adoption and operating performance in the first three years post-adoption. In columns 4-6, where HC metrics are disaggregated into HS, DEI, and TC subcategories, all coefficients remain insignificant except for the DEI metric indicator in column 4. The negative coefficient suggests that firms with DEI metrics experience weaker operating performance in the year of adoption.

To mitigate potential selection bias in HC metric adoptions, we repeat the analysis using the entropy balancing approach described earlier and present the results in Table 8 Panel B. The coefficient of the HC metric indicator is again insignificant in the first three columns. Across the subcategories, the coefficient of the DEI metric indicator is negative in all three columns and statistically significant in two. This result is more consistent with the rent seeking interpretation that the DEI-linked CEO pay premium is not backed by superior firm performance.

Table 9 Panel A shows that post-adoption stock performance is unrelated to any HC metric indicator. In Panel B, after entropy balancing, all coefficients of the HC metric indictors remain insignificant except for a significant negative HS metric in column 6. These findings support our conclusion from Table 8 that HC metric adoptions are not associated with better firm performance.

Taken together, the results in Tables 8 and 9 suggest that post-adoption firm performance is largely indistinguishable between firms with and without HC metrics. In some cases, DEI metrics for operating performance and HS metrics for stock returns are even associated with weaker performance. These findings, coupled with higher CEO pay observed for DEI metrics, point to potential rent seeking behavior in some HC-adopting firms.

4. Conclusion

Our paper documents a dramatic increase in the use of HC metrics in CEO compensation over the past decade. We show that the increase occurs across all industries and involves HC-linked pay elements that reach multiples of CEOs' base salaries. Moreover, the trend has unfolded in two waves: a surge in diversity, equity, and inclusion metrics after 2018, followed by a jump in talent and culture metrics after 2021. Such a pronounced shift in compensation design raises a natural question: which firms add HC metrics, and what drives their decisions? Although human capital's importance to firm success has long been recognized (Becker, 1964), the recent surge in HC metrics in CEO pay suggests new forces at work. We investigate these by linking metric adoption to firms' human-capital reliance, governance structures, and investor pressures.

Our analysis identifies several firm characteristics that help explain the inclusion of HC metric in CEO pay. Supporting the CEO-firm matching theory, firms that depend more on human capital, such as those with larger workforces and higher revenue per employee, are significantly more likely to adopt HC metrics. Reflecting the broader investor shift toward stakeholder welfare, firms with higher institutional ownership and those receiving lower support in their most recent SOP vote are also more likely to adopt HC metrics. Finally, consistent with the existing literature that typically finds no strong relation between ESG compensation metrics and firm financial

performance (e.g., Homroy et al., 2023), we find that firm performance shows no relation or a negative relation with HC metric adoption.

The inclusion of HC metric in CEO compensation appears to have minimal association with the CEO pay size or with firm performance after adoption. Notably, however, including DEI metrics, especially qualitative ones, is linked to higher CEO pay without accompanying improvements in operating or stock performance. These findings are more consistent with a rent-seeking explanation than with optimal contracting.

Our research has implications for researchers, investors, and policymakers. For researchers, we show that human capital metrics are distinct from other E.S.G. metrics and merit independent consideration. The strong association between firms' reliance on human capital and their adoption of HC metrics in CEO compensation underscores the benefit of a more focused approach – matching firm characteristics with targeted performance metrics yields sharper and deeper understanding of CEO pay design. For investors, the rise of non-financial metrics poses both opportunities and risks. While HC metrics can signal a firm's commitment to long-term value creation, their relative opacity may exacerbate agency concerns. Investors should therefore scrutinize not just the presence of non-financial targets but also their monitoring mechanisms and the broader governance context. For policymakers, the increasing shift from shareholder primacy toward broader stakeholder mandates calls for careful calibration of disclosure requirements. As regulators consider new ESG reporting standards, they must balance transparency with the practical challenges of measuring and overseeing non-financial outcomes. Clear guidance on metric selection and oversight will be key to harnessing the benefits of HC reporting while mitigating unintended consequences.

Appendix A. Human Capital Coding Guidelines

A.1. Coding outline

Step 1: Separate Financial metrics, and start with all Non-Financial metrics based on ISS classifications. A metric is identified as non-financial if ISS variable "metrictype" equals CSR, Environment, Non-Financial, Other, or Social.

Step 2: Evaluate all ISS Non-Financial Metrics to identify Human Capital Metrics.

We rely on the "MetricOther" variable in Incentive Lab and manually code individual metrics following the rules and keywords described in the subsequent sections. Once a metric is identified as a human capital metric, we set "primary type" of the metric= "Human Capital" then further classify it into three subcategories (Note that the subcategories are not mutually exclusive):

- DEI
- Health and Safety
- Talent and Culture

A.2. Keywords and rules for HC metrics

To classify a plan as in the "DEI" subcategory, we require the following:

- Include one or more of the following keywords in "Metric Other":
  "Diversity", "Equity", "Inclusion" or "DEI", "inclusive ", "diverse", "de&i", "d&I", "i&d", "female"; "multicultural";"execute diversification initiatives"; "i&d initiatives"; "women";" underrepresented"; "of color";"representation";"gender"; "diversify and grow"; "urm"; "black"; "veterans"; "minorit*"; "dib";"erg"
- When metrictype="social" + metric="diversity" and "Metric Other" contains the following keywords:
  - "esg", "social"
- Exceptions:
  - "equity renewable fuels production (mbpd)" for Chevron Corporation in 2023 is classified as "environmental" because it appears to be a typo in Incentive Lab.

To classify a plan as in the "Health & Safety" subcategory, we require the following:

- Include one or more of the following keywords in "Metric Other":
  "Health*", "Safe*", "injur*", "inciden*", "emergency response", "accident", "wellness" + "employee", "dart" (Days Away, Restricted, or Transferred), "trr" (Total Recordable Incident Rate), "lwcr" (Lost Workday Case Rate), "hse"(Health, Safety, and Environmental (HSE)); "hs&e"; "ehs"; "eh&s"; "fatalit*"; "damage prevention"; "collision"; "osha", "lces" (Lookouts, Communications, Escape Routes, and Safety Zones); "irr" (Injury/Illness Incident Rate); "lost workday"; "human performance event"; "lost time"; "FSI"(Field Safety Index);"NSC"(National Safety Council); "total preventable recordable rate"; "days"+"away"; "life changing"; "fatigue"; "critical control"; "total recordable"; "LCE"("lces" (Lookouts, Communications, Escape Routes);"wire-down"; "stretching"; "SIF" (serious incident &fatality);"severity"; "containment"; "lone worker

technology"; "fire ignitions"; "trir";"ticr"; "iir";"employee"+"release"; "human error releases"; "palo verde"

- When metric="staff health" and "Metric Other" contains the following keywords:
  - ""operational and values", "operating errors" "exposure reduction"; "regulatory and environmental events"; "care"; "tier";"she"; "zero harm"; "gas"; "hazard"
- Exceptions:
  - "healthy planet" for Walgreens Boots Alliance, Inc. in 2023; "healthcare events"; "launch four healthcare compliance online modules"; "healthcare compliance improvement plan"; "black maternal health" for Anthem, Inc. in 2021; "associate support of community health services" for Anthem, Inc. in 2021; "customer service and safety"; "environmental safety"; "safety - environmental stewardship"; "emphasize the significance of achieving compliance safeguarding the environment protection"; "safeguard"; "environmental incident"; "nerc compliance - reduction in nerc compliance incidents"; "environmental severity rate (spills) (produced fluid release rate (pfrr))"; "total recordable environmental rate"

To classify a plan as in the "Talent and Culture" subcategory, we require the following:

- Include one or more of the following keywords in "Metric Other":
  "individual", "person*", "people", "employee", "talent", "human", "Mindset", "ethic*", "integrity", "culture", "tone at the top", "retention", "staff"; "enps" (Employee Net Promoter Score); "succession", "labor", "workforce", "team"; "training"; "workgroup"; "colleague"; "engagement"; "leader*";" recruit";"ferc compliance";"volunteer*"; " best place to work"; "co-workers";"community involvement";"community index"; "building and maintain investment community credibility"; "mentoring"; "cultural"; "high-perform"; "retain"; "attrition"; "opportunity index"; "organizational education achievements"; "mentor"; "associate experience"; "launch and define internal esg committee"; "engage"+"modifier"; "scorecard"; "ability to manage","consistency among members of the management team"; "turnover"; "2019 key performance indicators" (for PDC Energy, Inc.), "compliance" + metric="individual"; "building and maintaining investment community credibility"
- Exceptions:
  - "personal" + subcategory1="health and safe"; "peoples gas"; "people of color"; "people : racial/ethnic diversity representation"; "people : female representation"; "people diversity equity and inclusion"; "people safety"; culture diversity and inclusion; "diverse and inclusive culture"; culture diversity equity; culture that values diversity equality; culture of inclusion; culture + subcategory1="health and safety"; "employee" + subcategory1="dei" or "health and safety"; "promote the long-term diversity of staff members"; "developing diverse talent", "development of diverse talent"; "human" + subcategory1="dei" or "health and safety"; "human rights"; "human error releases"; "integrity" + subcategory1="health and safety"; "student retention"; "staff" + + subcategory1="dei"; "workforce diversity" or "diverse workforce"; "diverse leadership team"; "employee engagement survey scores for inclusion index"; "diversity inclusion belonging and engagement";

Engagement + subcategory1="health and safety"; "strategic objectives (recruitment & retention of a diverse workforce)"; "emphasize diversity in hiring retention & promotion"; "improve attraction promotion and retention of females in leadership roles."; "leadership" + "environmental"; "leadership" + subcategory1="dei"; "financial controls compliance leadership and corporate responsibility"; "improve our culture of inclusion and the attraction promotion and retention of women in l"; "focus on attracting developing engaging retaining and rewarding a diverse employee base"; "reduction of the voluntary attrition of underrepresented groups"; "voluntary turnover of women and ethnic minorities"; "scorecard" + subcategory1="dei" or "health and safety"

A.3. Cases need attention:

Is "Risk" culture?

- If there are other keywords combined with risk, the category is classified based on the other keywords. For example, "safety- risk level 3 events" is "health and safety" under "human capital". When it is risk by itself, it is classified based on "metric".

"community":

- Be careful with the word "community" – e.g. "Discharge to Community" is "other" non-financial performance for a healthcare company; "Community Count" for housing developers but "Community Associate Turnover" is indeed a human capital/talent and culture measure. Vague mentions of Community are not HC, for example, "Community Events" is Broad ESG, not HC.

"placement":

- In total, we have 17 cases with "placement" in "metric" column. Only the ones contain "diversity" + "placement" are classified as "human capital" – "dei". The other cases are either "other" or environmental.

"volunteer":*

- Only explicit mention of employee volunteering is treated as HC.

When it mentions health/safety with Training –

- Should be recorded as both Health and Safety and Talent and Culture. – Done.
- The same rule is applied to when DEI with training mentioned – both DEI and Talent and Culture are flagged.

"Leadership":

- 222 metrics contain "leader*". Among them, 17 contain "environmental leadership", which are classified under "environmental" in "Primary Type", not as HC.

Appendix B. Variable Definitions

Variable Name	Data Source	Variable Definition
HC Metric (0/1)	ISS Incentive Lab	1 if a firm-year has at least one plan that contains human-capital metric(s), 0 otherwise.
HS Metric (0/1)	ISS Incentive Lab	1 if a firm-year has at least one plan that contains health and safety metric(s), 0 otherwise.
DEI Metric (0/1)	ISS Incentive Lab	1 if a firm-year has at least one plan that contains DEI metric(s), 0 otherwise.
TC Metric (0/1)	ISS Incentive Lab	1 if a firm-year has at least one plan that contains talent and culture metric(s), 0 otherwise.
HC – Quantitative (0/1)	ISS Incentive Lab	1 if a firm-year has at least one plan that contains quantitative human capital metric(s), 0 otherwise.
HC – Qualitative (0/1)	ISS Incentive Lab	1 if a firm-year has at least one plan that contains qualitative human capital metric(s), 0 otherwise.
HS – Quantitative (0/1)	ISS Incentive Lab	1 if a firm-year has at least one plan that contains quantitative health and safety metric(s), 0 otherwise.
HS – Qualitative (0/1)	ISS Incentive Lab	1 if a firm-year has at least one plan that contains qualitative health and safety metric(s), 0 otherwise.
DEI – Quantitative (0/1)	ISS Incentive Lab	1 if a firm-year has at least one plan that contains quantitative diversity, equity, and inclusion metric(s), 0 otherwise.
DEI – Qualitative (0/1)	ISS Incentive Lab	1 if a firm-year has at least one plan that contains qualitative diversity, equity, and inclusion metric(s), 0 otherwise.
TC – Quantitative (0/1)	ISS Incentive Lab	1 if a firm-year has at least one plan that contains quantitative talent and culture metric(s), 0 otherwise.
TC – Qualitative (0/1)	ISS Incentive Lab	1 if a firm-year has at least one plan that contains qualitative talent and culture metric(s), 0 otherwise.

HC-Based Pay/Salary	ISS Incentive Lab	Sum of all HC plan values of a firm-year scaled by CEO's salary of that firm-year.
CEO Short-Term Pay/Salary	ISS Incentive Lab	Sum of all short-term total plan values (both cash and equity) of a firm-year scaled by CEO's salary of that firm-year.
Employees	COMPUSTAT	The number of employees of a firm-year (*in 000s*).
Firm Age	COMPUSTAT	The number of years of since the initial public offering year (first non-missing PRCC_F in COMPUSTAT).
Capital Expenditures	COMPUSTAT	Capital expenditures scaled by the total assets of the previous year. *CAPX/AT_LAG*.
Stock Volatility	CRSP	Standard deviation of daily stock returns of the fiscal year.
Stock Return	CRSP	Annual stock return is the cumulative geometric sum of monthly stock returns for the fiscal year.
Adj. Return on Assets	COMPUSTAT	Operating income before depreciation scaled by total assets of the previous year, adjusted by the median ROA of the corresponding (Fama-French 48) industry in the same year. *OIBDP/AT_LAG – ROA_industry_median*.
Nonmissing R&D	COMPUSTAT	1 if the firm-year has non-missing R&D expense observation, 0 otherwise.
Revenue/Employees	COMPUSTAT	Sales revenue (*in 000,000s*) scaled by the number of employees (*in 000s*). *SALE/(EMP*1000)*.
InstOwnPct	Thomson Refinitiv	Total number of shares held by institutions divided by the total number of shares outstanding.
VotedForPct	ISS Voting Analytics	Ratio of the number of "for" votes to the total number of votes cast

First HC Adoption (0/1)	ISS Incentive Lab	1 if a firm-year adopts human capital metrics for the first time ever, 0 otherwise
First HS Adoption (0/1)	ISS Incentive Lab	1 if a firm-year adopts health and safety metrics for the first time ever, 0 otherwise
First DEI Adoption (0/1)	ISS Incentive Lab	1 if a firm-year adopts diversity, equity, and inclusion metrics for the first time ever, 0 otherwise
First TC Adoption (0/1)	ISS Incentive Lab	1 if a firm-year adopts talent and culture metrics for the first time ever, 0 otherwise
Multitype_HumanCapital (0/1)	ISS Incentive Lab	1 if a firm-year has more than one appearance of human capital metrics, 0 otherwise.
Singletype_HumanCapital (0/1)	ISS Incentive Lab	1 if a firm-year has and only has one appearance of human capital metric in all of the plans, 0 otherwise.
#HumanCapitalMetrics	ISS Incentive Lab	The total number of appearances of human capital metrics of all the plans in a firm-year.
#HS	ISS Incentive Lab	The total number of appearances of health and safety metrics of all the plans in a firm-year.
#DEI	ISS Incentive Lab	The total number of appearances of diversity, equity, and inclusion metrics of all the plans in a firm-year.
#TC	ISS Incentive Lab	The total number of appearances of talent and culture metrics of all the plans in a firm-year.
ROA	COMPUSTAT	Operating income before depreciation scaled by total assets at the beginning of the year, *OIBDP/AT_LAG*.
ROA Year 1	COMPUSTAT	Return on assets for the first year following the current year.
ROA Year 2	COMPUSTAT	Return on assets for the second year following the current year.

BHAR	CRSP	Buy and hold abnormal return. Calculated as the difference between the holding period return of a stock in a firm-year and the contemporaneous market holding period return.
BHAR Year 1	CRSP	Buy and hold abnormal return for the first year following the current year.
BHAR Year 2	CRSP	Buy and hold abnormal return for the second year following the current year.

References:

Albuquerque, A., Carter, M., Guo, M., and Lynch, L., (2022). Complexity in compensation contracts. Boston University working paper.

Aggarwal, R. K., and Samwick, A. A. (1999). The other side of the trade-off: The impact of risk on executive compensation. *Journal of Political Economy*, 107(1), 65-105.

Arif, S., Banker, D., and Wasley, C. E. (2023). Human capital management disclosures and firm performance. *Review of Accounting Studies*, Forthcoming.

Badawi, A.B., and Bartlett, R. (2024) ESG Overperformance? Assessing the Use of ESG Targets in Executive Compensation Plans (August 29, 2024. Stanford Law and Economics Olin Working Paper No. 592., Rock Center for Corporate Governance at Stanford University Working Paper No. 257., European Corporate Governance Institute – Finance Working Paper No. 1025/2024., Stanford Public Law Working Paper Available at SSRN: https://ssrn.com/abstract=4941016

Bebchuk, L. A., and Tallarita, R. (2022). The illusion of shareholder purpose. *Cornell Law Review*, 107(1), 91-178.

Becker, G. S. (1964). *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. University of Chicago Press.

Berk, J. B., Stanton, R., and Zechner, J. (2010). Human capital, bankruptcy, and capital structure. *Journal of Finance*, 65(3), 891-926.

Bourveau, T., Loumioti, M., Wang, X., and Wysocki, P. (2023). Human capital disclosures: Evidence from mandatory HCM reporting. *The Accounting Review*, Forthcoming.

Burkert, S., Oberpaul, T., Tichy, N., & Weller, I. (2024). Executive compensation complexity and firm performance. *Academy of Management Discoveries*, 10(2), 273-306.

Cai, J., Jo, H., and Pan, C. (2011). Vice or virtue? The impact of corporate social responsibility on executive compensation. *Journal of Business Ethics*, 104(2), 159-173.

Carlin, B. I., and Gervais, S. (2009). Work ethic, employment contracts, and firm value. *Journal of Finance*, 64(2), 785-821.

Carter, M. E., Pawliczek, A., & Zhong, R. I. (2023). Say on ESG: The adoption of say-on-pay laws, ESG contracting, and firm ESG performance. *European Corporate Governance Institute–Finance Working Paper*, (886).,

Chemmanur, T. J., Cheng, Y., and Zhang, T. (2013). Corporate innovation and the value of human capital. *Journal of Financial and Quantitative Analysis*, 48(3), 849-885.

Cheng, I., Hong, H.**, and Shue**, K. (**2023**)**.** Do managers do good with other people's money?" *Review of Corporate Finance Studies,* 12 (3), 443–487.

Cohen, S., Kadach, I., Ormazabal, G. and Reichelstein, S. (2023), Executive Compensation Tied to ESG Performance: International Evidence. *Journal of Accounting Research*, 61: 805-853.

Core, J. E., Holthausen, R. W., and Larcker, D. F. (1999). Creorporate governance, chief executive officer compensation, and firm performance. *Journal of Financial Economics*, 51(3), 371-406.

Dikolli, S.S., Frank, M.M., Guo, Z., and Lynch, L.J. (2023). ESG Mutual Fund Voting on Executive Compensation Shareholder Proposals. *Journal of Management Accounting Research*, 35(3): 51–74.

Edmans, A. (2011). Does the stock market fully value intangibles? Employee satisfaction and equity prices. *Journal of Financial Economics* 101(3):621-640.

Edmans, A., Gosling, T., and Jenter, D. (2023). CEO compensation: Evidence from the field." *Journal of Financial Economics,* 150 (3), 103718.

Eisfeldt, A. L., and Papanikolaou, D. (2013). Organization capital and the cross-section of expected returns. *Journal of Finance*, 68(4), 1365-1406.

Flammer, C., Hong, B., and Minor, D. B. (2019). Corporate governance and the rise of integrating corporate social responsibility criteria in executive compensation: Effectiveness and implications. *Strategic Management Journal*, 40(7), 1097-1122.

Foss, N. J., & Klein, P. G. (2023). Why do companies go woke? *Academy of Management Perspectives*, 37:351–367.

Gabaix, X., and Landier, A. (2008). Why has CEO pay increased so much? *Quarterly Journal of Economics*, 123(1), 49-100.

Gantchev, N., Giannetti, M., and Hober, M., (2025) Beyond ESG: Executive Pay Metrics and Shareholder Support. FEB-RN Research Paper No. 26/2024, European Corporate Governance Institute – Finance Working Paper No. 1020/2024, Available at SSRN: https://ssrn.com/abstract=4983921 or http://dx.doi.org/10.2139/ssrn.4983921

Gaver, J. J., and Gaver, K. M. (1993). Additional evidence on the association between the investment opportunity set and corporate financing, dividend, and compensation policies. *Journal of Accounting and Economics*, 16(1-3), 125-160.

Hazarika, S., Karpoff, J., and Nahata, R. (2022). Board monitoring and firm social performance: The role of diversity and ESG-based executive compensation. *Review of Financial Studies*, 35(4), 1789-1820.

Hartzell, J., and Starks, L., 2003. Institutional investors and executive compensation. *Journal of Finance* 58, 2351–2374.

Hartzmark, S. M. 2015. The worst, the best, ignoring all the rest: The rank effect and trading behavior. *The Review of Financial Studies* 28, 1024-1059.

Heimer, R., A. Simsek, 2019. Should retail investors' leverage be limited? *Journal of Financial Economics* 132, 1-21.

Holmstrom, B. (1979). Moral Hazard and Observability. *The Bell Journal of Economics*, 10(1), 74–91.

Homroy, S., Mavruk, T., and Nguyen, V.D. (2023). ESG-linked compensation, CEO skills, and shareholder welfare, *The Review of Corporate Finance Studies*, 12(4), 939–985.

Hong, B., Li, Z. and Minor, D. (2016), Corporate governance and executive compensation for corporate social responsibility, *Journal of Business Ethics*, 136(1), 199-213.

Human Capital Management Coalition. (2017). Petition for Rulemaking to Require Issuers to Disclose Information about Human Capital Management Policies, Practices, and Performance. U.S. Securities and Exchange Commission. Available at: https://www.sec.gov/rules/petitions/2017/petn4-711.pdf.

Kimbro, M.B. and Xu, D. (2016). Shareholders have a say in executive compensation: Evidence from say-on-pay in the United States. *Journal of Accounting and Public Policy*, 35(1), 19-42.

Magill, M., Quinzii, M., and J. Rochet. (2015). A theory of the stakeholder corporation. *Econometrica*, 83(5) 1685–1725.

Mayew, W. J., and Zhang, T. (2024). COVID-19 human capital management response and firm value. *Journal of Management Accounting Research,* 36 (3): 153–175.

Pan, Yihui. (2017). The determinants and impact of executive–firm matches. *Management Science* 63 (1), 185–200.

Rajan, R., Ramella, P. and Zingales, L., (2023). What purposes do corporations purport? Evidence from letters to shareholders. NBER Working Paper 31054.

Regier, M., and Rouen, E. (2023). The stock market valuation of human capital creation. *Journal of Corporate Finance* 79, 102384.

Starks, L. T. (2023). The evolving role of corporate ESG policies and the need for more granular analysis. *Journal of Finance*, 78(1), 35-72.

Tsang, A., Kang, J., and Yang, Y. G. (2021). Corporate ESG profiles and executive compensation. *The Accounting Review*, 96(5), 265-288.

Wiersema, M. and Koo, H., (2022). Corporate governance in today's world: Looking back and an agenda for the future. *Strategic Organization*, 20(4) 786-796.

Yang, L. (2023) Firms' socially responsible activities: the role of the Big Three. *Journal of Economics and Finance* 47, 859–883.

Zingales, L. (2000). In search of new foundations. *Journal of Finance*, 55(4), 1623-1653.

Figure 1.a Firms with Human Capital Metrics in CEO Incentive Plans, 1998-2023

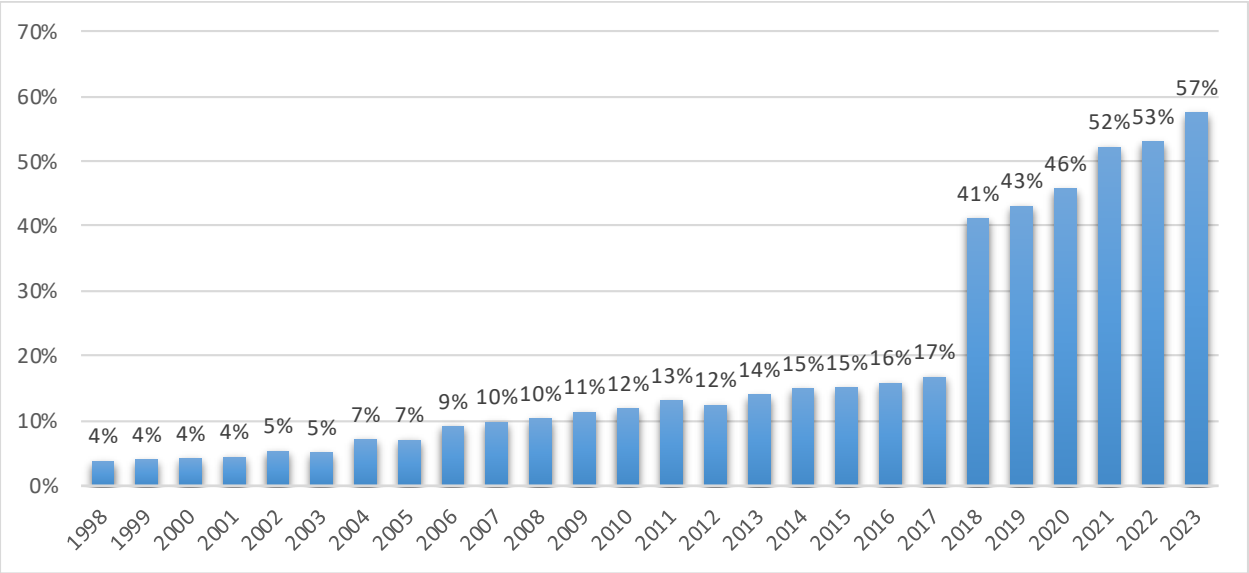


Figure 1.b Firms with Human Capital Metrics in CEO Incentive Plans by Subcategories, 1998-2023

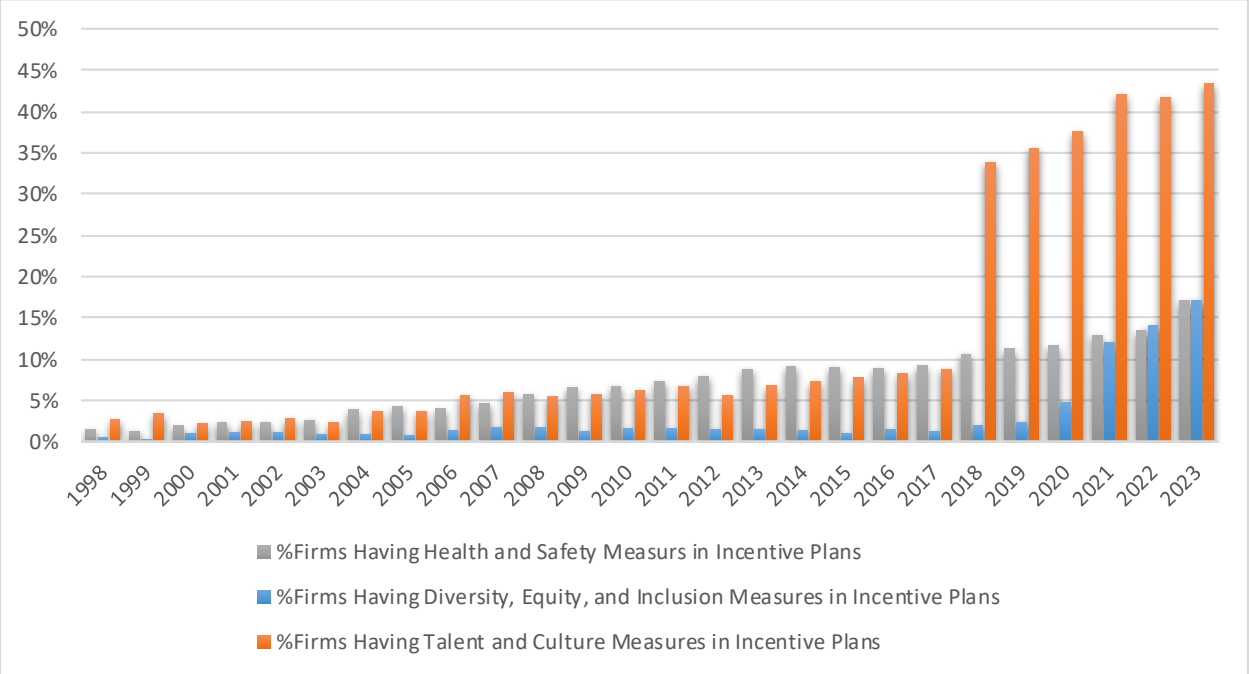


Figure 2.a Firms with Human Capital Metrics in CEO Incentive Plans by Industry, 1998-2023

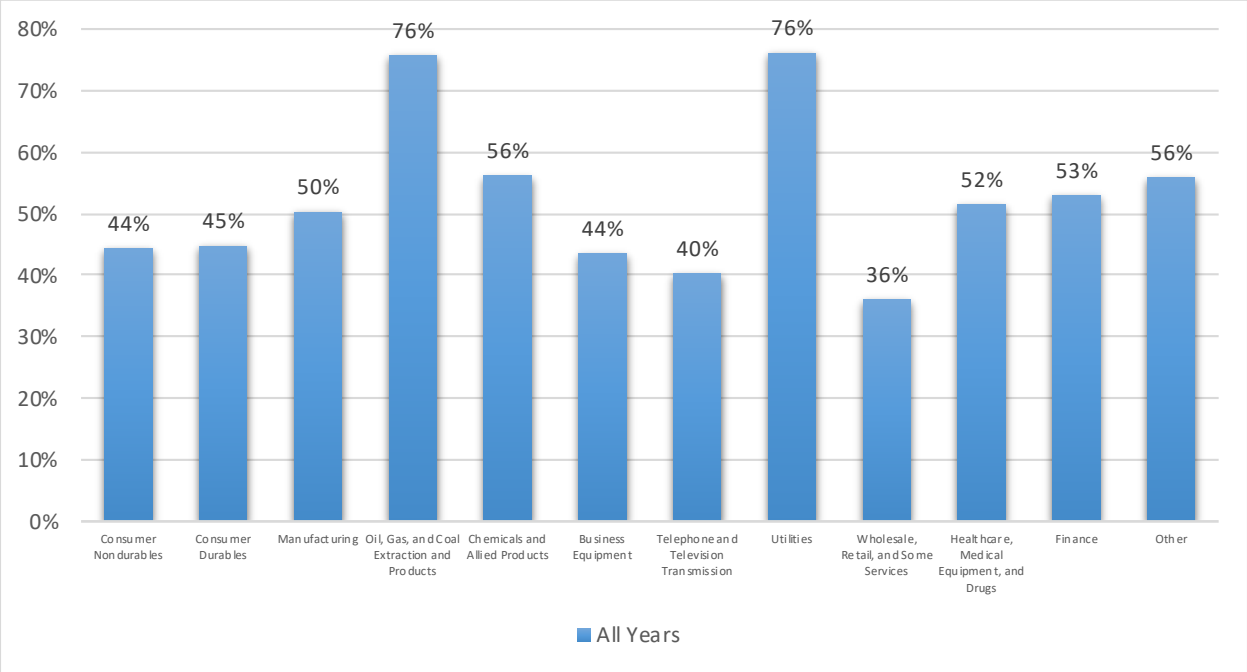


Figure 2.b Firms with Human Capital Metrics in CEO Incentive Plans by Industry, Pre vs. post 2018

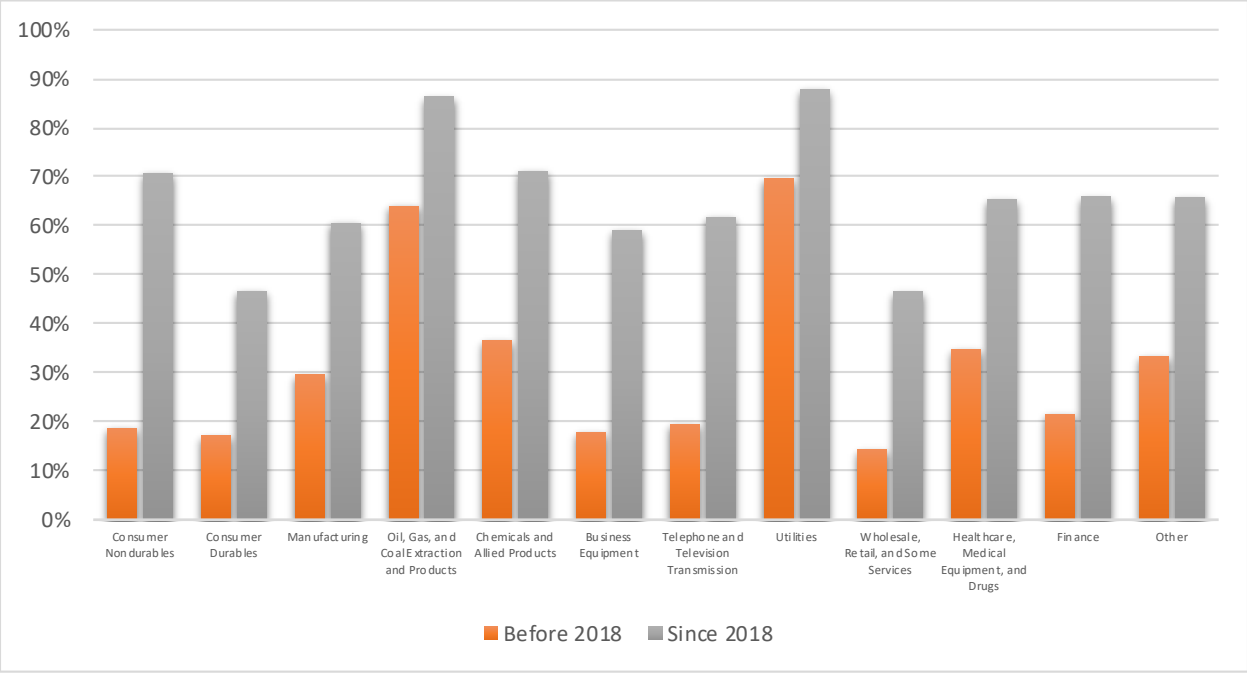


Figure 3.a Firms with Health and Safety Metrics in CEO Incentive Plans, Pre vs. post 2018

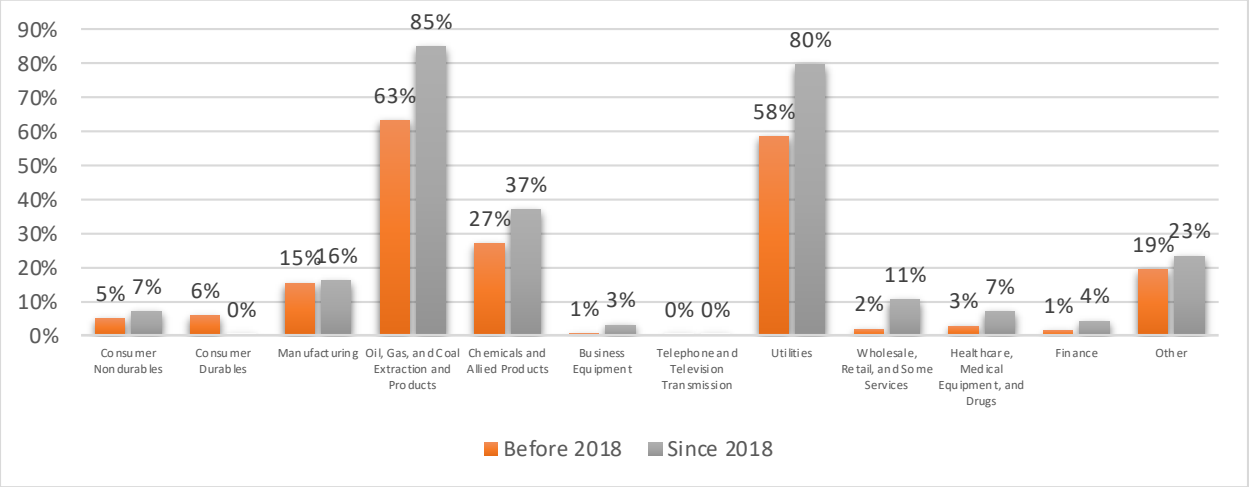


Figure 3.b Firms with DEI Metrics in CEO Incentive Plans, Pre vs. post 2018

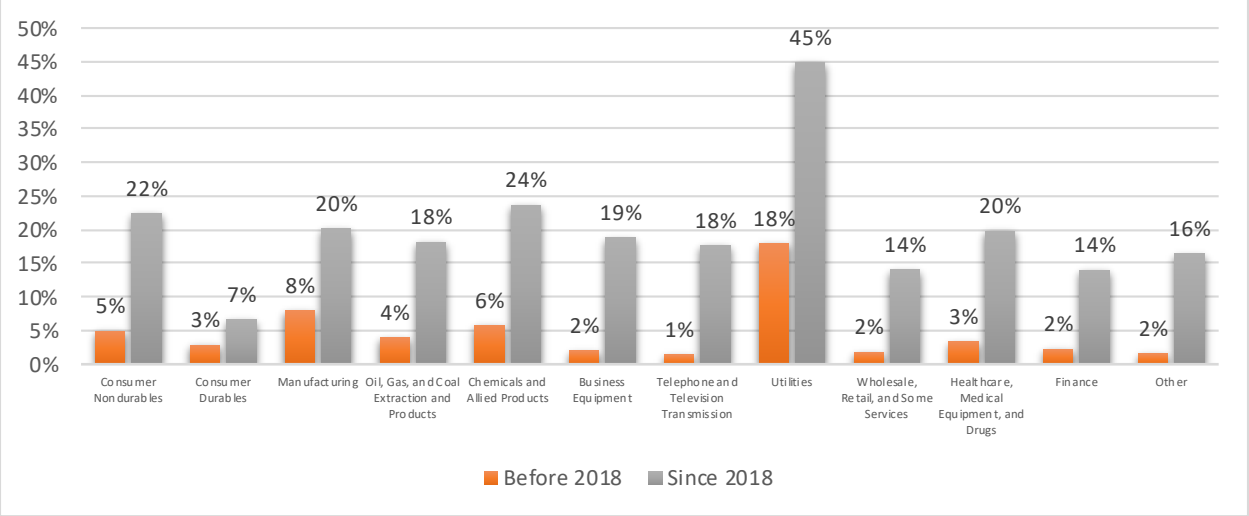


Figure 3.c Firms with Talent and Culture Metrics in CEO Incentive Plans, Pre vs. post 2018

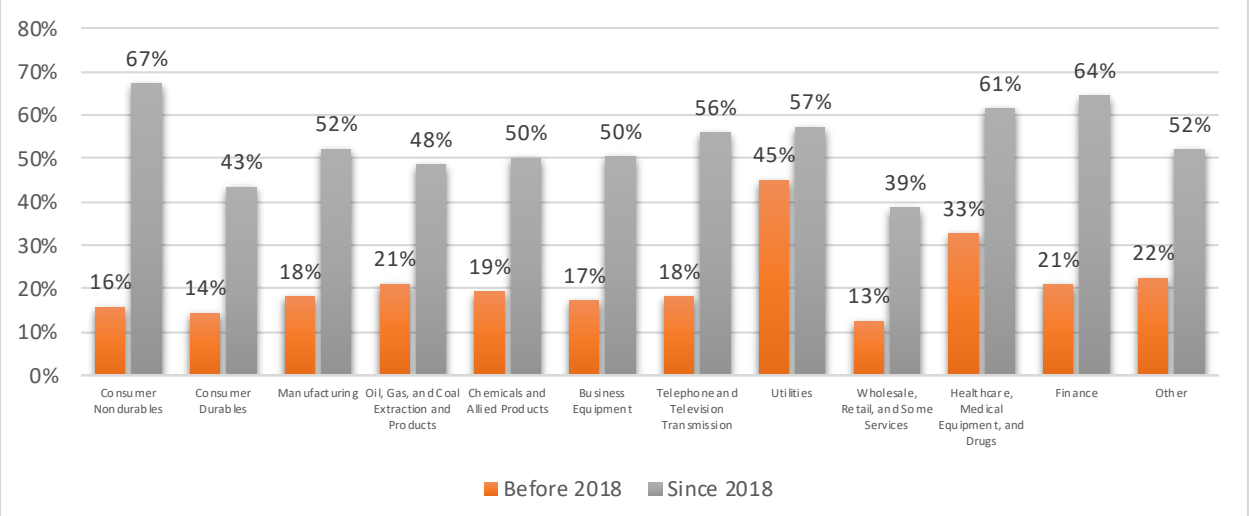


Figure 4 Combinations of Human Capital Metric Subcategories in CEO incentive plans, Post 2018

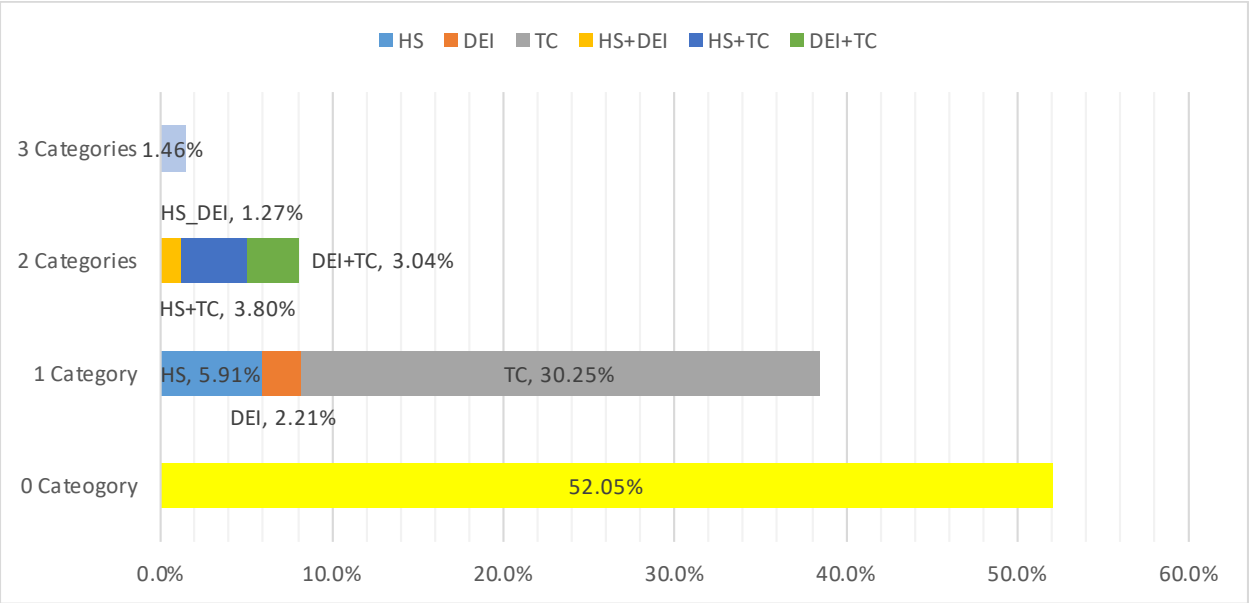


Figure 5. Quantitative Performance Metrics by Human Capital Metric Subcategory in CEO Plans, 1998-2023

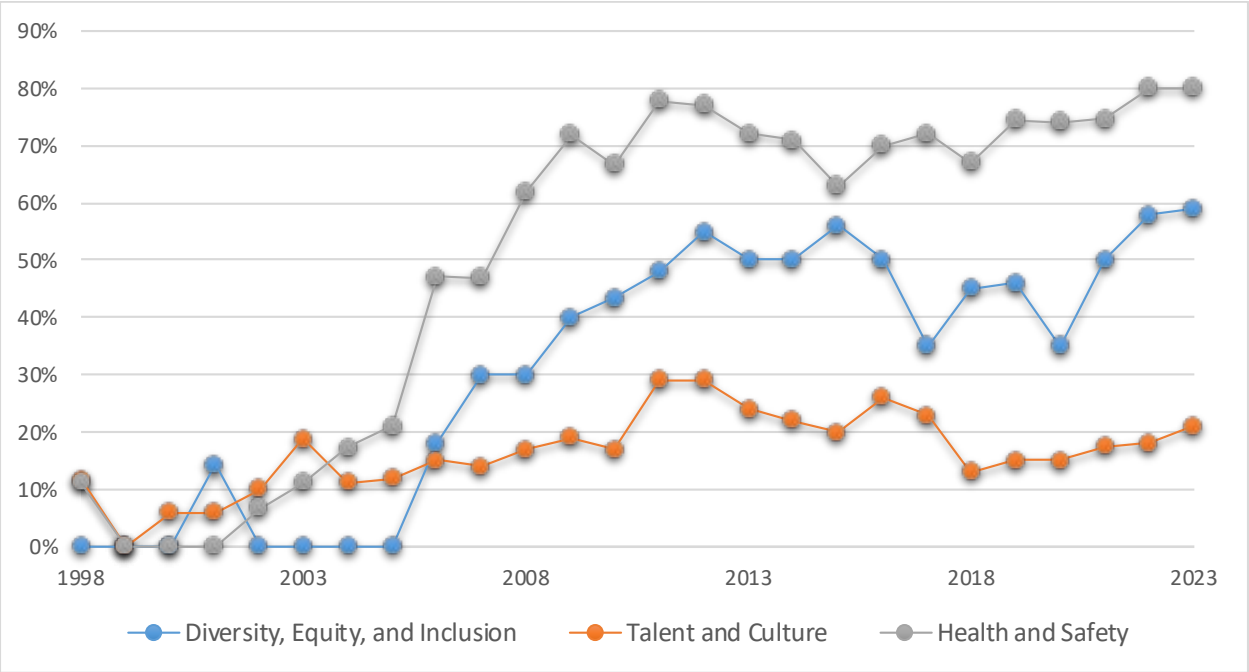


Figure 6. Time Series Trend of CEO Short-term Pay Size by Human Capital Metric Subcategory

This figure presents the trend of CEO total annual short-term pay value scaled by salary for each of the HC metric subcategories from 1998 to 2023.

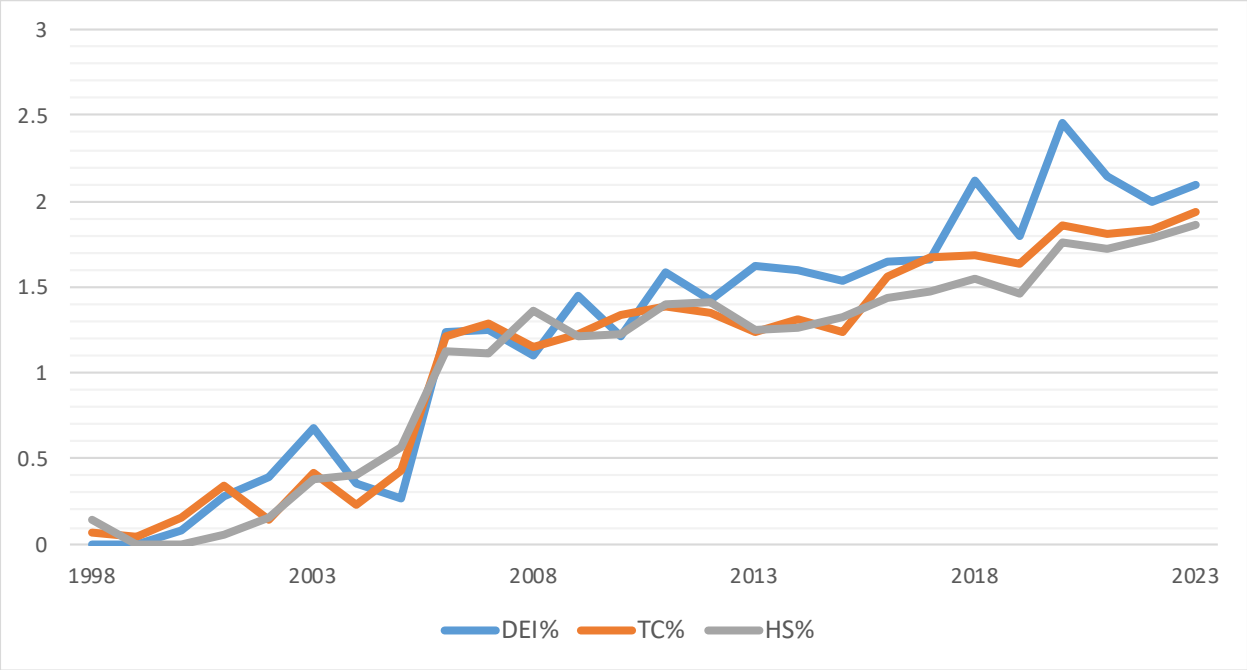


Table 1. Summary Statistics

Panel A presents the summary statistics for all CEO performance plans in our sample. Panel B presents the summary statistics for pay and firm variables at the firm-year level. The sample period is from 1998 to 2023. Variable definitions are in Appendix B. All continuous variables are winsorized at the 1% and 99% levels.

Panel A. Summary statistics at the plan level

	N	Mean	Std Dev.	Min	Median	Max
HC Metric (0/1)	45,585	0.123	0.328	0.000	0.000	1.000
Other ESG Metrics (0/1)	45,585	0.039	0.195	0.000	0.000	1.000
Characteristics of Human Capital Plans:						
ST-Plan (0/1)	5,600	0.952	0.214	0.000	1.000	1.000
HS Metric (0/1)	5,600	0.376	0.484	0.000	0.000	1.000
DEI Metric (0/1)	5,600	0.143	0.350	0.000	0.000	1.000
TC Metric (0/1)	5,600	0.682	0.466	0.000	1.000	1.000
HC-Based Pay/Salary	5,193	1.603	1.184	0.220	1.300	8.236
HS-Based Pay/Salary	1,940	1.399	0.906	0.359	1.226	6.906
DEI-Based Pay/Salary	749	1.976	2.041	0.196	1.500	17.556
TC-Based Pay/Salary	3,516	1.662	1.270	0.220	1.400	9.295
HC-Quantitative (0/1)	5,600	0.359	0.48	0.000	0.000	1.000
HS-Quantitative (0/1)	2,104	0.624	0.484	0.000	1.000	1.000
DEI-Quantitative (0/1)	801	0.431	0.495	0.000	0.000	1.000
TC-Quantitative (0/1)	3,822	0.176	0.381	0.000	0.000	1.000

Table 1 continued.

Panel B. Summary statistics at the firm level

	N	Mean	Std Dev.	Min	Median	Max
CEO incentive variables:						
HC Metric (0/1)	22,053	0.203	0.402	0.000	0.000	1.000
HS Metric (0/1)	22,053	0.079	0.269	0.000	0.000	1.000
DEI Metric (0/1)	22,053	0.032	0.176	0.000	0.000	1.000
TC Metric (0/1)	22,053	0.139	0.346	0.000	0.000	1.000
HC-Quantitativew (0/1)	22,053	0.075	0.263	0.000	0.000	1.000
HC-Based pay/Salary	21,924	0.315	0.841	0.000	0.000	7.770
CEO Short-term Pay/Salary	21,924	1.828	2.484	0.000	1.241	17.925
Firm characteristics:						
Employee (000s)	22,053	23.513	36.309	0.135	9.200	185.800
Firm Age	22,053	27.697	17.082	1.000	25.000	61.000
CapEx/Total Assets	22,053	0.046	0.050	0.000	0.031	0.283
Stock Volatility	22,053	0.023	0.011	0.008	0.020	0.063
Stock Return	22,053	0.153	0.356	-0.970	0.158	1.246
Adj. Return on Assets	22,053	0.009	0.099	-0.372	0.000	0.349
Nonmissing R&D (0/1)	22,053	0.441	0.497	0.000	0.000	1.000
Revenue/Employees ($M)	22,053	0.415	0.542	0.029	0.238	3.626
InstOwnPct	22,053	0.735	0.243	0.000	0.807	0.997
VotedForPct	6,398	0.727	0.137	0.199	0.754	0.953

Table 2. Correlation Matrix

This table presents the correlation matrix between variables at the firm-level. The sample is from 1998 to 2023. All variable definitions are in Appendix B.

Variables	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
(a)HC Metric (0/1)	-								
(b)Ln(Employee)	0.012								
	(0.083)								
(c)Firm Age	0.145	0.377							
	(0.000)	(0.000)							
(d)CapEx/Total Assets	0.016	-0.075	-0.059						
	(0.017)	(0.000)	(0.000)						
(e)Stock Volatility	-0.012	-0.246	-0.246	0.109					
	(0.077)	(0.000)	(0.000)	(0.000)					
(f)Stock Return	-0.023	-0.048	-0.046	0.001	-0.064				
	(0.001)	(0.000)	(0.000)	(0.920)	(0.000)				
(g)Adj. Return on Assets	-0.016	0.111	0.017	0.179	-0.188	0.111			
	(0.015)	(0.000)	(0.012)	(0.000)	(0.000)	(0.000)			
(h)Nonmissing R&D	-0.055	-0.030	0.006	-0.104	0.067	0.025	-0.093		
	(0.000)	(0.000)	(0.370)	(0.000)	(0.000)	(0.000)	(0.000)		
(i)Revenue/Employees	0.138	-0.350	-0.047	0.100	-0.022	0.011	0.073	-0.217	
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.117)	(0.000)	(0.000)	
(j)InstOwnPct	0.054	0.061	-0.004	-0.016	-0.096	0.057	0.075	0.099	-0.024
	(0.000)	(0.000)	(0.503)	(0.018)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Table 3. Determinants of Granting CEOs Human Capital Plans

This table presents the regression results of the likelihood of granting the CEO a human capital (HC) plan in a firm-year on firm characteristics. The dependent variable is a binary variable that equals one if the firm-year has one or more HC plans. Variable definitions are in Appendix B. t-statistics in parenthesis are based on robust standard errors clustered at the firm level. Industry fixed effects are based on Fama-French 12 or 49 industries. Panel A reports results without the industry fixed effect, and Panel B reports results with the industry fixed effect. Panel B presents the results with/without Say-On-Pay (SOP) separately.

Panel A. Regressions without industry fixed effect

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	HC Metric (0/1)						
Ln(Employee)	-0.013***	-0.013***	0.005	-0.013***	-0.028***	0.007	0.002
	(-3.324)	(-3.245)	(1.203)	(-3.278)	(-3.354)	(1.621)	(0.241)
Ln(Firm Age)	0.027***	0.026***	0.018***	0.031***	0.039*	0.020***	0.031
	(3.783)	(3.674)	(2.631)	(4.260)	(1.908)	(2.851)	(1.618)
CapEx/Total Assets	0.572***	0.626***	0.520***	0.523***	0.723***	0.572***	0.668**
	(5.310)	(5.662)	(4.952)	(4.999)	(2.681)	(5.435)	(2.496)
Stock Volatility	-0.625	-0.991	0.792	-0.970**	-2.198	-0.310	-0.346
	(-0.972)	(-1.490)	(1.259)	(-2.224)	(-1.316)	(-0.729)	(-0.278)
Stock Return		-0.022***				-0.008	-0.074***
		(-3.035)				(-1.196)	(-4.099)
Adj. Return on Assets		-0.119**				-0.227***	-0.301**
		(-2.467)				(-4.822)	(-2.411)
Nonmissing R&D			-0.022*			-0.023*	-0.016
			(-1.780)			(-1.908)	(-0.653)
Ln(Revenue/Employees)			0.0694***			0.073***	0.094***
			(8.707)			(9.012)	(5.552)
InstOwnPct				0.010		0.0314	0.044
				(0.479)		(1.564)	(0.939)
Post 2018 Dummy				0.315***		0.309***	0.276***
				(23.59)		(23.16)	(13.27)
Post 2021 Dummy				0.108***		0.107***	0.096***
				(9.017)		(8.970)	(5.830)
VotedForPct					-0.275***		-0.181***
					(-3.844)		(-2.712)
Industry fixed effects	No	No	No	No	No	No	No
Year fixed effects	Yes	Yes	Yes	No	Yes	No	No
Observations	22,053	22,053	22,053	22,053	6,398	22,053	6,398
R-squared	0.171	0.172	0.191	0.168	0.143	0.191	0.173

Table 3 continued.

Panel B. Regressions with industry fixed effect

	Without SOP		**With SOP**	
	(1)	(2)	(3)	(4)
VARIABLES	HC Metric (0/1)		HC Metric (0/1)	
Ln(Employee)	0.015***	0.015***	0.016*	0.017*
	(3.297)	(3.327)	(1.757)	(1.790)
Ln(Firm Age)	-0.000	-0.002	0.008	0.006
	(-0.0405)	(-0.378)	(0.449)	(0.333)
CapEx/Total Assets	-0.114	-0.095	-0.236	-0.222
	(-1.029)	(-0.849)	(-0.856)	(-0.774)
Stock Volatility	0.324	0.195	0.831	0.735
	(0.877)	(0.557)	(0.729)	(0.675)
Stock Return	-0.006	-0.006	-0.067***	-0.060***
	(-1.014)	(-1.008)	(-4.022)	(-3.645)
Adj. Return on Assets	-0.105**	-0.103**	-0.169	-0.175
	(-2.313)	(-2.287)	(-1.420)	(-1.480)
Nonmissing R&D	-0.005	0.007	-0.019	-0.003
	(-0.279)	(0.312)	(-0.543)	(-0.0662)
Ln(Revenue/Employees)	0.037***	0.038***	0.049***	0.069***
	(4.533)	(4.330)	(2.880)	(3.656)
InstOwnPct	0.056***	0.059***	0.057	0.069
	(2.823)	(2.954)	(1.206)	(1.457)
Post 2018 Dummy	0.306***	0.307***	0.263***	0.263***
	(23.19)	(23.37)	(12.89)	(13.07)
Post 2021 Dummy	0.106***	0.105***	0.097***	0.098***
	(8.884)	(8.868)	(5.921)	(5.977)
VotedForPct			-0.140**	-0.084
			(-2.130)	(-1.405)
Industry fixed effects	Fama-French 12	Fama-French 49	Fama-French 12	Fama-French 49
Year fixed effects	No	No	No	No
Observations	22,053	22,053	6,398	6,398
R-squared	0.231	0.242	0.220	0.248

Table 4. Determinants of Granting CEOs Human Capital Plans – Subcategory Analysis

This table presents the regression results of the likelihood of granting the CEO a specific subcategory of HC plan in a firm-year on firm characteristics. The dependent variable is a binary variable that equals one if the firm-year has one or more Healthy and Safety (HS) plans in columns 1 and 4, DEI plans in columns 2 and 5, and Talent and Culture (TC) plans in columns 3 and 6. Variable definitions are in Appendix B. t-statistics in parenthesis are based on robust standard errors clustered at the firm level. Industry fixed effects are based on Fama-French 49 industries.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	HS (0/1)	DEI (0/1)	TC (0/1)	HS (0/1)	DEI (0/1)	TC (0/1)
Ln(Employee)	0.010***	0.013***	0.007*	0.017***	0.025***	0.008
	(3.065)	(5.481)	(1.892)	(2.609)	(4.599)	(0.868)
Ln(Firm Age)	-0.002	0.003	-2.59e-05	-0.001	0.004	0.005
	(-0.345)	(1.045)	(-0.00483)	(-0.0952)	(0.395)	(0.310)
CapEx/Total Assets	-0.017	-0.020	-0.096	0.117	-0.042	-0.271
	(-0.178)	(-0.467)	(-1.032)	(0.502)	(-0.310)	(-1.031)
Stock Volatility	0.807***	0.042	0.056	2.997***	-0.023	-0.581
	(2.696)	(0.218)	(0.190)	(3.051)	(-0.0285)	(-0.546)
Stock Return	0.002	0.004	-0.001	-0.022	-0.018	-0.050***
	(0.357)	(1.379)	(-0.241)	(-1.538)	(-1.457)	(-3.147)
Adj. Return on Assets	-0.112***	-0.067***	-0.031	-0.250***	-0.157**	-0.027
	(-4.042)	(-3.227)	(-0.751)	(-3.365)	(-2.335)	(-0.232)
Nonmissing R&D	-0.021	0.007	0.018	-0.026	0.010	0.012
	(-1.479)	(0.981)	(1.240)	(-0.853)	(0.548)	(0.373)
Ln(Revenue/Employees)	0.038***	0.013***	0.019***	0.065***	0.029***	0.032**
	(5.393)	(4.136)	(2.855)	(5.143)	(3.168)	(1.971)
InstOwnPct	0.030*	0.008	0.044***	0.087***	0.014	0.014
	(1.872)	(0.837)	(2.623)	(2.784)	(0.493)	(0.300)
Post 2018 Dummy	0.083***	0.037***	0.309***	0.032**	0.039***	0.292***
	(8.862)	(5.600)	(22.23)	(2.565)	(3.887)	(13.90)
Post 2021 Dummy	0.062***	0.179***	0.091***	0.052***	0.176***	0.077***
	(6.591)	(12.82)	(7.351)	(4.246)	(9.398)	(4.629)
VotedForPct				-0.097*	-0.084**	-0.104*
				(-1.712)	(-2.423)	(-1.791)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	No	No
Observations	19,311	18,278	20,630	5,145	4,852	5,867
R-squared	0.265	0.149	0.210	0.375	0.180	0.191

Table 5. Determinants of the Pay Size of CEO Human Capital Plans

This table presents the regression results of the plan value of CEO HC plan in a firm-year on firm characteristics. The dependent variable equals the total value of all CEO HC plans in a fiscal year scaled by the CEO's salary in the year. Results for HC plans are in column 1, Healthy and Safety (HS) plans in column 2, DEI plans in column 3, and Talent and Culture (TC) plans in column 4. Variable definitions are in Appendix B. t-statistics in parenthesis are based on robust standard errors clustered at the firm level. Industry fixed effects are based on Fama-French 49 industries

	(1)	(2)	(3)	(4)
VARIABLES	HC Pay Value/Salary	HS Pay Value/Salary	DEI Pay Value/Salary	TC Pay Value/Salary
Ln(Employee)	0.075***	0.073***	0.079***	0.072***
	(8.843)	(6.340)	(6.857)	(7.621)
Ln(Firm Age)	0.027***	0.032**	0.030	0.009
	(2.597)	(2.146)	(1.395)	(0.763)
CapEx/Total Assets	-0.414**	-0.184	0.110	-0.566**
	(-2.430)	(-0.992)	(0.299)	(-2.387)
Stock Volatility	1.55**	2.533***	-0.802	0.377
	(2.006)	(2.731)	(-0.596)	(0.431)
Stock Return	-0.013	-0.034*	0.054	-0.015
	(-0.834)	(-1.885)	(1.586)	(-0.789)
Adj. Return on Assets	-0.060	-0.216	-0.251	0.063
	(-0.492)	(-1.403)	(-1.541)	(0.472)
Nonmissing R&D	-0.041	-0.078*	0.009	-0.041
	(-1.543)	(-1.942)	(0.238)	(-1.455)
Ln(Revenue/Employees)	0.092***	0.087***	0.063***	0.082***
	(6.953)	(5.121)	(2.813)	(5.205)
InstOwnPct	0.125***	0.139**	0.220*	0.100*
	(2.784)	(2.569)	(1.968)	(1.808)
Post 2018 Dummy	0.166***	0.129***	0.212***	0.177***
	(8.983)	(6.369)	(5.647)	(7.383)
Post 2021 Dummy	0.024**	0.023	0.013	0.001
	(2.041)	(1.486)	(0.560)	(0.0473)
Industry fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No
Observations	4,460	1,728	703	3,039
R-squared	0.177	0.201	0.354	0.180

Table 6. CEO Short-term Payout and Human Capital Metrics in CEO Performance Plans, 1998 to 2023

This table presents the regression results of the total value of CEO short-term compensation incentives in a firm-year on human capital metrics and firm characteristics. The dependent variable is the total value of all CEO short-term incentives in a fiscal year scaled by the CEO's salary in the year. Results for HC plans are in column 1, Healthy and Safety (HS) plans in column 2, DEI plans in column 3, Talent and Culture (TC) plans in column 4, and all three subcategories in column 5. Variable definitions are in Appendix B. t-statistics in parenthesis are based on robust standard errors clustered at the firm level. Industry fixed effects are based on Fama-French 48 industries. Panel A reports results using the baseline model. Panel B presents the coefficients using the entropy balancing model. Panel C shows the relation between CEO short-term incentive pay and the first adoption of human capital plans.

Panel A. Relation between CEO short-term incentive pay and the presence of human capital plans

	(1)	(2)	(3)	(4)	(5)
VARIABLES	CEO Short-Term Pay/Salary				
HC Metric (0/1)	0.020				
	(1.230)				
HS Metric (0/1)		0.009			-0.004
		(0.475)			(-0.213)
DEI Metric (0/1)			0.100***		0.100***
			(3.350)		(3.292)
TC Metric (0/1)				0.013	0.007
				(0.718)	(0.404)
Controls	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	21,924	21,924	21,924	21,924	21,924
R-squared	0.139	0.139	0.140	0.139	0.140

Panel B. Entropy Balanced Sample

	(1)	(2)	(3)	(4)	(5)
VARIABLES	CEO Short-Term Pay/Salary				
HC Metric (0/1)	0.027*				
	(1.717)				
HS Metric (0/1)		0.017			-0.057
		(0.777)			(-1.231)
DEI Metric (0/1)			0.145***		0.103**
			(4.309)		(2.497)
TC Metric (0/1)				0.017	0.040
				(1.007)	(1.210)
Controls	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	21,924	21,924	21,924	21,924	21,924
R-squared	0.138	0.137	0.189	0.131	0.283

Table 6 continued.

Panel C: First Adoption

	(1)	(2)	(3)	(4)	(5)
VARIABLES	**CEO Short-Term Pay/Salary**				
First HC Adoption (0/1)	0.010				
	(0.541)				
First HS Adoption (0/1)		0.030			-0.021
		(1.125)			(-0.815)
First DEI Adoption (0/1)			0.090***		0.146***
			(2.807)		(3.176)
First TC Adoption (0/1)				0.008	-0.012
				(0.389)	(-0.560)
Controls	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	17,476	20,343	21,103	18,362	17,476
R-squared	0.138	0.140	0.137	0.136	0.139

Table 7. CEO Short-term Payout and Human Capital Metrics in CEO Performance Plans, by contract details

This table presents the regression results of the total value of CEO short-term compensation incentives in a firm-year on various types of human capital plans based on the contract details. The dependent variable is the total value of all CEO short-term incentives in a fiscal year scaled by the CEO's salary in the year. Variable definitions are in Appendix B. t-statistics in parenthesis are based on robust standard errors clustered at the firm level. Industry fixed effects are based on Fama-French 49 industries. Panel A reports results for the presence of qualitative vs quantitative human capital plans, and Panel B reports results for presence of one or multiple types (HS, DEI, and TC) human capital metrics and the number of HS, DEI, and TC metrics in the plans.

Panel A. Relation between CEO short-term incentive pay and the presence of quantitative/qualitative human capital plans

	(1)	(2)	(3)	(4)	(5)
VARIABLES	CEO Short-Term Pay/Salary				
HC-Quantitative (0/1)	0.002				
	(0.100)				
HC-Qualitative (0/1)	0.024				
	(1.408)				
HS-Quantitative (0/1)		0.004			-0.001
		(0.205)			(-0.032)
HS-Qualitative (0/1)		0.001			-0.025
		(0.043)			(-0.897)
DEI-Quantitative (0/1)			0.027		0.031
			(0.739)		(0.882)
DEI-Qualitative (0/1)			0.134***		0.137***
			(3.491)		(3.485)
TC-Quantitative (0/1)				-0.010	-0.017
				(-0.372)	(-0.640)
TC-Qualitative (0/1)				0.023	0.018
				(1.241)	(0.975)
Controls	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	21,924	21,924	21,924	21,924	21,924
R-squared	0.139	0.139	0.140	0.139	0.140

Panel B. Relation between CEO short-term incentive pay and some particular types of HC plans

	(1)	(2)	(3)
VARIABLES	CEO Short-Term Pay/Salary		
Multitype_HumanCapital (0/1)	0.0708***		
	(3.093)		
Singletype_HumanCapital (0/1)	-0.000529		
	(-0.0316)		
#HumanCapitalMetrics		0.0149**	
		(2.170)	
#HS			-0.00133
			(-0.178)
#DEI			0.0389**
			(2.039)
#TC			0.0266*
			(1.740)
Controls	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	21,924	21,924	21,924
R-squared	0.140	0.139	0.140

Table 8. Human Capital Metrics in CEO Performance Plans and Post-adoption ROA

This table presents the regression results of the adjusted return on assets in a firm-year on human capital metrics and firm characteristics. The dependent variable is the adjusted return on assets in a fiscal year in the year of human capital metrics adoption (columns 1 and 4), one year since (columns 2 and 5), and two years since (columns 3 and 6). Results for HC plans are in columns 1, 2, and 3. Results for Healthy and Safety (HS) plans, DEI plans, and Talent and Culture (TC) plans are in column 4, 5, and 6. Variable definitions are in Appendix B. t-statistics in parenthesis are based on robust standard errors clustered at the firm level. Industry fixed effects are based on Fama-French 49 industries. Panel A reports results using the baseline model. Panel B presents the coefficients using the entropy balancing model.

Panel A. Baseline Model

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	ROA	ROA Yr 1	ROA Yr 2	ROA	ROA Yr 1	ROA Yr 2
HC Metric (0/1)	-0.001	0.001	0.0004			
	(-0.735)	(0.506)	(0.274)			
HS Metric (0/1)				-0.001	-0.001	0.001
				(-0.684)	(-0.596)	(0.331)
DEI Metric (0/1)				-0.008**	0.005	-3.13e-05
				(-2.401)	(1.568)	(-0.007)
TC Metric (0/1)				0.002	0.001	0.002
				(1.130)	(0.820)	(0.796)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	21,462	20,406	18,877	21,462	20,406	18,877
R-squared	0.722	0.704	0.546	0.723	0.704	0.546

Panel B. Entropy Balancing Model

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	ROA	ROA Yr 1	ROA Yr 2	ROA	ROA Yr 1	ROA Yr 2
HC Metric (0/1)	0.0003	0.0006	0.0002			
	(0.234)	(0.415)	(0.078)			
HS Metric (0/1)				0.0004	0.005	0.008
				(0.095)	(0.818)	(1.180)
DEI Metric (0/1)				-0.009**	-0.006	-0.016***
				(-2.062)	(-1.369)	(-2.815)
TC Metric (0/1)				0.006	0.0001	0.004
				(1.542)	(0.031)	(1.013)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	21,462	20,406	18,877	21,462	20,406	18,877
R-squared	0.660	0.627	0.436	0.549	0.555	0.401

Table 9. Human Capital Metrics in CEO Performance Plans and Post-Adoption Stock Performance

This table presents the regression results of the buy-and-hold stock abnormal return in a firm-year on human capital metrics and firm characteristics. The dependent variable is the buy-and-hold stock abnormal return in a fiscal year in the year of human capital metrics adoption (columns 1 and 4), one year since (columns 2 and 5), and two years since (columns 3 and 6). Results for HC plans are in columns 1, 2, and 3. Results for Healthy and Safety (HS) plans, DEI plans, and Talent and Culture (TC) plans are in column 4, 5, and 6. Variable definitions are in Appendix B. t-statistics in parenthesis are based on robust standard errors clustered at the firm level. Industry fixed effects are based on Fama-French 49 industries. Panel A reports results using the baseline model. Panel B presents the coefficients using the entropy balancing model.

Panel A. Baseline Model

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	BHAR	BHAR Yr 1	BHAR Yr 2	BHAR	BHAR Yr 1	BHAR Yr 2
HC Metric (0/1)	-0.007	-0.009	-0.009			
	(-1.220)	(-1.232)	(-1.186)			
HS Metric (0/1)				-0.011	-0.019	-0.014
				(-1.320)	(-1.613)	(-1.281)
DEI Metric (0/1)				0.017	0.013	-0.004
				(1.532)	(0.963)	(-0.284)
TC Metric (0/1)				-0.001	0.006	0.002
				(-0.100)	(0.771)	(0.236)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	20,811	20,029	18,441	20,811	20,029	18,441
R-squared	0.420	0.063	0.054	0.420	0.063	0.054

Table 9 continued.
Panel B. Entropy Balancing Model

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	BHAR	BHAR Yr 1	BHAR Yr 2	BHAR	BHAR Yr 1	BHAR Yr 2
HC Metric (0/1)	-0.006	-0.005	-0.007			
	(-0.835)	(-0.643)	(-0.874)			
HS Metric (0/1)				0.003	-0.021	-0.045**
				(0.138)	(-0.757)	(-2.178)
DEI Metric (0/1)				0.006	0.003	-0.014
				(0.382)	(0.108)	(-0.656)
TC Metric (0/1)				0.021	0.040	0.001
				(0.983)	(1.625)	(0.054)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	20,811	20,029	18,441	20,811	20,029	18,441
R-squared	0.406	0.074	0.085	0.608	0.447	0.458