ESG Incentives in Executive Compensation*

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Abstract

This paper examines the integration of ESG performance metrics into executive compensation using a detailed panel dataset of European executives. Despite becoming more widespread, most ESG metrics are largely discretionary, carry immaterial weights in payout calculations, and contribute little to executive pay risk. Such ESG metrics with arguably weak incentive power are common in financial firms and large companies, particularly for their most visible executives, which seems consistent with greenwashing. In contrast, binding ESG metrics with significant weights, which have the potential to influence incentives, are only found in sectors with a large environmental footprint.

JEL classification: G30, G35, J33, M12, M52.

Keywords: executive compensation, ESG, ESG metrics, ESG contracting, CSR contracting, sustainability, incentive contracting, optimal contracts.

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"ESG metrics are now one of the most prevalent metrics in executive incentive plans"
Willis Towers Watson (2023)

I. Introduction

In recent years, there has been a growing trend of incorporating Environmental, Social, and Governance (ESG) metrics into executives' performance-linked compensation plans, as observed by many industry experts and scholars (e.g., PricewaterhouseCoopers, 2021; Willis Towers Watson, 2023; Hazarika, Kashikar, Peng, Röell, and Shen, 2022; Cohen, Kadach, Ormazabal, and Reichelstein, 2023b). Typical ESG metrics include, for instance, emissions, working conditions, workforce diversity, or employee satisfaction. This shift in ESG contracting raises important questions: What motivates firms to link executive compensation to ESG outcomes, and does this practice genuinely create incentives for executives to improve ESG performance?

To measure the adoption of ESG-linked pay, past research has primarily focused on identifying whether a given company incorporates at least one ESG performance metric (ESG criterion) in the compensation contract of at least one of its executives.[1] The information necessary for this approach is readily available and allows the analysis of large (global) firm samples.[2] However, this approach does not reveal the actual importance that firms assign to ESG metrics. For example, it cannot refute the possibility that firms report ESG metrics to "greenwash" executive pay: i.e., firms could be windowdressing incentive pay to appear ESG-friendly but without making ESG targets sufficiently ambitious or without giving them material weight in the remuneration function.

In this paper, we move beyond this "extensive margin approach" to measuring ESG adoption in executive pay. Instead, we use a novel dataset with comprehensive information both on the ex-ante design of executives' compensation plans (such as numbers and weights of different performance metrics or target bonuses) and on realized performance (e.g., target achievement rates) and payout (e.g., salary, bonuses, etc.). This detailed analysis results in a smaller firm sample than in previous research; still we are able to analyze a panel of 674 executives from 73 constituent firms in Europe's

[1] See, for example, Tsang, Wang, Liu, and Yu (2021), Hazarika et al. (2022), Qin and Yang (2022), Aresu, Hooghiemstra, and Melis (2023), Carter, Pawliczek, and Zhong (2023), Cohen et al. (2023b), Ikram, Li, and Minor (2023), and Barontini and Hill (2024).

[2] As such, Hazarika et al. (2022) and Cohen et al. (2023b) are able to study, for example, regulatory and cultural differences across countries as determinants of ESG adoption in executive pay.

leading stock indices, the EURO STOXX 50 and the STOXX Europe 50, between 2013 and 2020. Crucially, the joint analysis of ex-ante contract design and realized pay helps gauge firms' main rationales for linking compensation to ESG.

A priori, there are several possible reasons why firms would tie executive compensation to ESG criteria. For example, strengthening ESG performance could increase shareholder value (doing well by doing good). Firms may then condition executives' incentive pay on ESG performance metrics, especially if strong ESG performance acts as a leading indicator of shareholder value (e.g., Edmans, Gabaix, and Jenter, 2017; Cohen et al., 2023b; Edmans, 2023).[3] When stronger ESG performance does not increase, but undermines shareholder value, the rationale for ESG-linked pay is more complex. Still, incentivizing executives to improve ESG performance can be efficient if the firm's objective is not pure shareholder value maximization but places some weight on ESG, for example, because investors genuinely care about the environment and society (shareholder welfare approach).[4]

However, ESG-linked pay of executives can also occur for reasons other than incentive provision. Firms can "greenwash" executive pay to appease external pressure by third parties without sacrificing shareholder value to ESG performance (Cho and Roberts, 2010; Crilly, Hansen, and Zollo, 2016; Christensen, Hail, and Leuz, 2018, 2021; Grabner, Renders, and Yang, 2024). For example, firms might communicate publicly about a large number of ESG metrics in executives' incentive pay without giving these measures a significant weight in the calculation of realized bonuses and other pay elements. Alternatively, they can design ESG metrics in a way that achievement is certain, making ESG-linked performance pay essentially part of (guaranteed) fixed salary with little incentive power. Finally, entrenched executives themselves could seek the inclusion of easy-to-achieve or hard-to-verify ESG performance metrics as a way to extract rents from the firm (e.g., Bebchuk and Tallarita, 2022).[5] Under such greenwashing and rent-seeking, ESG-linked compensation does not generate additional ESG incentives for executives.

To find out which rationals explain best the rise of ESG-linked pay, past research has tried

[3] If markets do not fully understand the effect of ESG on long-term value creation, ESG outcomes convey information not already included in the stock price. The informativeness principle by Holmström (1979) implies that firms would then condition compensation also on ESG outcomes (rather than on the stock price alone).

[4] See, for example, Broccardo, Hart, and Zingales (2022), Hart and Zingales (2022), Landier and Lovo (forthcoming), Barzuza, Curtis, and Webber (2023), and Bonham and Riggs-Cragun (2024).

[5] For a discussion of how tax incentives or ESG subsidies might impact greenwashing behavior or managers' behavior to game the ESG-related incentive scheme, see, for instance, Bonham and Riggs-Cragun (2024).

different approaches. For example, existing papers have studied whether firms that include ESG metrics in executive pay show higher ESG performance or how such ESG adoption correlates with different investor clienteles, industries, regulatory regimes, or cultural differences across countries (e.g., Aresu et al., 2023; Carter et al., 2023; Cohen et al., 2023b; Hazarika et al., 2022).[6] This literature generates important insights, which we review further below. However, we believe that it lacks a natural first step: a detailed analysis of the *design* of ESG-linked compensation. For example, the simple weight of an ESG metric in the calculation of performance pay can already tell a lot about whether this metric has any hope of altering incentives. Similarly, a variance decomposition of realized performance pay may tell us whether executives' wealth, and thus their financial incentives, depends mostly on variation in ESG or non-ESG performance.

In a first step, our own analysis adopts the commonly used extensive margin approach to quantify how much firms include ESG performance metrics in executive pay. In our European sample, this method suggests that ESG is indeed becoming more significant, with the share of executives with short-term incentive pay (STI) tied to at least one ESG criterion increasing from 40% in 2013 to 60% in 2020.[7] Social metrics related to the workforce and product quality/responsibility are particularly widespread, while environmental metrics, and social metrics related to local communities and human rights, remain less common. For example, emissions-linked performance metrics only become more prominent after 2018, coinciding with a fourfold increase in the price of EU carbon permits. Still, the 60% share of executives with at least one ESG metric seemingly confirms that the importance of ESG performance metrics in executives' incentive pay is growing.

We then move beyond the extensive margin approach and study the design of compensation plans in more detail. Our granular data reveal that the role of ESG in STI is in fact limited. First, ESG metrics are far less prevalent than non-ESG metrics, with approximately four times fewer ESG metrics. Moreover, many of these ESG metrics are discretionary, meaning that they are assessed

[6] Similar studies can be found on the adoption of CSR criteria in executive compensation (e.g., Hong, Li, and Minor, 2016; Flammer, Hong, and Minor, 2019; Al-Shaer, Albitar, and Liu, 2023; Ikram et al., 2023).

[7] Whenever available, we handcollect and report the necessary information both for short-term incentive pay (STI) with a performance period of one year and for long-term incentive pay (LTI) with longer performance periods. For some parameters such as target achievement rates, reporting granularity and data availability is better for STI plans. For instance, LTI target values are reported in a minority of cases, with information often missing in earlier years. Additionally, LTI details are sometimes not specified at the individual level, but only for the entire executive team. Lastly, it often occurs that multiple LTI plans for the same executive overlap across time, as each of these plans have different vesting periods, making it difficult to determine LTI target achievement. Nevertheless, results regarding the adoption of ESG criteria in STI and LTI plans are qualitatively similar.

jointly with non-ESG metrics at year-end. In other words, for these discretionary ESG measures, the supervisory board or compensation committee determines their exact weight in the calculation of performance pay only at the end of the fiscal year, leaving the executive uncertain about how much ESG performance will, in fact, be rewarded. Even when ESG metrics are binding, i.e., when the firm commits to weights for ESG metrics at the beginning of the year, they enter the calculation of realized STI pay only with a small weight of 2% in 2013 and 5% in 2020 for the average executive in our sample. This is arguably too small for a material effect on executives' incentives.

After studying the ex-ante design of compensation plans, we turn to ex-post pay realizations, and ask how much variation in STI is driven by variation in ESG or non-ESG performance. In a subsample of 57 firms that report granular target achievement rates for different metrics, we decompose the variance of realized STI into different components for ESG and non-ESG performance pay. Binding *non-ESG* metrics (binding metrics have an explicit weight to which the firm commits ex ante) account for 87%, that is, for the lion's share of STI variance. Binding *ESG* metrics account only for an immaterial 1%. The remaining 12% of STI variance are explained by 8% for discretionary metrics (ESG and non-ESG metrics that are assessed jointly without individual ex-ante weights), and 4% for covariance terms.[8] Even if we drop all STI plans without any ESG metric and consider only the remaining subsample of ESG adopters, binding ESG metrics contribute only 2.5% to total STI variance, that is, 26 times less than binding non-ESG metrics.

Of course, the small contribution of ESG metrics to STI variance is largely due to the small weight that firms assign to ESG in the payout function. However, it is interesting to note that the variance share of 1% for binding ESG metrics even falls short of their official weight, which implies that target achievement is in fact more stable for ESG than for non-ESG metrics. Additional analyses confirm that executives with more ESG metrics and higher ESG target weights are exposed to less pay risk overall, as their overall target achievement for all targets combined is more stable. It seems that ESG metrics are either less ambitious than non-ESG metrics or that ESG performance measurement is less noisy.[9]

Overall, our analyses of ex ante contract design and ex post STI pay realizations reveal an

[8] These numbers are reported for a variance contribution that only considers within-executive variation in realized STI. We also decompose total (within- as well as between-executive) variation, in which case achievement rates of binding ESG targets explain 2% of total STI variance.

[9] A third explanation could be that combining ESG and non-ESG metrics reduces overall pay risk through diversification. However, the covariance term between ESG and non-ESG target achievement is relatively small.

important dichotomy. On the one hand, the weight of ESG in the payout function and, hence, the contribution of ESG to pay risk are very small, which makes it difficult to explain ESG-linked pay under rationals of incentive contracting or rent extraction. On the other hand, the share of executives with at least one ESG metric increases, and so does the number of ESG metrics per executive. This begs the question of why firms report an increasing number of ESG metrics, albeit ESG metrics with limited hope of altering incentives? To explore this further, we analyze heterogeneity in executive pay across industries, firms, and executive positions, which yields several key insights.

First, there are in fact some industries where ESG-linked pay appears to align more closely with the rational of incentive contracting. Specifically, sectors with a significant environmental impact, such as energy and utilities, stand out. These industries are particularly vulnerable to rising energy costs and EU carbon permit prices, potentially making policies that reduce emissions or conserve resources not only environmentally beneficial but also financially advantageous. In such industries, executive pay is indeed linked to more binding ESG metrics with larger weights, and, hence, ESG also explains a larger share of STI variance. Interestingly, our variance decomposition shows that the covariance between ESG and non-ESG target achievement is positive and six to seven times higher in the energy and utilities sector than for the average executive. This is consistent with the hypothesis that ESG performance and financial performance are positively associated in the energy & utilities sector (doing well by doing good). Importantly, executive pay in energy-dependent and emissions-heavy industries is rarely linked to discretionary ESG metrics, that is, to performance measures that firms can choose to ignore at year-end. In contrast, such discretionary ESG metrics are prevalent in the financial services sector, where binding ESG metrics (with arguably larger incentive power) are largely absent.

These findings of our industry analysis also hold within industry, i.e., in regressions with industry fixed effects: Firms with a historically high carbon footprint avoid discretionary ESG metrics, while large, visible companies subject to scrutiny from institutional (but dispersed) investors and independent directors are more likely to include numerous discretionary ESG metrics. These same companies often fail to link executive pay to binding ESG metrics with material weights, weakening the potential of ESG criteria to change incentives. By contrast, firms with highly volatile stock prices—where stock performance is a less reliable measure of individual performance—are

more likely to implement binding ESG metrics with substantial weights in STI calculations. This aligns with the prediction that when stock prices provide a poor signal of executive actions, firms compensate by incorporating additional metrics, such as ESG, into incentive pay.

Overall, our analysis of different industries and firms suggests that there is no single rationale for ESG-linked pay. Sure, for the vast majority of companies, ESG plays a minimal role in executive compensation. Especially financial firms and large, visible companies under public scrutiny tend to rely on discretionary ESG metrics with arguably limited incentive power, which could be driven by greenwashing strategies. However, for a subset of firms, particularly in energy-intensive and high-polluting sectors, as well as firms with highly volatile stock prices, (binding) ESG criteria could play a more meaningful role within an incentive contracting framework.

Lastly, we compare compensation plans across various executive positions to determine whether firms tailor ESG performance metrics to the specific responsibilities of different top managers. Intuitively, one would expect workforce-related metrics to be more prominent for a Chief Human Resource Officer (CHRO), or environmental and emissions-related metrics to be assigned to a Chief Technology Officer (CTO). Surprisingly, our findings suggest otherwise. In firm-year fixed effects regressions, CHROs are no more likely to have workforce-related metrics than the CEOs of the same company, and CTOs are actually significantly less likely to have environmental metrics than the corresponding CEOs in the same firm-years. This is unexpected from an incentive contracting perspective, where one would anticipate a stronger alignment between specialized executives, such as the CHRO or CTO, and their respective ESG-related tasks. The CEO, as a generalist responsible for overall firm performance, could reasonably have pay tied primarily to stock price, rather than specific ESG outcomes. More broadly, we find that ESG-linked pay is generally less common among specialized C-suite roles and most frequently applied to more visible generalist positions, particularly CEOs. This pattern seems suggestive of firms applying ESG metrics to their most publicly visible executives, potentially as part of a greenwashing strategy.

The rest of the paper is organized into seven sections. We review the literature on ESG (and CSR) contracting in Section II. In Section III, we develop testable hypotheses regarding ESG-linked executive pay under incentive contracting, greenwashing, and rent extraction. The typical design of STI and LTI contracts in practice is described in Section IV. Section V describes the data and Section VI our empirical analyses. We conclude in Section VII.

II. Literature review

ESG (or CSR) contracting describes the integration of non-financial sustainability and corporate social responsibility metrics in executive pay contracts (e.g., Kolk and Perego, 2014). These terms all describe "a firm's voluntary actions to manage its environmental and social impact and increase its positive contribution to society." (Khan, Serafeim, and Yoon, 2016, p. 1697).[10] More recent contributions find that ESG/CSR contracting is associated with firm-level outcomes such as long-term orientation, financial and social performance outcomes, and improvements in environmental and social initiatives (e.g., Hong et al., 2016; Flammer et al., 2019; Al-Shaer et al., 2023; Ikram et al., 2023). It has also been shown that particularly quantitative ESG performance measures can effectively generate incentives to improve ESG outcomes (Maas, 2018).[11] However, this evidence might be subject to limited generalizability, as the vast majority of these studies uses US data (e.g., Flammer et al., 2019; Ikram et al., 2023; Grabner et al., 2024) and ESG contracting has been shown to be less developed in the US than, for instance, in Europe (Hazarika et al., 2022; Cohen et al., 2023b; Barontini and Hill, 2024).

Most recently, contributions have shifted their attention towards a more international perspective of ESG contracting, documenting the prevalence of ESG metrics in executive pay plans and their anticipated effects. Cohen et al. (2023b) analyze a broad sample of 4,395 listed firms from 21 countries between 2011 and 2020 and find that firms in more resource-intensive sectors as well as those with higher engagement by institutional investors are more likely to engage in ESG contracting. Ultimately, ESG adopters report lower CO2 emissions and attract higher ESG scores from rating agencies. Barontini and Hill (2024) analyze a sample of 53,602 listed firm-year observations from 58 countries and 19 industrial sectors over the period 2002-2021 and broadly confirm previous results on adopters of ESG contracting, based on a dummy variable which reflects whether a firm has implemented an ESG- or sustainability-oriented executive compensation policy. Hazarika et al. (2022) expand the analysis of Cohen et al. (2023b) and include a country's culture as main predictor

[10] ESG and CSR contracting have been used interchangeably so far. The term ESG is now used to group all sustainability-related issues (Khan et al., 2016). More recently, Edmans (2024) has added the term "rational sustainability" to this debate.

[11] Moreover, the role of corporate governance aspects in ESG contracting is of growing interest to researchers. Recent papers emphasize, for instance, the pivotal role of sustainability committees in this context and the complementary relationship between the public disclosure of sustainability information and CSR contracting (Al-Shaer and Zaman, 2019; Grabner et al., 2024).

of ESG pay adoption. In their analysis of firms from 59 countries in the time period 2005-2020 they furthermore exploit a regulatory shock that requires firms to disclose ESG-related information and find that ESG contracting leads to higher social and financial outcomes, most likely mediated by employee satisfaction. Carter et al. (2023) exploit the staggered adoption of say-on-pay (SOP) voting laws in 36 countries between 2002 and 2019 to show that the prevalence of ESG contracting increases, particularly in jurisdictions with binding SOP votes.

The influence of institutional characteristics such as regulatory pressure on ESG contracting is also researched by Aresu et al. (2023), who exploit a dataset of 2,328 firms listed in 37 countries in 2003 through 2015. Using a firm's first-time adoption of CSR contracting as the dependent variable, they find that firms in countries with greater social and environmental regulatory pressures are more likely to adopt ESG contracting, but that this effect is moderated by a firm's internal corporate governance structure such as block ownership or board independence. Tsang et al. (2021) add the moderating role of institutional settings on the relationship between CSR contracting and firm innovation to the discussion, based on a sample of 17,855 firm-year observations from 30 countries between 2004 and 2015.

The empirical papers cited above mostly measure ESG adoption in executive pay with a binary variable that equals one if a firm adopts at least one ESG element or a broader ESG-related compensation policy, and thus can make only limited statements regarding the importance that such ESG adoption takes relative to non-ESG criteria.[12] Not surprisingly, researchers explicitly have called for more detailed research on ex-ante information in pay contracts: *"Specifically, it would be valuable for future research to have further access to the exact compensation vehicles, the relative weights attached to different performance metrics, and the use of discretionary bonus rules* (Cohen et al., 2023b, p.810)." We contribute to the literature a detailed analysis of the ex-ante design of compensation plans. In particular, we distinguish between binding performance metrics (whose weights are fixed by the firm ex ante) and discretionary metrics, and compare the relative weights that firms assign to ESG and non-ESG criteria. As regards ex-post realizations, we collect individual target achievement rates, which allows us to identify the relative contribution of ESG and non-ESG target achievement to the overall pay risk that performance-linked remuneration

[12] Cohen et al. (2023b) at least document median weights of ESG metrics in STI and LTI bonus plans, but do not report further analyses based on these weights. Bebchuk and Tallarita (2022) document in a cross-section of 2021 S&P 100 firms that only less than one-third of firms report ex-ante weights of ESG metrics.

poses to executives. Importantly, we uncover a number of novel insights regarding heterogeneity in contract design across industries and executive positions.

Finally, ESG-linked executive pay has also recently been studied in the theoretical literature. For example, Bonham and Riggs-Cragun (2024) analyze a principal-agent model where boards contract with managers to maximize shareholder welfare, denoted as a sum of financial and ESG outcomes. In a scenario where shareholders treat financial and ESG outcomes as complements, desired behavior of the agent can be triggered with stock awards that are contingent on ESG performance, or, in other words, incentives for financial performance are increasing in ESG performance.

III. Hypothesis development

In this section, we discuss different rationales for why firms include ESG performance metrics in executive incentive pay and develop several testable hypotheses. The first rational we consider is that (some dimensions of) ESG performance could increase shareholder value (doing well by doing good). For example, higher employee satisfaction (a common ESG criterion) could result in a higher stock price if it leads to higher motivation and more successful recruitment (e.g., Edmans, 2011). Hence, some firms might include employee satisfaction as a key performance indicator in executive compensation. However, this begs the question of why these firms would not link compensation directly to the stock price. If the ultimate goal is shareholder value creation, would it not be more efficient to use *pure* equity incentives and to let the executive decide whether she should allocate her time and effort to employee satisfaction or to some other determinant of shareholder value?

One common argument against pure equity incentives derives from the informativeness principle by Holmström (1979), which states that the principal optimally conditions compensation on additional signals if these signals provide new information about the agent's past actions.[13] In our context, ESG outcomes could provide information that is not contained in the stock price for several reasons. For example, markets might not be fully efficient and fail to understand the effect of ESG outcomes on long-term value creation, such that ESG outcomes act as leading indicators of the stock price (e.g., Cohen et al., 2023b; Edmans et al., 2017).[14] Furthermore, if the stock

[13] Also see Lambert and Larcker (1987).

[14] Krueger, Sautner, and Starks (2020) show that many institutional, long-term oriented investors believe that climate risk has financial implications that are not fully priced into firms' equity, and Garel, Romec, Sautner, and Wagner (2024) show that a biodiversity risk premium emerged only after the Kunming Declaration in 2021.

price is very noisy and depends on factors outside the executive's control, it might be efficient to condition compensation on non-equity criteria with a closer link to the executive's job (possibly ESG criteria). For example, the link between a CHRO's actions and employee satisfaction is likely stronger (and easier to understand) than the link between the CHRO's actions and the stock price, which depends on firm-wide performance and thus on corporate policies she cannot control. In general, the more specialized the job of a given executive, the less informative should be firm-wide performance, as captured by the stock price, about the executive's actions. In that case, ESG performance metrics tailored to the job of the specialist could have a relatively higher "signal-to-noise ratio". By contrast, equity incentives should be more appropriate for a generalist like a CEO, whose job is to set the overarching, long-term strategy and vision for the *entire* firm and to integrate all different corporate policies in an attempt to maximize firm-wide performance. Overall, the noisier the equity (as a measure of the executive's actions) the more relevant could become ESG performance metrics for executive pay.

Our example of a positive link between employee satisfaction and financial performance falls under the paradigm of "doing well by doing good". However, firms sometimes face trade-offs between (some dimensions of) ESG performance and shareholder value. For example, a firm might find it *financially* optimal to ignore concerns about workplace conditions further up its supply chain rather than to perform costly due diligence in its suppliers' factories. This might be especially true if bad workplace conditions up the supply chain are difficult to detect for third parties and the risk of reputational damage in the future is therefore low. For such a trade-off between financial and ESG performance, the objective of shareholder value maximization implies that the firm does not tie executive pay to ESG metrics in any meaningful way that affects incentives. However, this does not preclude the possibility that the firm pretends to be "ESG conscious" and, for example, includes non-consequential ESG criteria in executive pay. For example, firms can artificially report a large number of ESG performance metrics in executive pay but without giving these measures a material weight in the payout function. Firms can also tie compensation to ESG metrics that the executive is sure to achieve, such that "ESG performance pay" essentially becomes part of fixed salary without any incentive effects.

Firms might engage in such "greenwashing" of executive pay if meaningful (that is effective) ESG incentives would conflict with shareholder value maximization but, at the same time, firms

face public pressure by third parties (governments, customers, some investor groups, proxy advisors, etc.) to become more ESG-friendly. Although it might not be possible to deceive (rational) third parties in equilibrium over multiple periods, firms could still engage in greenwashing executive pay during some transition phase of rising ESG pressure, especially if greenwashing is difficult to detect in the short run and cheap to implement (Cohen et al. 2023b, p. 812).

If we relax the assumption of pure shareholder value maximization and consider the possibility that sufficiently many shareholders genuinely care about ESG outcomes (e.g., Landier and Lovo, forthcoming) and wish to maximize shareholder *welfare* rather than shareholder *value* (e.g., Hart and Zingales, 2022; Bonham and Riggs-Cragun, 2024), then firms will optimally tie executive pay to ESG outcomes even if doing so sacrifices some shareholder value. These ESG metrics would enter executive pay with a material weight, and their achievement would not be automatic but truly depend on the actions chosen by the manager.

Summarizing the above discussion, we expect **incentive contracting** on ESG outcomes in two scenarios: (1) when better ESG performance increases shareholder value and pure equity incentives would be a too noisy signal of managers' actions; and (2) when better ESG performance decreases shareholder value, but shareholders genuinely care about ESG and are willing to sacrifice shareholder value for better ESG outcomes. In contrast, under **greenwashing**, ESG metrics in executive pay are immaterial and/or target achievement is de facto guaranteed such that ESG pay is effectively part of fixed pay without any incentive effects, while still seemingly responding to potential investor pressure.

Overall, we make the following predictions for our empirical analysis:

HYPOTHESIS 1: *RELEVANCE OF ESG METRICS*

(a) ***Incentive contracting:*** *ESG metrics have a material weight in the calculation of executives' performance pay. ESG target achievement is not guaranteed.*

(b) ***Greenwashing:*** *Firms report ESG metrics but do not assign them any material weights in the calculation of performance pay, and/or target achievement is quasi-automatic, suggesting that firms simply relabel part of executives' fixed salary as ESG performance pay.*

HYPOTHESIS 2: *INDUSTRY AND FIRM CHARACTERISTICS*

(a) ***Incentive contracting:*** *ESG metrics with material weights and non-automatic achievement are more common in industries whose shareholder value increases in ESG performance and in firms whose stock price is a relatively noisy measure of executives' actions.*

(b) ***Greenwashing:*** *ESG metrics with immaterial weights and/or automatic achievement are more common in industries without a strong positive relation between shareholder value and ESG performance and in firms that attract more public attention and ESG pressure.*

HYPOTHESIS 3: *EXECUTIVE CHARACTERISTICS*

(a) ***Incentive contracting:*** *ESG metrics are tailored to the job of the executive. They are more common among specialized executives responsible for only a limited number of corporate policies or functions than among CEOs and other generalists in charge of firm-wide performance and strategic goals.*

(b) ***Greenwashing:*** *ESG metrics are unrelated to the specific task performed by the executive, and more common among more visible executives under public scrutiny. Specifically, ESG metrics are more common among CEOs than among lower-ranked, specialized executives.*

Finally, a third rationale for ESG pay, apart from incentive contracting and greenwashing, is rent extraction. The general prediction is that entrenched executives convince shareholders/directors to tie their compensation to dimensions of performance on which they expect to succeed (Morse, Nanda, and Seru, 2011, Edmans et al. 2017, p. 467, Bebchuk and Tallarita 2022). We note that a large number of reported ESG metrics albeit with *immaterial* weights can occur under greenwashing but not under rent extraction, as entrenched executives want their preferred performance metrics to have a *large* weight in the calculation of their realized performance pay. We can also disentangle rent extraction from incentive contracting because rent extraction predicts that executives choose ESG metrics that they are sure to achieve and thus expose them to very little pay risk. By contrast, incentive contracting is inconsistent with such guaranteed target achievement.

HYPOTHESIS 4: *RENT EXTRACTION*

Entrenched executives convince shareholders and supervisory boards to tie their performance pay to ESG metrics they are sure to achieve. These performance metrics enter the calculation of performance pay with a material weight, but target achievement is quasi-automatic, making ESG

pay essentially part of fixed salary.

IV. Contract design in practice

An executive's compensation contract is typically composed of base salary, annual variable compensation, and multi-year variable compensation elements (see, for instance, Murphy (1999) and Edmans et al. (2017) for a detailed description of the structure of executive pay and Edmans, Gosling, and Jenter (2023) for a survey on the objectives, constraints, and determinants of CEO pay from both a director's and investor's perspective).

The annual base salary (also referred to as fixed compensation) includes all contractually agreed fixed compensation components, which are paid regardless of individual, business, or firm-wide performance. In the following, we describe in more detail executives' variable (i.e., performance-contingent) remuneration.

A. Short-term incentive pay (STI)

Executives' *annual* variable compensation, denoted as short-term incentive pay (STI), includes all variable compensation elements with a performance period of one year. Its calculation is generally formula-based.[15] At the beginning of the year, firms set a *target* bonus or *target* STI amount, which we denote as $TSTI_{i,t}$ for executive i in year t. The *realized* bonus or *realized* STI amount $RSTI_{i,t}$ at the end of the year depends on the extent to which the executive has achieved the target, i.e., on the fulfillment rate $f_{i,t}$:[16]

$$RSTI_{i,t} = TSTI_{i,t} \times f_{i,t} \tag{1}$$

Usually, the calculation of $RSTI_{i,t}$ in Equation (1) is qualified by so-called bonus hurdles and bonus caps. Specifically, firms impose constraints on the fulfillment rate $f_{i,t}$. If actual performance falls below a lower threshold (the hurdle), realized $RSTI_{i,t}$ is set to a lower bound (typically zero). Similarly, $RSTI_{i,t}$ is sometimes capped at an upper threshold (the cap). In the so-called incentive

[15] In some firms, directors reserve the right to make adjustments to the formula-based STI payout ex post. We discuss these ex-post adjustments further below.

[16] Payout of realized STI is typically made in cash at or shortly after the end of the performance period.

zone between the hurdle and the cap, $RSTI_{i,t}$ increases (typically linearly) in target fulfillment $f_{i,t}$ as in Equation (1).

In practice, most contracts include several performance metrics. It then becomes important how much each of these different metrics contributes to overall target achievement $f_{i,t}$. Most bonus plans (STI plans) in our sample are additive:

$$f_{i,t} = \underbrace{w_{i,t}^{B1} \times f_{i,t}^{B1} + w_{i,t}^{B2} \times f_{i,t}^{B2} + ... + w_{i,t}^{Bn} \times f_{i,t}^{Bn}}_{\text{binding metrics}} \quad + \quad \underbrace{w_{i,t}^{D} \times f_{i,t}^{D}}_{\text{discretionary metrics}} \tag{2}$$

In Equation (2), the firm has committed to individual weights $w_{i,t}^{B1}$, $w_{i,t}^{B2}$, ..., $w_{i,t}^{Bn}$ for n performance metrics at the beginning of the fiscal year. For these n metrics, the executive already knows ex ante with what weight each of them will enter into the calculation of overall target fulfillment $f_{i,t}$. For example, fulfillment rate $f_{i,t}^{B1}$ of metric $B1$ will enter with weight $w_{i,t}^{B1}$. As the firm commits to these weights ex ante, we call them the *binding metrics*. In practice, these binding metrics are often measured with respect to *hard* (quantitative) key performance indicators (KPIs) that can be easily verified. In our analyses, it will be convenient to distinguish between binding *ESG* and binding *non-ESG* performance metrics. For this purpose, we rewrite Equation (2):

$$f_{i,t} = \underbrace{w_{i,t}^{B,ESG} \times f_{i,t}^{B,ESG}}_{\text{binding ESG metrics}} \quad + \quad \underbrace{w_{i,t}^{B,nESG} \times f_{i,t}^{B,nESG}}_{\text{binding non-ESG metrics}} \quad + \quad \underbrace{w_{i,t}^{D} \times f_{i,t}^{D}}_{\text{discretionary metrics}} \tag{3}$$

where $w_{i,t}^{B,ESG}$ and $f_{i,t}^{B,ESG}$ are the total weight and the joint achievement rate of all binding *ESG* metrics together, and $w_{i,t}^{B,nESG}$ and $f_{i,t}^{B,nESG}$ are defined correspondingly for binding *non-ESG* metrics. In other words, Equation (3) shows the relative importance of (binding) ESG and non-ESG performance metrics in the calculation of total target fulfillment $f_{i,t}$.

Besides binding metrics, many firms also include *discretionary* (often called *soft*) metrics. The defining characteristic of these discretionary metrics is that their individual weights are not known to the executive at the beginning of the fiscal year (Maas, 2018).[17] An example would be an STI plan that considers the two metrics "Continue to drive strategic initiatives" and "Improve

[17] Ikram et al. (2023) differentiate between objective or formulaic contracts and subjective contracts. They define contracts as objective if a proxy statement clearly specifies the weights (dollar amount of compensation or the percentage) attached to CSR-related metrics.

employee satisfaction", but without specifying their relative importance (their individual weights). At the beginning of the year, the executive only knows the joint weight of both discretionary metrics *together*, i.e., $w_{i,t}^{D} = 1 - \sum_{j}^{n} w_{i,t}^{Bj}$. In Equations (2) and (3), the joint contribution of all discretionary metrics together to overall target fulfillment $f_{i,t}$ enters as the product between their joint weight $w_{i,t}^{D}$ and fulfillment rate $f_{i,t}^{D}$. Economically, these discretionary metrics expose the executive to additional risk as the (supervisory) board / the compensation committee will pick their relative weights only ex post. In other words, the executive cannot be certain how much strong performance on one of these discretionary metrics will actually be rewarded ex post.[18]

Some bonus plans are not additive but connect achievement for different performance metrics multiplicatively. Combinations of the additive and the multiplicative model are also possible—for example, when a subset of metrics is combined additively as in Equation (2) before being scaled by a multiplier that measures an additional performance metric. An example would be an STI plan, where the attainment of additively connected financial targets is ultimately multiplied by an individual (non-financial) performance factor. Oftentimes, only ranges of this multipliers or scaling factors are communicated ex ante, whereas the exact values of the multiplier are chosen by the supervisory board only at year-end. Hence, these multipliers can be understood as discretionary metrics.

Finally, realized STI can be subject to deferral conditions, under which STI elements are paid with a certain delay.[19] Usual forms of deferrals include cash deferrals and equity deferrals. In case of cash deferrals, a cash payment is delayed for a certain period of time (e.g., three years) and might also be subject to predefined internal performance thresholds. Equity deferrals represent a deferred payment in the form of real or virtual shares, with the resulting number of shares being blocked for a certain period of time, commonly three years. After expiry of the blocked period, these shares are placed at the beneficiary's disposal.

[18] In our example of the two discretionary metrics "Continue to drive strategic initiatives" and "Improve employee satisfaction", the firm has full discretion to choose the relative importance of both metrics at year-end. For example, the firm is free to concentrate on the first metric at the expense of employee satisfaction.

[19] If part of the payout is deferred, the payout amount less the deferred amount is reported as annual realized STI pay in our data.

B. Long-term incentive pay (LTI)

The lion's share of multi-year incentive plans is represented by the classical long-term incentive plans (LTI) with forward orientation, i.e., variable compensation elements which are based on a performance/vesting period of multiple years. Typical examples include performance cash, performance shares, restricted stock, and traditional stock option plans.

Under performance cash plans, executives are granted a conditional right to a certain cash compensation after the expiry of a predefined performance period, e.g., three to four years. The final amount is determined at the end of the performance period, depending on the achievement of pre-defined performance targets during the performance period. Hence, this constitutes a time- and performance-vesting, long-term bonus plan.

Performance shares are time- and performance-vesting stock awards, under which a certain number of shares are conditionally granted to executives at the beginning of a pre-defined performance period. Depending on the achievement of pre-defined performance targets during the performance period, the final number of shares is awarded (which can then increase or decrease). The final amount is delivered either in the form of shares or as an equivalent payment in cash.

Restricted stock plans grant the executive a certain number of real or virtual shares that are blocked for a certain period of time, e.g., four years, and afterward placed at her disposal. Alternatively, at the end of the period, the number of shares may be multiplied by the current share price and the payment is made in cash.

Classical stock options plans grant executives the right (but not the obligation) to purchase shares at a pre-defined strike price. After expiry of the blocking period, the options can be exercised within a pre-specified exercise period, provided that the current share price exceeds the strike price set at the grant date. Payment is then made either in the form of shares or in cash.

V. Data

A. Data sources

Our sample selection is based on Europe's two leading stock market indices in terms of free-float market capitalization, the EURO STOXX 50 and the STOXX Europe 50. The EURO STOXX 50

tracks the 50 largest and most traded listed companies in the eurozone. The STOXX Europe 50 covers the largest European firms in terms of market capitalization, i.e., it also includes European companies outside the eurozone.[20] Our main sample includes all firms that have been listed for at least ten days on either the EUROSTOXX 50 or the STOXX Europe 50 (or both), between December 31, 2014 and December 31, 2020.[21] We collect data for all firm-years between 2013 and 2020. In case firms enter or exit one of the stock indices within our considered time period 2013 to 2020, we also collect data on the years prior to entry and the years after the exit. If a firm's fiscal year differs from the calendar year, our reporting year refers to the year the company's fiscal year ends. Table A.1 in Appendix B provides an overview about the composition of the indices and the studied firms.

Our empirical analysis builds on multiple data sources. First, information on realized (i.e., ex-post) short- and long-term compensation elements of top executives is provided by the international consulting and board advisory firm Mercer hkp/// group (part of Mercer/Marsh McLennan), a market leader for executive remuneration. This data set comprises information on fixed salaries, annual short-term incentives (STI), multi-year performance elements including deferred compensation, and long-term incentives (LTI), which are typically based on equity. This data is of high accuracy, as the consulting firm offers their executive pay data for benchmarking analyses via Europe's leading portal for remuneration data on executive and management board members. Importantly, the data can be compared across countries and companies, due to the use of the consultancies' International Compensation Disclosure Standard (ICDS) methodology.[22]

We complement this data with hand-collected information from companies' annual reports, corporate governance reports, and compensation reports about the various elements of executives' compensation plans. Importantly, we do not limit our data collection to realized compensation at year-end, but also collect information about ex ante contract details at the beginning of the fiscal year. As regards the ex ante contract, we record the target bonus (target STI amount) $TSTI_{i,t}$ and

[20] As of July 2024, the market capitalization of the EURO STOXX 50 amounts to 4,388 billion Euros and that of the STOXX Europe 50 amounts to 6,266 billion Euros.

[21] A few firms were in of one of the indices for less than ten days, e.g., due to corporate restructuring or (de)mergers. As this is usually only a transitional period, we did not include these companies in our sample. This concerns South32 (8 days, 2015), Uniper (1 day, 2016), Alcon, M&G (both 1 day, 2019), and Siemens Energy (1 day, 2020).

[22] See www.boardpay.com and https://boardpay.com/downloads/boardpay_Methodology_ICDS.pdf for details. For all firms that have entered or exited one of the stock indices within our considered time period 2013 to 2020, we hand-collect information on realized compensation elements on the years prior to entry and the years after the exit following Mercer hkp/// group's methodology.

the weights that firms assign to individual metrics (except for discretionary metrics).[23] We further record information on bonus caps and hurdles and whether directors / compensation committees reserve the right to scale STI at their discretion (e.g., via ex post multipliers). As regards the ex post realization at year-end, we collect the realized bonus (realized STI amount) $RSTI_{i,t}$, overall target achievement $f_{i,t}$, specific achievement rates for individual metrics (whenever available), as well as information on whether directors / compensation committees exercised any right to scale STI with an ex post multiplier. Whenever possible, we collect the same information also for executives' LTI plans.[24] As LTI plans are granted over multiple years, information on the number and weights of metrics in LTI plans always refer to the first year of granting such an LTI plan. Note that additional compensation elements such as pension schemes and fringe benefits (company cars, insurances) are not included in our analyses. All compensation data is converted into Euro using year-specific conversion rates provided by the European Central Bank.

We carefully distinguish between ESG and non-ESG performance metrics (as well as between financial and non-financial metrics). Our classification of ESG metrics is based on the ESG framework provided by LSEG Data & Analytics (formerly Thomson Reuters Refinitiv), "one of the largest ESG content collection operations in the world" (LSEG, 2024). This data has been used in more than 1,200 scientific articles, mainly in finance journals (Berg, Fabisik, and Sautner, 2020). According to this taxonomy, the "E", "S", and "G" categories are divided into the following 10 subcategories: Emissions, Innovation, Resource use (E), Community, Product responsibility, Human rights, Workforce (S), and Corporate Social Responsibility strategy, Management, Shareholders (G). These classifications can then be subdivided into 375 more detailed metrics. Table A.2 in Appendix C provides an overview of exemplary metrics per category. We use this detailed taxonomy to classify non-financial metrics in executive compensation contracts into non-financial-ESG-related and non-financial-non-ESG-related metrics and to group them accordingly.

We merge our compensation data set with (non-) financial company-level information from LSEG Data & Analytics. This data comprises a series of balance sheet and income statement items as well as stock price information for the majority of firms in our sample. Corporate governance

[23] Appendix D highlights examples of different levels of disclosure of ESG-related metrics in executive STI compensation contracts from company reports.

[24] Like Cohen et al. (2023b), we observe that reporting granularity varies across firms, countries, regulatory regimes, and over time. Similarly, Bebchuk and Tallarita (2022) document that out of those 53 S&P 100 firms who adopt ESG contracting in 2021, only 27% fully disclose the exact weights of the associated metrics.

information comprises data on the fraction of independent and female directors. Corporate carbon emissions are proxied by Scope 1 CO2 and CO2 equivalents emissions. Lastly, we retrieve data on the number of institutional investors and blockholders per firm-year. We define blockholders as large shareholders owning more than 10% of outstanding equity. These firm-level variables are very similar to the ones used in, for instance, Cohen et al. (2023b) and Hazarika et al. (2022). We winsorize all balance sheet items, realized compensation data (STI and LTI), target bonuses, and executive characteristics (age, tenure) at the 1%-level in each tail of the distribution.

For a detailed description of variable definitions, calculations, and data sources of all main variables, see Appendix A.

B. Sample construction

We apply three filters to the raw data ($n = 3,875$ executive-year observations). First, we discard 762 executive-year observations for executives with an annual work period of less than 360 days. In case of executive turnover in the mid of a fiscal year, resulting in only a few months of employment, pay information is hardly comparable to those of incumbent (i.e., non-moving) executives due to special conditions on annual bonus payments in case of leaving and the existence of lump-sum payments such as severance pay. Second, some firms have entered the stock indices as a result of merger and acquisition activities. In these cases, we drop data on the two predecessor companies that have not been part of the stock indices. This results in a drop of 76 executive-year observations. Third, in order to maintain a strongly balanced panel of firms covering all fiscal years from 2013 to 2020, we discard 360 executive-year observations from firms with less than eight firm-years (equivalent to 22 firms).

Our final sample includes 2,677 executive-year observations (584 firm-year observations), derived from 674 distinct executives employed by 73 distinct firms across our eight-year time period. The number of executives within a firm ranges from 1 to 17 with a mean of 4 and a median of 3.

C. Descriptive statistics

In Table I, we report the composition of our firm sample by industry and headquarter country. Most of our firm-year observations come from the financial services sector, followed by consumers and industrials & materials (Panel A). Unsurprisingly, most firms are headquartered in Germany,

the UK, and France (Panel B). We report firm characteristics in Table II. Our average sample firm employs 112,332 employees and four executives, has a market capitalization of 59.8 billion Euros, 321.6 billion Euros in total assets, and a ROA (ROE) of 5.4% (15.1%). Female board membership amounts to 31.2% and institutional ownership to 50.3%.

Table III, Panel A reports on the main characteristics at the executive level. The average executive is 54 years old and predominantly male, with average tenure in the firm of 6 years. Panel B shows that CEOs account for 576 executive-year observations, followed by CFOs with 399 observations. CHROs and COOs are also relatively frequent (148 and 141 observations each). All other expert C-suite positions (e.g., chief marketing officer, chief sales officer, chief legal officer, etc.) are grouped as *other specialists* (416 observations). Executives heading the management of individual divisions of firms, i.e., executives responsible for certain product lines or geographical markets, account for 825 observations.

Table IV provides a first overview of the main characteristics of STI bonus plans in our sample of the largest, listed European firms. The average target bonus (target STI) $TSTI$ equals approximately one million Euros, or 100.6% of annual base salary. STI plans contain an average of 4.6 binding performance metrics, that is, metrics for which firms commit to a specific weight known to the executive ex ante (see Section IV). Of these binding metrics, 4.2 are non-ESG metrics and only 0.4 are binding ESG metrics. On average, all binding metrics combined have a (total) weight of 75.8% in the payoff function. In the average STI plan, binding ESG metrics have a combined weight of around 2.6%. Discretionary metrics, i.e., metrics for which the firm chooses the weight ex post (at year-end), account for the remaining 24.2% of the payoff function, and an average STI plan is composed of 1.4 discretionary ESG metrics and 3.4 discretionary non-ESG metrics. Furthermore, caps and hurdles in the payoff function are relatively common, with STI bonuses capped, on average, at 177% of base salary. Boards reserve a right to adjust the STI payout, as calculated according to the formula in the STI plan, ex post in more than 70% of the cases, in one-fifth of the cases through ex-post multipliers. Table V shows the corresponding characteristics of LTI plans in our sample.[25] They are characterized by a smaller number of metrics in their year of granting (2.8

[25]Note that we do not report target values for LTI plans for several reasons. First, LTI target values are reported in a minority of cases, with missing information being present particularly in earlier years. Additionally, LTI details are sometimes not specified at the individual level, but only for the entire executive team. Lastly, it often occurs that multiple LTI plans in the same firm overlap over time, as each of these plans have different vesting periods, which makes it difficult to determine LTI target achievement across time.

binding and 0.8 discretionary metrics in LTI plans compared to 4.6 and 4.8 binding and discretionary metrics in STI plans). Discretionary metrics are less important in LTI than in STI plans, as they have a combined weight of only 8.4% in LTI compared to 24.2% in STI contracts. Focusing on binding ESG metrics, we observe a similar weight of 2.5% in LTI plans (2.6% in STI).

In Table VI, we break down the different ESG metrics into their environmental, social, and governance components. Both for STI and LTI plans, firms most often include social metrics, followed by governance metrics, whereas environmental metrics are less frequent. In LTI plans, non-ESG metrics are mostly financial performance measures, whereas STI plans have a similar (average) number of financial and non-financial non-ESG metrics.

Finally, Table VII shows statistics for STI fulfillment (achievement) rates as well as realized compensation at year-end. On average, overall target achievement amounts to 104%, suggesting that executives hit close to the target set at the beginning of the fiscal year. However, the standard deviation is large at 40%. The average base salary is 1,093,465 Euros and average realized bonus (realized STI) $RSTI$ amounts to 821,716 Euros, i.e., 84% of base salary. The average realized LTI amount $RLTI$ is 1,726,691 Euros. Realized STI is partially deferred for about half our sample. In case of deferral, 53% of the STI amount is deferred over an average deferral period of 3 years. Although boards reserve the right for discretionary adjustments in more than two-thirds of cases, they exercise these discretion rights in only 13% of all cases.

VI. Empirical Analysis

Our empirical analysis consists of three parts. In Section VI.A, we study the relevance of ESG metrics in executive STI contracts, analyzing the reported numbers and weights of different ESG metrics as well as their contribution to executives' pay risk. In Section VI.B, we show how the design of ESG metrics and their contribution to pay risk vary across different industries and firms and in Section VI.C, we do a similar comparison across different executive positions. We focus on STI contracts because of better data availability (see footnote 25) and because previous research has shown that ESG metrics are more often used in STI vs. LTI schemes (Walker, 2022; Cohen et al., 2023b; Homroy, Mavruk, and Nguyen, 2023; Willis Towers Watson, 2023).

A. Relevance of ESG pay

In this section, we show that many firms report a large number of ESG metrics that lack a material weight in the calculation of total STI (Section VI.A.1), that variation in ESG target achievement is low, and that ESG metrics account for only a small fraction of total STI variance (Section VI.A.2). We compare these initial findings against Hypothesis 1 in Section VI.A.3.

A.1. Prevalence of ESG performance metrics in listed European firms

To measure the adoption of ESG pay, most papers check whether a given compensation plan is tied to at least one ESG criterion (e.g., Carter et al., 2023; Cohen et al., 2023b; Hazarika et al., 2022; Ikram et al., 2023). We apply this "extensive margin approach" to 674 executives of 73 firms that are listed on the EURO STOXX 50 or the STOXX Europe 50 between 2013 and 2020. Panel A of Figure 1 shows that in 2013, only 40% of executives have STI pay linked to ESG metrics, which increases to approximately 60% in the second half of our sample period (dashed black line). By 2020, nearly 60% of executives have at least one social metric, just over 30% have one or more governance metrics, and only 19% have environmental criteria. In contrast, all executives have one or more non-ESG performance metrics across the entire sample period (solid line at 100%).

We further break down each of the three main ESG categories into their subcategories (see Table A.2 in Appendix C for definitions and examples of these subcategories). Panel B of Figure 1 shows that emissions reduction metrics are the most common environmental criteria, increasing from 4% to 15% of executives by 2020, with the most significant rise from 2018 to 2020, i.e., precisely at a time when the price of EU carbon permits quadruples (see Internet Appendix Figure IA.1). Metrics for resource use, such as water and energy efficiency, increase from 0% in 2013 to an executive share of 7.5% in 2020. Innovation and green R&D metrics remain uncommon and are found for only 2.4% of executives by 2020. For social metrics, Panel C reveals that workforce-related and product quality metrics are the most common, reaching executive shares of about 45% and 30%, respectively, by 2020. Social criteria that consider possible externalities on local communities are much rarer, with a share of about 10%, and not a single executive has any metrics explicitly related to human rights. Panel D shows that governance metrics related to CSR strategy and management are the most prevalent, covering about 20% of executives in 2020, where the strong increase over

our sample period is likely driven by an anticipation of new regulations towards improved corporate governance, such as board independence and board diversity. Overall, Figure 1 suggests that while a substantial share of executives have at least one ESG performance metric, firms tend to prefer criteria that may improve financial performance, such as emissions and workforce-related criteria, over metrics addressing broader externalities, such as human rights.

While the extensive margin approach in Figure 1 tells us about the *presence* of ESG in STI, it remains silent about its *importance* relative to non-ESG criteria. In a first attempt to overcome this limitation, Figure 2 plots the *number* of ESG versus non-ESG metrics per executive. Panel A shows that, on average, executives have four times more non-ESG than ESG metrics, and Panel B reveals that the average executive has three times more social metrics than governance-linked metrics and very few environmental criteria.[26] Together, Panels A and B suggest that ESG metrics, particularly social outcomes, carry only about one-fourth the importance of non-ESG criteria. Although this is a step forward compared to Figure 1, there remain two limitations to this analysis.

First, it remains unclear if ESG metrics are binding and how heavily they factor into year-end performance assessments. As explained in Section IV, *binding* metrics have a pre-set weight known to the executive, whereas *discretionary* metrics lack an explicit ex-ante weight and may even be disregarded by the firm ex post. Interestingly, Panel C of Figure 2 shows that especially the number of discretionary ESG metrics increases during our sample period, whereas binding ESG metrics only increase slightly after 2018. A second limitation is that firms can inflate the perceived importance of ESG-linked pay by splitting a given ESG outcome into several criteria, even if they lack substantial weight or are non-binding. To overcome these limitations, Figure 3 plots the joint weight that firms give to binding ESG metrics together. We find that the total weight of all binding ESG metrics combined is, on average, less than 2% in 2013. Even after a strong increase between 2018 and 2020, this ESG weight reaches only 5% by 2020.

Overall, the extensive margin analysis reveals little about the actual importance of ESG pay. By 2020, although 60% of executives had at least one ESG metric, ESG metrics were still outnumbered by non-ESG metrics, were often discretionary, and, when binding, carried modest weights in STI calculations.

[26] We plot average numbers of ESG metrics per executive because plotting median numbers would not reveal any new information. Figure 1 already shows that the median executive has zero metrics in most ESG categories.

A.2. Contribution of ESG metrics to pay risk

Whether an executive has incentives to work towards a given ESG performance metric depends on two factors. First, the metric must carry substantial weight in the performance assessment; otherwise, the executive is likely to disregard it unless intrinsically motivated (in which case incentive pay is unnecessary). Second, achieving the target should be contingent on the executive's actions. As discussed in Section III, some firms might want to greenwash executive pay and design ESG metrics in a way that makes their achievement automatic. In this case, variation in the achievement rates of ESG metrics would be zero, making ESG-linked STI effectively part of fixed salary with no incentive power.[27] Thus, greenwashing implies that ESG criteria subject executives to minimal pay risk, due to small, immaterial weights of ESG metrics and/or stable ESG achievement rates.

Our goal is to estimate the contribution of ESG performance metrics to the pay risk posed by the STI contract of executives. To this end, we decompose total STI variance into its different components. First, we substitute Equation (3) into Equation (1) to rewrite total realized STI:

$$\begin{aligned} RSTI_{i,t} &= TSTI_{i,t} \times w_{i,t}^{B,ESG} \times f_{i,t}^{B,ESG} + TSTI_{i,t} \times w_{i,t}^{B,nESG} \times f_{i,t}^{B,nESG} + TSTI_{i,t} \times w_{i,t}^{D} \times f_{i,t}^{D} \\ &= RSTI_{i,t}^{B,ESG} + RSTI_{i,t}^{B,nESG} + RSTI_{i,t}^{D}, \end{aligned} \tag{4}$$

where $RSTI_{i,t}^{B,ESG}$ and $RSTI_{i,t}^{B,nESG}$ are the parts of total realized STI that the executive receives for the achievement of binding ESG and non-ESG metrics. As explained in Section IV, discretionary ESG and non-ESG metrics lack individual weights and are only assessed jointly. Hence, it is not possible to split $RSTI_{i,t}^{D}$ into an ESG and a non-ESG part. Finally, we can decompose the variance of total realized STI into the following components:

$$\begin{aligned} Var\left(RSTI_{i,t}\right) &= Var\left(RSTI_{i,t}^{B,ESG}\right) + Var\left(RSTI_{i,t}^{B,nESG}\right) + Var\left(RSTI_{i,t}^{D}\right) \\ &\quad + 2Cov\left(RSTI_{i,t}^{B,ESG}, RSTI_{i,t}^{B,nESG}\right) + 2Cov\left(RSTI_{i,t}^{B,ESG}, RSTI_{i,t}^{D}\right) \\ &\quad + 2Cov\left(RSTI_{i,t}^{B,nESG}, RSTI_{i,t}^{D}\right) \end{aligned} \tag{5}$$

[27] For example, greenwashing firms can set the ESG metric so low that the executive is sure to reach the highest possible level of target achievement. Alternatively, firms might be able to hide the executive's true performance from the public (e.g., if the performance metric is intransparent and hard to verify) and then always declare full target achievement. In both examples, the executive is guaranteed to get the highest possible bonus for ESG performance.

Table VIII shows this variance decomposition for different samples. We report total STI variance $Var\left(RSTI_{i,t}\right)$ in column 2. In Panel A, this total variance includes both within-executive and between-executive STI variation. In the full sample of 1,076 executive-year observations with information on all necessary variables, binding ESG metrics account for only 1.9% of this total STI variance (column 4). Interestingly, this variance share is smaller than the weight of 3.5% that these metrics take in the overall performance assessment at year-end (column 3).[28] Hence, binding ESG metrics contribute less to total STI variance than their weight may suggest. Binding non-ESG performance metrics have by far the largest variance share at 88.1% (column 6), which slightly exceeds their weight of 87.5% (column 5). Hence, binding non-ESG metrics contribute 46 times (88.1/1.9) more to overall STI variance than binding ESG metrics. The contribution of the covariance between binding ESG and non-ESG metrics is positive with a variance share of 4.4% (column 9), suggesting that both are positively correlated. Finally, all discretionary metrics together account for another 9.3% of total STI variance (column 8).

A potential issue with our analysis could be that some firms (i.e., their supervisory boards and/or compensation committees) do not calculate realized STI based on weights and achievement rates alone but reserve the right to make a final adjustment to total STI at their discretion (see Section IV). A priori, it is unclear how such an adjustment to total STI should be attributed to the different performance metrics. However, Table VIII shows that the variance shares change only marginally if we drop these firms with supervisory board discretion and focus on the remaining subset of 926 observations.

As shown in Figure 1, 40% to 60% of the executives in our sample (black, dashed line in Panel A) do not have a single ESG criterion in their STI. For these executives, the contribution of ESG metrics to total STI variance is (mechanically) zero. After we drop the corresponding observations and retain only executives with at least one ESG metric, the weight of binding ESG metrics increases from, on average, 3.5% to 8.5% (column 3). Strikingly, the variance share of these metrics increases much less and remains low at 3.5% (column 4), indicating again that binding ESG metrics contribute less to total STI variance than their explicit weight suggests, even in a sample of executives whose contracts are all related to at least one ESG metric.

As explained above, Panel A of Table VIII considers both within-executive and between-

[28] The weight of 3.5% is calculated as the sample average among the 1,076 executive-year observations.

executive STI variance. However, the pay risk that STI poses to an individual executive is better measured by within-variation alone, that is, by how much the STI of a given executive varies over the years she works at a given firm. To eliminate all between-executive variation in STI, we regress $RSTI_{i,t}^{B,ESG}$, $RSTI_{i,t}^{B,nESG}$, and $RSTI_{i,t}^{D}$ in Equation (4) on interacted executive × firm fixed effects $\theta_{i,f}$.[29] Then we redo the variance decomposition for the regression residuals, which only exhibit within-executive STI variation.

Panel B of Table VIII reports the results of this new decomposition. In the largest available sample with 1,074 observations, binding ESG metrics account for only 1% of within-executive STI variance (column 4). This implies that the variance share of binding ESG metrics is three times smaller than the weight of 3.5% that these metrics take in the assessment of overall performance at year-end (column 3). Even if we focus only on executives with at least one ESG metric, this variance share remains small at 2.5%, and binding ESG metrics explain 26 times (64.9/2.5) less of within-executive STI variance than binding non-ESG metrics.

Overall, our variance decomposition in Table VIII allows us to draw two conclusions. First, it shows that ESG performance metrics contribute very little to the pay risk that STI poses to executives. Focusing on within-executive STI variance (Panel B), we estimate that depending on whether we consider only binding or also discretionary metrics, the risk contribution of ESG is somewhere between 1% (column 4 of Panel B) and 8.7% (column 4 + column 8) in the full sample, and between 2.5% and 17.7% in the subsample of executives with at least one ESG metric.

Second, the variance decomposition also gives us an idea of *why* ESG contributes so little to the overall pay risk posed by executives' STI bonus plans. Of course, the main reason is the small weight of ESG metrics in the year-end assessment of overall performance. Beyond this, it also seems likely that ESG criteria have very stable target achievement rates, since their contribution to overall STI variance falls well short of their already small weights (compare columns 3 and 4 of Panel B). Indeed, additional analyses show that the year-end assessment of overall performance exhibits less annual variation if ESG criteria take a larger place in the executive's STI contract. In Table IX, we calculate the annual variation (S.D.) of the overall achievement rate $f_{i,t}$ for each of the 65 CEOs in our sample and regress it on numbers (columns 1-3) and weights of ESG and non-ESG metrics (columns 4-6). Regardless of the set of controls, overall performance achievement

[29] We use the interaction to account for cases in which the same person subsequently works for different firms.

is less volatile for executives with more *ESG* performance metrics and with higher weights on these metrics, whereas *non-ESG* metrics are not associated with higher performance volatility. Hence, ESG criteria seem to pose relatively little pay risk, both due to immaterial metric weights and also because they seem to reduce variation in overall performance achievement.

A.3. Interim conclusion for Hypothesis 1

Part (a) of Hypothesis 1 predicts that under incentive contracting, ESG metrics have a *material* weight in the calculation of executives' performance pay, and that ESG target achievement is *not* automatic. In contrast to this prediction, Sections VI.A.1 and VI.A.2 show that most ESG metrics are either discretionary (firms can ignore them at year-end) or that firms commit only to very small weights ex ante. As a consequence, they explain only an immaterial portion of total executive pay risk posed by STI plans. Overall, the fact that firms report an increasingly large number of ESG metrics (for up to 60% of their executives), albeit with questionable incentive power, seems more consistent with greenwashing (Part (b) of Hypothesis 1). Similarly, the small ESG weights also seem inconsistent with rent extraction (Hypothesis 4).

B. Industry and firm characteristics

In this section, we study heterogeneity in the prevalence and design of ESG-linked STI plans between different industries (Section VI.B.1) and firms (Section VI.B.2). We observe that historically more polluting and energy-reliant industries, as well as firms with noisier stock prices, mostly use *binding* ESG performance metrics. By contrast, discretionary (non-binding) ESG performance metrics are especially common in the financial sector and in large firms with institutional but dispersed ownership and with more independent directors. We compare these findings to Hypothesis 2 in Section VI.B.3.

B.1. Industry differences

In Figure 4, we begin by plotting the numbers of discretionary and binding ESG performance metrics per executive by industry. We observe a striking difference in the prevalence of both types of performance metrics, that is, binding and discretionary ESG metrics are common in different industries. In particular, *discretionary* metrics are most popular in the financial sector, and least

common in the energy & utilities sector, whereas the opposite is true for *binding* ESG metrics. Financial firms rapidly increase the number of discretionary ESG metrics from 1 to approximately 4 between 2013 and 2020. These same financial firms have no binding ESG metrics until 2018, and only about 0.75 binding metrics per executive in 2020. By contrast, in the energy & utilities sector, companies start with only 0.5 discretionary ESG metrics in 2013 and further reduce this number to about 0.25 metrics in 2020. For binding ESG metrics, energy & utilities take the opposite trend and increase the number of binding metrics per executive from about 0.25 to 1.75 in 2020.

Unsurprisingly, the industries that favor binding ESG performance metrics over discretionary ones also have the highest weights for these binding metrics in the year-end calculation of total STI. Figure 5 shows that industrial & materials, ICT, and energy & utility firms commit to weights that are between 2 and 3 times larger (depending on the year) than in the financial, consumer, and health care industries. These higher ESG weights also translate into a larger contribution of binding ESG metrics to the overall pay risk that STI poses to executives. Panel A of Table X shows that binding ESG metrics contribute 6.1% to total STI variance in energy & utilities (column 4), but only 0.9% in finance. When considering only within-executive STI variance in Panel B, those variance shares decrease, but the difference between both sectors remains qualitatively unchanged. Interestingly, the covariance terms between ESG and non-ESG metrics in column 9 are also very different in both sectors. In finance, the correlation between ESG and non-ESG performance pay is close to zero—the covariance term is only 6.8% in Panel A and 3.1% in Panel B. By contrast, this covariance term between ESG and non-ESG is larger in energy & utilities firms than in any other industry—i.e., 27.1% in Panel A and 14.2% in Panel B. One possible explanation could be that ESG and non-ESG performance have an especially strong, positive relation in the energy & utilities sector (doing well by doing good).

B.2. Firm characteristics

Next, we move from a broad industry comparison to fixed effects regressions that allow us to study firm heterogeneity *within* industries. To this end, we estimate the following model:

$$y_{i,t} = \alpha + \beta_1 X_{f,t}^{firm} + \beta_2 X_{i,t}^{exec} + IndustryFE + ExecPositionFE + YearFE + \epsilon_{i,t} \tag{6}$$

where we use different dependent variables $y_{i,t}$ to measure the adoption of ESG performance metrics in the STI compensation plan of executive i in year t. In this section, we focus on the vector of firm characteristics $X_{f,t}^{firm}$ to gauge possible differences between firms conditional on industry fixed effects. As firm characteristics, we include a list of variables similar to that in Cohen et al. (2023b), subject to a few conscious changes. In particular, to measure a firm's scope-1 emissions of CO_2 equivalents, we use the *historical* (log) average in the five years *before* the start of our sample period (hence, we use the years 2008-2012), and we use the same pre-sample years to measure firms' stock-to-accounting volatility (see Appendix A). In both cases, the historical values should address potential concerns about reverse causality. Besides industry fixed effects, Equation (6) further includes fixed effects for time and for different executive positions (CEO, CFO, etc.), as well as a vector of different executive characteristics $X_{i,t}^{exec}$, which we will analyze in Section VI.C. Standard errors are clustered at the firm level.[30]

Table XI shows regressions for different dependent variables $y_{i,t}$. We study the use of discretionary ESG performance metrics in executives' STI contracts in columns 1 to 4 and the use of binding ESG performance metrics in columns 5 to 8. Previous research mostly uses a binary variable that equals one if a compensation plan includes at least one ESG performance metric, and zero otherwise. We adopt this approach in columns 1 and 5. Then we refine the analysis and count the (log) number of ESG metrics in columns 2 and 6. To gauge the relative importance of ESG and non-ESG performance metrics, we standardize the number of ESG metrics by the total number of reported (ESG and non-ESG) metrics in columns 3 and 7. Finally, we use the weight of binding ESG metrics in column 8 and the weight of all (ESG and non-ESG) discretionary metrics together in column 4.[31]

Like in our industry analysis, we observe again a striking difference between firms that use discretionary and firms that use binding ESG performance metrics. In Table XI, the only statistically significant firm characteristic that has the same (positive) coefficient sign for both types of ESG metrics is the binary variable *Emissions policy*, which identifies firms that have officially enacted some policy to reduce emissions. For all other firm characteristics, the coefficient estimates are

[30] We do not cluster by year because we only have 13 years of data, whereas the conventional threshold for the cluster-robust covariance matrix to converge is 50 clusters.

[31] We cannot use the weight of discretionary ESG metrics alone because as explained above, firms do not commit to explicit weights for individual, discretionary metrics. They only report one overall weight for all discretionary metrics together, i.e., the combined weight of discretionary ESG and non-ESG metrics.

either statistically insignificant or have opposing signs for discretionary and binding ESG metrics, which suggests again that both types of metrics serve very different purposes.

Our first, maybe surprising, result in Table XI is that *discretionary* ESG performance metrics are significantly *less* common in firms with historically higher CO_2 emissions (columns 1 to 4). This contrasts with Cohen et al. (2023b), who predict that "more polluting firms have a higher incentive to improve ESG performance (they face a higher cost for their emissions and could suffer from stranded assets) (p.824)." One possible explanation could be that *discretionary* ESG metrics, which firms are free to ignore if they wish to, are simply not suited to provide strong incentives. Indeed, our industry analysis in the previous section has already shown that sectors with a large environmental footprint, like energy & utilities, shun discretionary ESG metrics. Instead, discretionary ESG metrics are more common in larger (high *Log(total assets)*) and more mature (high *Log(book-to-market ratio)*) firms, which tend to be more visible and likely attract more public scrutiny (Cohen et al., 2023b). Similarly, discretionary ESG metrics tend to be associated with more independent directors (high *Board independence*) and larger institutional but dispersed equity ownership (high *Institutional ownership* but low *Block ownership*)—that is, with variables that likely capture stronger ESG pressure.[32] Interestingly, we observe a very different relationship with ownership structure for *binding* ESG metrics, as the coefficients of *Institutional* and *Block ownership* flip signs between columns 1 to 4 and columns 5 to 8, suggesting that blockholders have different preferences over binding vs. discretionary ESG performance metrics than other institutional owners.[33]

Finally, we observe that firms with noisier stock prices, as measured by a high historical stock-to-accounting volatility (Li and Wang, 2016), use *binding* ESG performance metrics more often (columns 5 to 8), consistent with the prediction that firms rely on these metrics when their equity is too noisy as a signal for managerial performance.[34] Strikingly, the coefficient of *Historical stock-*

[32]For example, Azar, Duro, Kadach, and Ormazabal (2021) and Cohen, Kadach, and Ormazabal (2023a) show evidence that institutional investors care about ESG performance.

[33]Cohen et al. (2023b) use *Controlling shareholder*, which equals one if one shareholder owns more than 50% of the equity. In our European sample, only Volkswagen AG has a controlling shareholder. Therefore, we include *Block ownership*, defined as the fraction of equity held by investors that hold at least 10% of total outstanding shares, instead.

[34]The assumption that variance in stock returns proxies for the signal-to-noise ratio of equity as a measure of executive performance is common in the literature and has been shown to explain variation in CEO incentives across firms (e.g., Lambert and Larcker, 1987; Garen, 1994; Aggarwal and Samwick, 1999; Himmelberg, Hubbard, and Palia, 1999; Jin, 2002; Garvey and Milbourn, 2003; Li and Wang, 2016).

to-accounting volatility is only significant for binding but not for discretionary ESG metrics.

B.3. Interim conclusion for Hypothesis 2

Hypothesis 2 suggests that binding ESG metrics with actual incentive power are more prevalent in sectors where ESG performance enhances shareholder value and in firms where equity alone is an unreliable indicator of managerial performance. Consistent with these predictions, binding ESG metrics are more common in firms with a high environmental footprint, i.e., in firms with significant environmental costs, such as carbon pricing, as well as in firms with noisier stock prices. In contrast, discretionary ESG metrics—those without clear incentive power—are common in larger, high-visibility firms, especially in finance, where public attention is high. Overall, these findings suggest that binding and discretionary ESG metrics serve different purposes and are thus prevalent in different firms, depending on whether the focus is on genuine incentive provision or on greenwashing.

C. Executive characteristics

In this section, we study heterogeneity in the prevalence and design of ESG-linked STI plans between different executive positions. We find that ESG-linked STI tends to be more prevalent among generalists like CEOs than among specialists. We find no evidence that firms tailor ESG performance metrics to the specific tasks that a given executive must perform in her job, nor that they tailor metrics to demographic characteristics like age or gender (Section VI.C.1). We compare these findings to Hypothesis 3 in Section VI.C.2.

C.1. Which executives have which types of ESG performance metrics?

Figure 6 shows the numbers of discretionary and binding ESG performance metrics by executive position. Between 2013 and 2016, metric numbers are roughly the same across all different positions. However, after 2016, we observe an increase in discretionary ESG metrics (Panel A) for CEOs, COOs, and for our catch-all category "Other specialist", which groups all executive positions with very few observations. After 2016, CEOs and COOs also experience a strong increase in the number of binding ESG metrics (Panel B). Similarly, Figure 7 shows that after 2016, firms commit to increasingly large ESG weights in the STI of CEOs, COOs, and also CFOs. Consistent with both figures, the variance decomposition in Table XII confirms that CEOs, COOs, and CFOs have

larger variance shares for binding ESG performance metrics than other executives, although these variance shares remain low at an absolute level.[35] Overall, the evidence suggests that ESG-linked pay is more common among generalist executives than among specialists, as CEOs, COOs, and (to a lesser degree) also CFOs tend to have a broader spectrum of tasks than most other executives.[36]

While specialists have fewer ESG metrics than generalists, firms can still tailor these metrics to the specific tasks each specialist is responsible for. However, the specialists' executive positions indicate only the broad corporate policies they oversee, and our data do not clarify how these should correspond to specific ESG performance metrics. Nonetheless, in two cases, this alignment appears relatively straightforward. For example, reducing a firm's environmental footprint often involves developing new technologies and replacing stranded assets. Therefore, we would expect chief technology officers (CTOs) to have more environmental ESG metrics, particularly those linked to emissions. Similarly, a firm aiming to improve working conditions and employee wellbeing will likely assign this task to its CHRO. As a result, CHROs are expected to have social ESG metrics, especially workforce-related metrics, more often than other executives. To test these predictions, we estimate the following regression:

$$y_{i,t} = \alpha + \beta_1 CTO_{i,t} + \beta_2 CHRO_{i,t} + Firm \times Year\ FE + \epsilon_{i,t} \tag{7}$$

where the dependent variable $y_{i,t}$ equals one if the STI of executive i is linked to a given ESG metric in year t, and zero otherwise. The regressors $CTO_{i,t}$ and $CHRO_{i,t}$ are also binary and equal one if executive i is a CTO or, respectively, a CHRO, and zero otherwise. We condition the estimation on firm fixed effects interacted with year fixed effects. The regression sample is restricted to CTOs, CHROs and CEOs. Hence, the coefficient β_1 tells us whether a given CTO is more or less likely to have metric $y_{i,t}$ than the CEO of the same firm in the same year. Similarly, β_2 compares the propensity of a given metric between the CHRO and the CEO in the same firm and year. In keeping with our prediction of "tailoring" metrics to positions, we expect β_1 to be positive for

[35] This difference is stronger in Panel A (total STI variance decomposition) than in Panel B (only within-executive variation).

[36] CEOs are responsible for overall firm performance, for integrating the different corporate policies into a unified strategy, and for shaping the firm's strategic vision. COOs act as the CEO's right hand, overseeing all daily, internal operations. CFOs nowadays also require, besides expert knowledge in finance and financial reporting, a high-level understanding of firm-wide strategy and broader management responsibilities, as their financial decisions affect all other corporate policies (Brickley, Smith, and Zimmerman, 2017).

environmental metrics, and β_2 to be positive for social metrics.

In Table XIII, we report the coefficient estimates for Equation (7). In columns 1 and 2 of Panel A, the dependent variable equals one if executive i has any environmental metric. The coefficients are all negative and significant, indicating that CTOs are less and not more likely than CEOs to have environmental metrics. Moreover, CTOs are not even more likely to have environmental metrics than CHROs. This result remains unchanged when we look specifically at metrics to reduce emissions (columns 3 and 4 of Panel A). Panel B further shows that social metrics in general (columns 1 and 2) and workforce-related metrics in particular (columns 3 and 4) are not more common among CHROs than among CEOs. These findings run counter to our prediction that firms tailor ESG metrics to the tasks of different specialists.

Finally, we return to our initial regression model in Equation (6) and study the coefficient estimates for executives' demographic characteristics $X_{i,t}^{exec}$. Table XI shows coefficients for executive tenure and age (in years) and a binary variable equal to one if the executive is female. Again, the overwhelming majority of coefficient estimates for these three variables is statistically insignificant across the different dependent variables. Overall, we see no evidence of metric tailoring, neither to executives' positions nor to their individual characteristics.

C.2. Interim conclusion for Hypothesis 3

Hypothesis 3 predicts that under incentive contracting, ESG performance metrics are tailored to the job of the executive and are more common among specialists than among generalists. By contrast, if firms include ESG metrics to greenwash STI (and not to incentivize executives), then ESG metrics should be most common among the more visible executives that attract most public scrutiny. The evidence above is more consistent with the greenwashing rational of Hypothesis 3. First, we see no evidence that firms carefully tailor ESG performance metrics to the executives' different tasks. Second, ESG metrics are most common among CEOs, CFOs, and COOs, whose compensation plans likely attract most public attention and scrutiny. If firms want to greenwash executive pay, it would make sense that they start with those high-ranking and more visible generalists.

VII. Conclusion

In conclusion, this study reveals significant heterogeneity in the role of ESG metrics in executive compensation across industries, firms, and executive positions. While ESG metrics are increasingly prevalent, their integration into executive pay often lacks material weight and incentive power. Discretionary ESG metrics dominate in financial firms and large, visible companies, raising concerns of greenwashing rather than genuine incentive alignment. In contrast, firms in energy-intensive and high-polluting industries, as well as those with highly volatile stock prices, tend to adopt binding ESG metrics with more substantial weights. This variation highlights the complex and evolving role of ESG metrics in executive compensation, with some firms adopting ESG-linked pay as part of a broader incentive framework, while others use it more for external signaling. Standardization in ESG-related compensation practices may increase with regulatory changes and rising transparency, providing a clearer framework for assessing the true impact of ESG criteria on executive behavior.

Appendix A. Variable Definitions

Compensation variables:

- *Base salary*$_{i,t}$: Includes all contractually agreed on fixed compensation components, paid regardless of business, company-wide and/or individual performance. (source: hkp, own data collection)
- $RLTI_{i,t}$: Realized long-term incentive compensation defined as the sum of all variable compensation elements (in Euros) based on a performance period of more than one year. The following plan types are considered: cash and equity deferrals, share matching plans, multi-year bonuses, restricted stock, performance shares, and stock options. In case a long-term incentive plan (LTI) is not granted annually, but upfront for a multi-year period, the grant value is distributed over this period and the pro-rated value is shown for each year. (source: hkp, own data collection)
- $RSTI_{i,t}$: Realized short-term incentive compensation defined as the sum of all variable compensation elements (in Euros) with a performance period of one year paid to executive i in fiscal year t. Payment is made in cash at or shortly after the end of the performance period. (source: hkp, own data collection)
- $TSTI_{i,t}$: Target short-term incentive compensation defined as the amount (in Euros) that the firm targets to pay to executive i in fiscal year t if the executive fully meets her targets, i.e., neither over- nor underperforms. In practice, firms typically report $TSTI_{i,t}$ as a proportion of base salary or as a proportion of a bonus cap/STI cap. Occasionally, a target range is reported instead, in which case we take the midpoint. (source: hkp, own data collection)
- $w_{i,t}^{B,ESG}$: Total weight of all *binding* ESG performance metrics of executive i in fiscal year t. In the case of binding metrics, the firm commits to consider target achievement with a weight that is communicated at the beginning of fiscal year t. (source: own data collection)
- $w_{i,t}^{B,nESG}$: Total weight of all *binding* non-ESG performance metrics of executive i in fiscal year t. In the case of binding metrics, the firm commits to consider target achievement with a weight that is communicated at the beginning of fiscal year t. (source: own data collection)
- $w_{i,t}^{D}$: Total weight of all *discretionary* performance metrics of executive i in fiscal year t, calculated as $w_{i,t}^{D} = 1 - w_{i,t}^{B,ESG} - w_{i,t}^{B,nESG}$. Ex ante, executive i knows that the firm will consider the achievement of all discretionary metrics jointly with weight $w_{i,t}^{D}$ in the calculation of compensation at year-end. Specific weights for individual discretionary metrics are not known. (source: own data collection)
- $f_{i,t}$: Overall target fulfillment rate for all performance metrics together, defined as the weighted average of specific target fulfillment rates for individual binding metrics and all discretionary metrics combined (Equation (2)). A value of $f_{i,t}$ =100% means that executive i has fully met her targets, i.e., neither over- nor underperformed in fiscal year t. Values reported in the tables are values as reported in firms' annual statements, i.e., after discretionary adjustments by the supervisory board or compensation committee. (source: own data

collection)

- *STI hurdle* $Y/N_{i,t}$: Dummy variable indicating whether a firm reports using a lower threshold for realized STI. If actual performance falls below this lower threshold, realized $RSTI_{i,t}$ is set to a minimum value, typically zero. (source: own data collection)
- *LTI hurdle* $Y/N_{i,t}$: See *STI hurdle* $Y/N_{i,t}$, but for LTI. (source: own data collection)
- *STI cap* $Y/N_{i,t}$: Dummy variable indicating whether STI amount is capped at an upper threshold. (source: own data collection)
- *LTI cap* $Y/N_{i,t}$: See *STI cap* $Y/N_{i,t}$ but for LTI. (source: own data collection)
- *STI board discretion allowed* $Y/N_{i,t}$: Dummy variable indicating whether the supervisory board and/or compensation committee retains the right to subjectively adjust the STI amount ex post (e.g., to account for unpredicted exogenous events). (source: own data collection)
- *LTI board discretion allowed* $Y/N_{i,t}$: See *STI board discretion allowed* $Y/N_{i,t}$, but for LTI. (source: own data collection)
- *STI ex post multiplier (ESG/nESG)* $Y/N_{i,t}$: Dummy variable indicating whether STI has been adjusted ex post according to a multiplier determined by the supervisory board / compensation committee. (source: own data collection)
- *LTI ex post multiplier (ESG/nESG)* $Y/N_{i,t}$: See *STI ex post multiplier (ESG/nESG)* $Y/N_{i,t}$, but for LTI. (source: own data collection)
- *STI partly deferred* $Y/N_{i,t}$: Dummy variable indicating whether parts of the STI amount were deferred, i.e., paid out in later periods. (source: own data collection)
- *STI deferral period*$_{i,t}$: In case of deferral, this variable denotes the period in years over which the STI is to be deferred. (source: own data collection)
- *Board exercised discretion* $Y/N_{i,t}$: Dummy variable indicating whether supervisory board and/or compensation committee has ultimately exercised its right to subjectively adjust the STI amount ex post. (source: own data collection)

Executive characteristics:

- *Age*$_{i,t}$: Age of the executive in years. (source: hkp, own data collection)
- *Tenure*$_{i,t}$: Tenure of the executive in years. (source: hkp, own data collection)
- *Female* $Y/N_{i,t}$: Gender of the executive. (source: hkp, own data collection)
- C-suite position: (source: own data collection)
  - *CEO*: Chief Executive Officer
  - *CFO*: Chief Financial Officer
  - *CHRO*: Chief Human Resources Officer
  - *COO*: Chief Operating Officer
  - *Other specialists*: All other expert C-suite positions such as chief marketing officer, chief sales officer, chief legal officer, etc.
  - *Divisional/regional head*: Executives who are chairing a division, geographic region, or are responsible for a product segment

Company-level variables (all accessed via LSEG Data & Analytics):

- *Market capitalization*$_{f,t}$: Market price year-end multiplied with common shares outstanding (WC08001) (source: Worldscope)
- *Total assets*$_{f,t}$: Total assets (WC02999) (source: Worldscope)
- *EBITDA*$_{f,t}$: Earnings before interest, taxes, depreciation, and amortization represented by sum of EBIT and total depreciation and amortization value for the period (TR.EBITDAActValue) (source: Refinitiv Eikon)
- *EBIT*$_{f,t}$: Earnings before interest & taxes represented by difference between total revenues and total operating expenses (TR.EBITActValue) (source: Refinitiv Eikon)
- *Net income*$_{f,t}$: Income after all operating and non-operating income and expense, reserves, income taxes, minority interest, and extraordinary items (TR.InvtrNetIncome) (source: Refinitiv Eikon)
- *Book-to-market ratio*$_{f,t}$: Book value of common equity (WC03501) divided by market value of equity (WC08001) (source: Worldscope)
- *Book leverage*$_{f,t}$: Total debt (sum of long- and short-term debt) (WC03255) divided by total assets (WC02999) (source: Worldscope)
- *Net PPE/total assets (tangibility)*$_{f,t}$: Gross property, plant, and equipment (PPE) less accumulated reserves for depreciation, depletion, and amortization (WC02501) divided by total assets (WC02999) (source: Worldscope)
- *Return on assets*$_{f,t}$: ((Net income – bottom line + (interest expense on debt-interest capitalized) * (1 - tax rate))) / Average of last year's and current year's total assets (WC08326) (source: Worldscope)
- *Return on equity*$_{f,t}$: (Net income - bottom line - preferred dividend requirement) / Average of last year's and current year's common equity (WC08301) (source: Worldscope)
- *Dividends/earnings*$_{f,t}$: Dividends per share (WC05101) divided by earnings per share (WC05201) (source: Worldscope)
- *Stock (total investment) return*$_{f,t}$: Stock return of the company divided by last year's market value (WC08801) (in percent, source: Worldscope)
- *Historical stock-to-accounting volatility*$_{f}$: Standard deviation of total investment return (WC08801) divided by standard deviation of return on assets (WC08326) between the years 2008 and 2012 (source: Worldscope)
- *Board independence*$_{f,t}$: Share of independent board members (TR.AnalyticIndepBoard) (source: Refinitiv Eikon)
- *Female board membership*$_{f,t}$: Share of female board members (TR.AnalyticBoardFemale) (source: Refinitiv Eikon)
- *Institutional ownership*$_{f,t}$: Share of company's equity owned by institutional investors. Institutional investors include the following categories of financial institutions: investment advisors, hedge funds, pension funds, banks and trusts, insurance companies, sovereign wealth funds, venture capital, and private equity (Shareholders History Report) (source: Refinitiv

Eikon)

- *Block ownership*$_{f,t}$: Share of owners that own more than 10% of company's equity (Shareholders History Report) (source: Refinitiv Eikon)
- *Emission pledge Y/N*$_{f,t}$: Company policy to improve emission reduction (TR.PolicyEmissions) (source: Refinitiv Eikon)
- CO_2 *(Scope 1)*$_{f,t}$: Direct of CO2 and CO2 equivalents emissions in tonnes from sources owned or controlled by the company (scope 1 emissions). The following gases are relevant: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorinated compound, sulfur hexafluoride, nitrogen trifluoride. Emission classifications based on greenhouse gas protocol (GHG) (ENERDP024) (source: Datastream)
- *Historical Log(Avg.* CO_2*)*$_f$: Natural log of average CO_2 *(Scope 1)*$_{f,t}$ between 2008 and 2012 (source: Datastream)
- *Industry*$_f$: Industry classification is based on the primary Global Industry Classification Standard (GICS) sector code, which we aggregate to six major industry sectors comprising Consumers, Energy & Utilities, Financials, Industrials & Materials, Health, and Information & Communication Technology (ICT).

Appendix B. Overview - Firms in Sample

Table A.1. List of sample firms

Firm	Country	Sample period (FY)
ABB	CH	2013-2020
Adidas	DE	2013-2020
Ahold Delhaize	NL	2016-2020
Air Liquide	FR	2013-2020
Airbus	NL	2013-2020
Allianz	DE	2013-2020
Amadeus IT	ES	2013-2020
Anheuser-Busch InBev	BE	2013-2020
ASML	NL	2013-2020
Assicurazioni Generali	IT	2013-2020
AstraZeneca	GB	2013-2020
AXA	FR	2013-2020
Banco Santander	ES	2013-2020
Barclays	GB	2013-2020
BASF	DE	2013-2020
Bayer	DE	2013-2020
BG Group	GB	2013-2015
BHP Group	AU/GB	2013-2020
BMW	DE	2013-2020
BNP Paribas	FR	2013-2020
British American Tobacco	GB	2013-2020
Carrefour	FR	2013-2020
Credit Suisse	CH	2013-2020
CRH	IE	2013-2020
Daimler	DE	2013-2020
Danone	FR	2013-2020
Deutsche Bank	DE	2013-2020
Deutsche Börse	DE	2013-2020
Deutsche Post	DE	2013-2020
Deutsche Telekom	DE	2013-2020
Diageo	GB	2013-2020
E.ON	DE	2013-2020
Enel	IT	2013-2020
ENGIE	FR	2013-2020
Eni	IT	2013-2020
EssilorLuxottica	FR	2013-2020
Flutter Entertainment	IE	2016-2020
Fresenius	DE	2013-2020
GlaxoSmithKline	GB	2013-2020
Glencore	JE	2013-2020
HSBC	GB	2013-2020

Continued on next page

Table A.1 – continued from previous page

Firm	Country	Sample period (FY)
Iberdrola	ES	2013-2020
Imperial Brands	GB	2013-2020
Inditex	ES	2014-2020
ING Groep	NL	2013-2020
Intesa Sanpaolo	IT	2013-2020
Kering	FR	2013-2020
KONE	FI	2013-2020
Linde SE	IE	2018-2020
Lloyds Banking	GB	2013-2020
L'Oréal	FR	2013-2020
LVMH	FR	2013-2020
Münchener Rück	DE	2013-2020
National Grid	GB	2013-2020
Nestlé	CH	2013-2020
Nokia	FI	2013-2020
Novartis	CH	2013-2020
Novo Nordisk	DK	2013-2020
Orange	FR	2013-2020
Pernod Ricard	FR	2013-2020
Philips	NL	2013-2020
Prosus	NL	2020
Prudential	GB	2013-2020
Reckitt Benckiser	GB	2013-2020
RELX Group	GB	2013-2020
Repsol	ES	2013-2020
Richemont	CH	2013-2020
Rio Tinto	AU/GB	2013-2020
Roche	CH	2013-2020
Royal Dutch Shell	GB	2013-2020
RWE	DE	2013-2020
Safran	FR	2013-2020
Saint-Gobain	FR	2013-2020
Sanofi	FR	2013-2020
SAP	DE	2013-2020
Schneider Electric	FR	2013-2020
Siemens	DE	2013-2020
Société Générale	FR	2013-2020
Standard Chartered	GB	2013-2020
Syngenta	CH	2013-2016
Telefónica	ES	2013-2020
Total	FR	2013-2020
UBS	CH	2013-2020
Unibail-Rodamco-Westfield	FR	2018-2020
UniCredit	IT	2013-2020

Continued on next page

Table A.1 – continued from previous page

Firm	Country	Sample period (FY)
Unilever Group	GB	2013-2020
Vinci	FR	2013-2020
Vivendi	FR	2013-2020
Vodafone	GB	2013-2020
Volkswagen	DE	2013-2020
Vonovia	DE	2015-2020
Zurich Insurance	CH	2013-2020

Notes: Our sample includes all firms that have been listed for at least ten days on either the EUROSTOXX 50 or the STOXX Europe 50 (or both), between December 31, 2014 and December 31, 2020. Index composition includes changes up until FY2020.

Appendix C. ESG classification according to LSEG

The following table shows the underlying taxonomy which we use to classify the non-financial metrics in executive compensation contracts with respect to the E, S, and G dimension and its subcategories.

Table A.2. ESG classification

Category	Subcategory	Exemplary metrics
Environmental	Emission	Emissions (scope 1-3), GHG protocol
		Emission reduction target
		Internal carbon pricing
		Waste & waste recycling
		Biodiversity
		Environmental management systems
	Innovation	Product innovation (environmental, organic, eco-design products)
		Green revenues (from environmental products)
		Environmental R&D expenditures
		Environmental assets under management
		Environmental project financing
	Resource use	Water
		Energy
		Toxic chemicals
		Renewable energy
		Sustainable packing policy
		Environmental supply chain management
Social	Community	Fair competition
		Bribery and corruption policy
		Whistleblower protection
		Donations
		Product Sales at Discount to Emerging Markets
		Corporate Responsibility Awards
		Crisis Management Systems
	Human rights	Human rights policy
		Child labor policy
		Ethical Trading Initiative
		Freedom of Association policy
	Product responsibility	Responsible marketing
		Customer Health & Safety policy
		Product quality
		Quality management system
		Customer satisfaction
		Healthy foods or products
		Retailing responsibility
		Revenues from alcohol, tobacco, gambling, armaments

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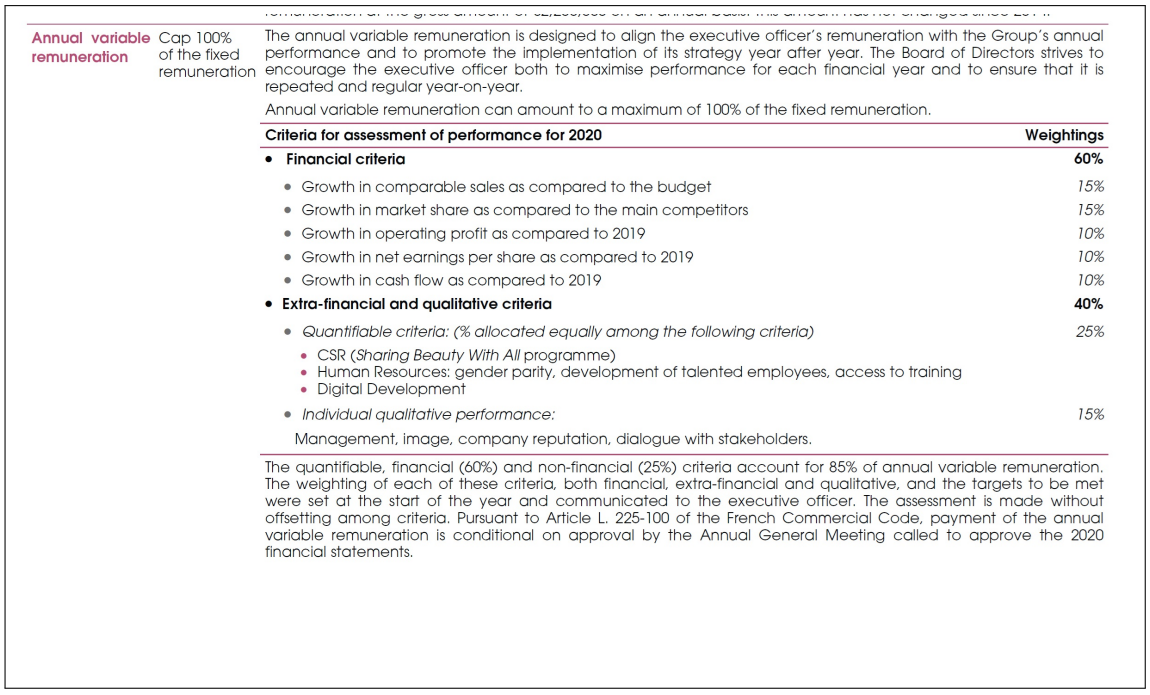
Table A.2 – continued from previous page

Category	Subcategory	Exemplary metrics
Social	Workforce	Diversity, equity, and inclusion
		Career development and training
		Employee satisfaction and turnover
		Employees with disabilities
		Female representation (top) management
		Workplace accidents
		Working conditions
		Gender pay gap
		Employee health and safety policy
Governance	CSR strategy	CSR strategy
		Stakeholder engagement
		ESG and GRI reporting scope
		UNPRI Signatory
	Management	Board independence and diversity
		Committees (Audit, compensation, nomination)
		Board size
		Succession plans
		Executive Compensation Policy
	Shareholders	Shareholder rights policy
		Shareholders Vote on Executive Pay
		Shareholder Approval Significant Transactions
		Takeover defences

Appendix D. Exemplary disclosure of ESG-related metrics from company reports

This section highlights examples of the disclosure of ESG-related metrics in executive STI compensation contracts, differentiating between low-disclosure and high-disclosure cases w.r.t. to the richness and salience of information on ESG metrics.

L'Oréal 2019 and 2020 annual financial reports (prototype of an STI contract with numerous ESG-related metrics, which are simultaneously also binding)



Annual variable remuneration	Cap 100% of the fixed remuneration	The annual variable remuneration is designed to align the executive officer's remuneration with the Group's annual performance and to promote the implementation of its strategy year after year. The Board of Directors strives to encourage the executive officer both to maximise performance for each financial year and to ensure that it is repeated and regular year-on-year. Annual variable remuneration can amount to a maximum of 100% of the fixed remuneration.

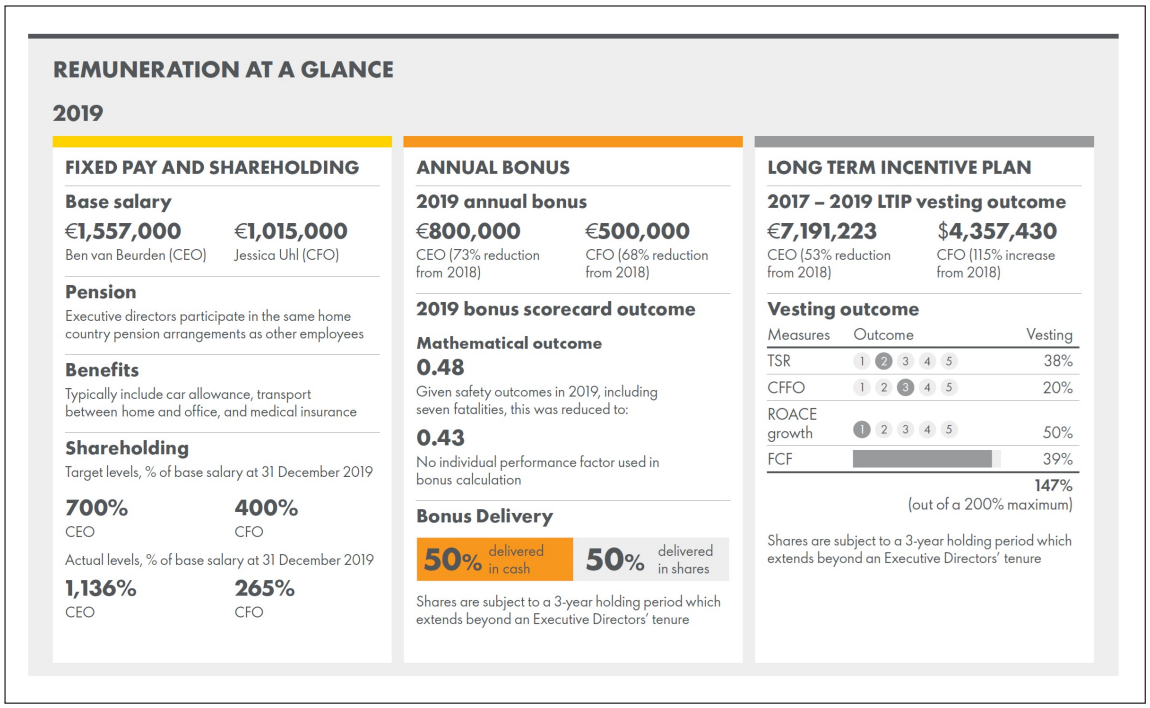
Criteria for assessment of performance for 2020	Weightings
• **Financial criteria**	**60%**
◦ Growth in comparable sales as compared to the budget	*15%*
◦ Growth in market share as compared to the main competitors	*15%*
◦ Growth in operating profit as compared to 2019	*10%*
◦ Growth in net earnings per share as compared to 2019	*10%*
◦ Growth in cash flow as compared to 2019	*10%*
• **Extra-financial and qualitative criteria**	**40%**
◦ *Quantifiable criteria: (% allocated equally among the following criteria)*	*25%*
▪ CSR (*Sharing Beauty With All* programme) ▪ Human Resources: gender parity, development of talented employees, access to training ▪ Digital Development	
◦ *Individual qualitative performance:*	*15%*
Management, image, company reputation, dialogue with stakeholders.	

The quantifiable, financial (60%) and non-financial (25%) criteria account for 85% of annual variable remuneration. The weighting of each of these criteria, both financial, extra-financial and qualitative, and the targets to be met were set at the start of the year and communicated to the executive officer. The assessment is made without offsetting among criteria. Pursuant to Article L. 225-100 of the French Commercial Code, payment of the annual variable remuneration is conditional on approval by the Annual General Meeting called to approve the 2020 financial statements.

2020 NON-FINANCIAL AND QUALITATIVE TARGETS
TABLE OF NON-FINANCIAL AND QUALITATIVE ACHIEVEMENTS

CSR criteria: Sharing Beauty with All programme	2020 results	2019 results
The Sharing Beauty with All programme was launched in October 2013 by Mr Jean-Paul Agon. It structures the Group's CSR strategy and sets ambitious targets to be met by 2020. This project consists of four pillars, for which the 2020 achievements are set out in detail in Chapter 4 of this document.		
"Innovating Sustainably"		
• Improved environmental or social impact for 100% of our products.	• 96% of new products that have been screened have an improved environmental or social profile.	85%
"Producing Sustainably" (plants and distribution centres)		
• -60% on CO_2 emissions.	• -81% on CO_2 emissions (absolute value).	-78%
• -60% in water consumption.	• -33% water consumption (per finished product unit).	-51%
• -60% waste generation.	• -37% waste production (by finished product unit) The objective of 0% waste from plants and distribution centres sent to landfill was met from 2018.	-35%
"Living Sustainably"		
• Each brand will have assessed its environmental and social footprint.	• 89% of brands have assessed their impact.	89%
• Each brand will have reported on its progress and associated consumers with its commitments.	• 79% of the brands conducted a consumer awareness initiative.	57%
"Developing Sustainably"		
• With the employees (*L'Oréal Share & Care* programme): 100% of L'Oréal employees around the world will have access to healthcare coverage and social protection in 2020.	• 96% of the Group's permanent employees have access to healthcare coverage reflecting the best practices in their country of residence. 92% of the Group's permanent employees benefit from financial protection in the event of life-changing accidents, such as death or permanent disability.	94% 91%
• With strategic suppliers.	• 99% of the Group's strategic suppliers carried out a self-assessment of their Sustainable Development policy.	96%
• With communities.	• Access to work for 100,905 people.	90,635
Human Resources criteria	**2020 results**	**2019 results**
Gender Balance		
• Improving gender balance, in particular at the level of senior management positions.	• 26% of Executive Committee members are women • 49% of key positions held by women • 2020 Equileap ranking: France: No. 1 International: No. 4 • For the fourth consecutive year, L'Oréal is ranked in the Top 100 among the 325 companies of the Bloomberg Gender-Equality Index 2021.	30% 47% No. 2 in Europe Top 100
Talent Development		
• Positive policy results for the recruitment of both experienced and more junior talented employees, and talent development all over the world, in order to favour the emergence of local talent.	• 10th place in the Universum global ranking (business schools). L'Oréal is the only French and European company in the Top 10.	12th place
• Attractive, targeted, digital employer communication.	• Strong presence on social networks: 3.2 million followers on LinkedIn. • 3rd place in the PotentialPark global ranking (recruiting/social media).	2.3 million No. 2
Access to training		
• 100% of employees will receive training once a year starting in 2020.	• 100% of employees received training in 2020. Over 580,000 hours of digital training.	96% 202,000 hours

Royal Dutch Shell 2019 annual financial report (prototype of an STI contract with ESG metrics which are all binding, no subjective component



REMUNERATION AT A GLANCE

2019

FIXED PAY AND SHAREHOLDING

Base salary

€1,557,000 Ben van Beurden (CEO)

€1,015,000 Jessica Uhl (CFO)

Pension

Executive directors participate in the same home country pension arrangements as other employees

Benefits

Typically include car allowance, transport between home and office, and medical insurance

Shareholding

Target levels, % of base salary at 31 December 2019

700% CEO

400% CFO

Actual levels, % of base salary at 31 December 2019

1,136% CEO

265% CFO

ANNUAL BONUS

2019 annual bonus

€800,000 CEO (73% reduction from 2018)

€500,000 CFO (68% reduction from 2018)

2019 bonus scorecard outcome

Mathematical outcome

0.48

Given safety outcomes in 2019, including seven fatalities, this was reduced to:

0.43

No individual performance factor used in bonus calculation

Bonus Delivery

50% delivered in cash | **50%** delivered in shares

Shares are subject to a 3-year holding period which extends beyond an Executive Directors' tenure

LONG TERM INCENTIVE PLAN

2017 – 2019 LTIP vesting outcome

€7,191,223 CEO (53% reduction from 2018)

$4,357,430 CFO (115% increase from 2018)

Vesting outcome

Measures	Outcome	Vesting
TSR	1 **2** 3 4 5	38%
CFFO	1 2 **3** 4 5	20%
ROACE growth	**1** 2 3 4 5	50%
FCF		39%
		147% (out of a 200% maximum)

Shares are subject to a 3-year holding period which extends beyond an Executive Directors' tenure

Notes to the single total figure of remuneration for executive directors table (audited)

Annual bonus

The Annual bonus operated in line with the policy as disclosed on page 156.

Determination of the 2019 annual bonus

The table below summarises the 2019 annual bonus scorecard measures including their weightings, targets and outcomes. The mathematical scorecard outcome for 2019 was 0.48. Please refer to pages 135-136 for a commentary on the scorecard outcome.

After reviewing the mathematical scorecard outcome, and considering the context of wider company performance for the year, the REMCO exercised discretion to adjust the scorecard result downwards to 0.43. This downwards adjustment was to reflect the seven fatalities under Shell operational control during the year.

Accordingly, the REMCO determined a final bonus outcome of €800,000 for the CEO which is 41% of target and 21% of maximum. This is a 73% reduction from 2018. The REMCO determined a final bonus outcome of €500,000 for the CFO which is 41% of target and 21% of maximum. This is a 68% reduction from 2018.

2019 annual bonus outcome (audited) [A][B]

Measures	Weight (% of scorecard)	Threshold	Target set	Outstanding	Result achieved	Score (0-2)
Cash flow from operating activities ($ billion)	**30%**	44	50	56	42	**0**
Operational excellence	**50%**					**0.72**
Production (kboe/d)	12.5%	3,647	3,760	3,873	3,665	0.16
LNG liquefaction volumes (mtpa)	12.5%	35.3	36.4	37.4	35.6	0.23
Refinery and chemical plant availability (%)	12.5%	88.4	90.4	92.4	90.8	1.20
Project delivery on schedule (%)	6.25%	60	80	100	90	1.50
Project delivery on budget (%)	6.25%	105	100	95	99	1.10
Sustainable development	**20%**					**0.59**
Total recordable case frequency (injuries/million hours)	5%	0.9	0.7	0.5	0.9	–
Operational Tier 1 and 2 process safety events (number)	5%	145	115	85	130	0.50
Upstream and Integrated Gas GHG intensity (tonnes of CO_2 equivalent/tonne of hydrocarbon production available for sale)	4%	0.176	0.168	0.160	0.168	1.00
Refining GHG intensity (tonnes CO_2 equivalent per Solomon's Utilized Equivalent Distillation Capacity (UEDC™))	4%	1.11	1.06	1.01	1.06	1.00
Chemicals GHG intensity (tonnes CO_2 equivalent/tonne of petrochemicals production)	2%	1.10	1.00	0.90	1.04	0.60
	100%					
Mathematical scorecard outcome						**0.48**
Adjusted scorecard outcome						**0.43**

[A] These metrics measure the effectiveness with which we operate our assets and portfolio base, assessed against our operational business plan. Shell's longer-term strategic ambitions are measured in the LTIP metrics.

[B] Scorecard targets are based on Shell's annual operating plan and increase or decrease year-on-year. In 2019, target refinery and chemical plant availability was lower and target GHG emission intensities higher than 2018, due to planned business activities, reflecting scheduled maintenance and expected market conditions, and portfolio developments.

[C] In external disclosure, we may use an alternative performance measure, i.e. CFFO excluding Working Capital, to describe the cash flow generation from our operations without the effect of working capital changes.

2019 bonus outcome calculation

Ben van Beurden

Target bonus:

€1,557,000 (base salary)
x 125% = **€1,946,250**

× 2019 scorecard result 0.43

= **€800,000** [A]
(51% of base salary)
↓ 73% reduction from 2018

Richemont 2020 annual financial report (prototype of an STI contract with only a few ESG metrics which are also only discretionary, i.e., non-binding metrics)

Variable compensation of the Senior Executive Committee

Executives also benefit from a short-term cash incentive plan and awards granted under the Group's share option and PSU plans. The Committee considers these components in total to ensure there is an appropriate balance between reward for short-term success and long-term retention. Targets used to determine the payout levels for both the variable short-term incentives and the variable long-term incentives are considered by the Committee on an annual basis prior to the start of the next financial year. The Group does not provide for any transaction-specific success fees for its executives.

Short-term cash incentives

Short-term incentives are paid in cash annually and relate to performance in the previous financial year.

The determination of the level of short-term cash incentive comprises both quantitative and qualitative components, each with a pre-set target and a maximum percentage of base salary. The mix of quantitative and qualitative targets are aligned with the Group's business priorities for the year ahead, encouraging individual creativity and delivering continued profit growth and value creation. The short-term incentive target is set at 75% of base salary, with a maximum cap of 150% of base salary.

The quantitative component of the short-term cash incentive is assessed on actual Group or Maison turnover, operating profit and cash generation, being operating cash flow after capital expenditure and lease payments, compared against the current year's budget. Each of these three measures has equal weighting in the calculation. The impact of the Covid-19 outbreak on results for the year has therefore reduced the percentage achievement of quantitative objectives. The qualitative component is assessed on performance against both individual and collective strategic targets, measuring the contribution to creativity, team-building and succession-planning, among other elements.

The total incentive awards achieved represented on average 56% of base salary. The individual figures for the Group's executive directors are as follows:

	Quantitative (% of salary)		Qualitative (% of salary)		Total (% of salary)	
	Target	Achieved	Target	Achieved	Target	Achieved
Nicolas Bos	*41%*	37%	*34%*	38%	*75%*	75%
Burkhart Grund	*41%*	12%	*34%*	36%	*75%*	48%
Sophie Guieysse	*41%*	12%	*34%*	35%	*75%*	47%
Jérôme Lambert	*41%*	12%	*34%*	34%	*75%*	46%
Cyrille Vigneron	*41%*	29%	*34%*	32%	*75%*	61%

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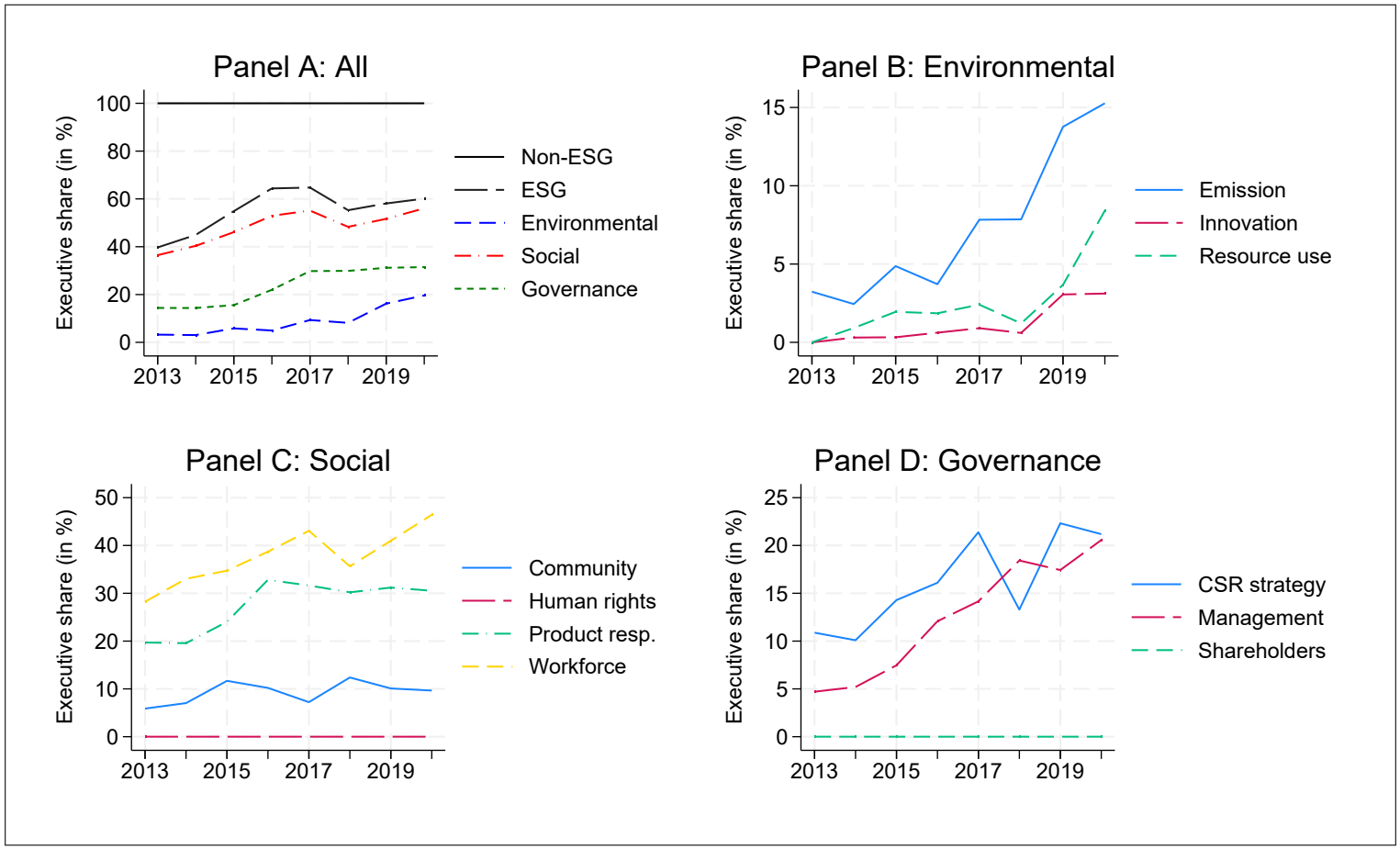


Figure 1. Share of executives with at least one ESG or non-ESG-related performance metric (STI)
The figure shows the share of executives with at least one ESG- or non-ESG performance metric in their short-term incentive contracts (STI). Panel A differentiates between ESG and non-ESG metrics, while also splitting the ESG part into its three main categories Environmental, Social, and Governance. Panels B to D show the corresponding executive shares for each of the three subcategories in each main ESG category, i.e, Environmental (Panel B), Social (Panel C), and Governance (Panel D). Analyses are based on a sample of 674 executives from 73 firms that have been constituents of the EURO STOXX 50 and the STOXX Europe 50 for at least ten days between 2013 and 2020.

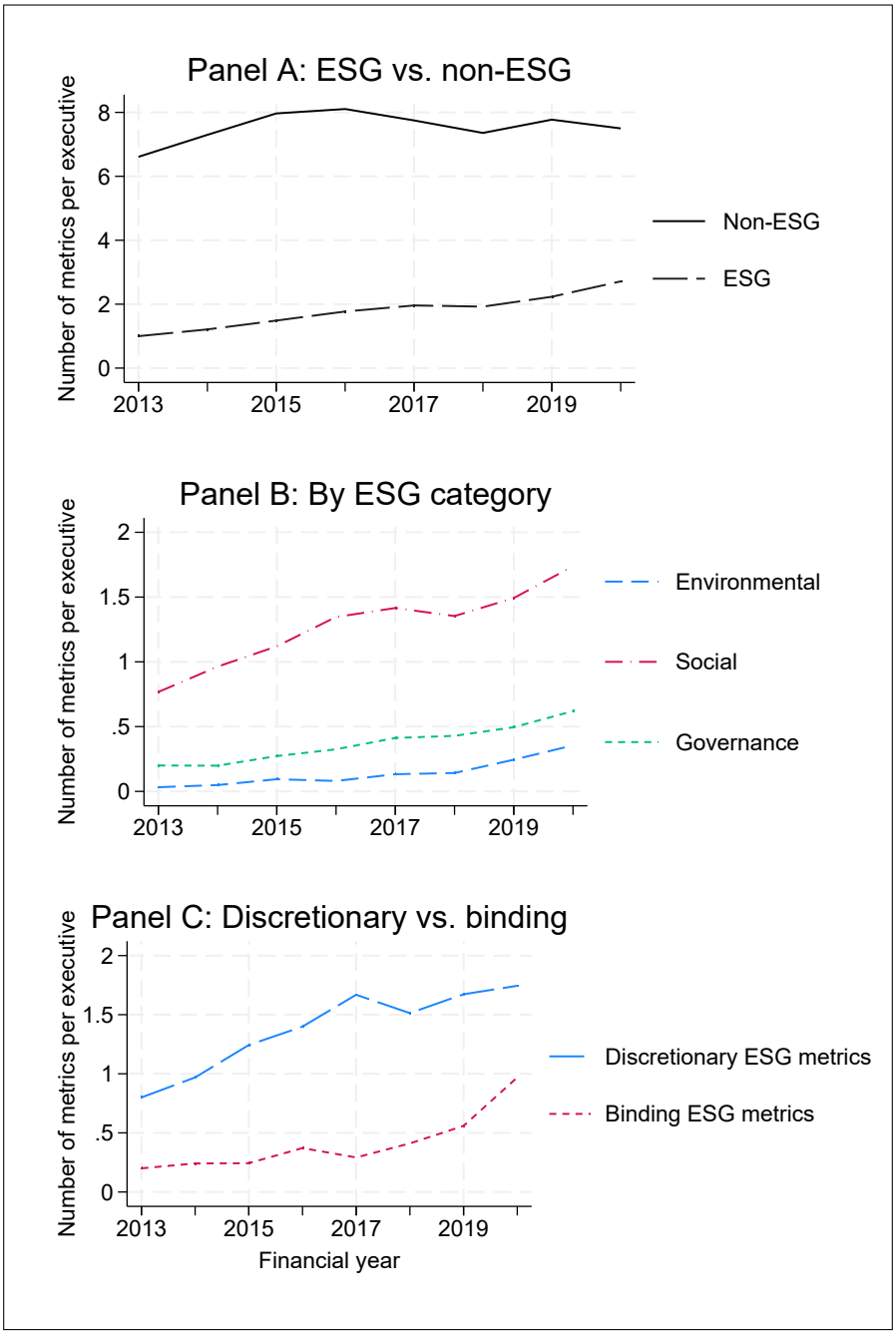


Figure 2. Number of ESG vs. non-ESG performance metrics per executive (STI)
The figure shows the number of performance metrics in the short-term incentive contract (STI) of the average executive in our sample. Panel A differentiates between ESG and non-ESG metrics and Panel B splits ESG up into its three main categories Environmental, Social, and Governance. Panel C differentiates between discretionary and binding ESG metrics. We define binding performance metrics as metrics where the firm commits already at the beginning of the fiscal year with what weight it will consider each of them in the calculation of realized STI at year-end. For discretionary metrics, however, the respective weights are not known to the executive ex ante. For more information about the design of discretionary and binding performance metrics, see Section IV.A.

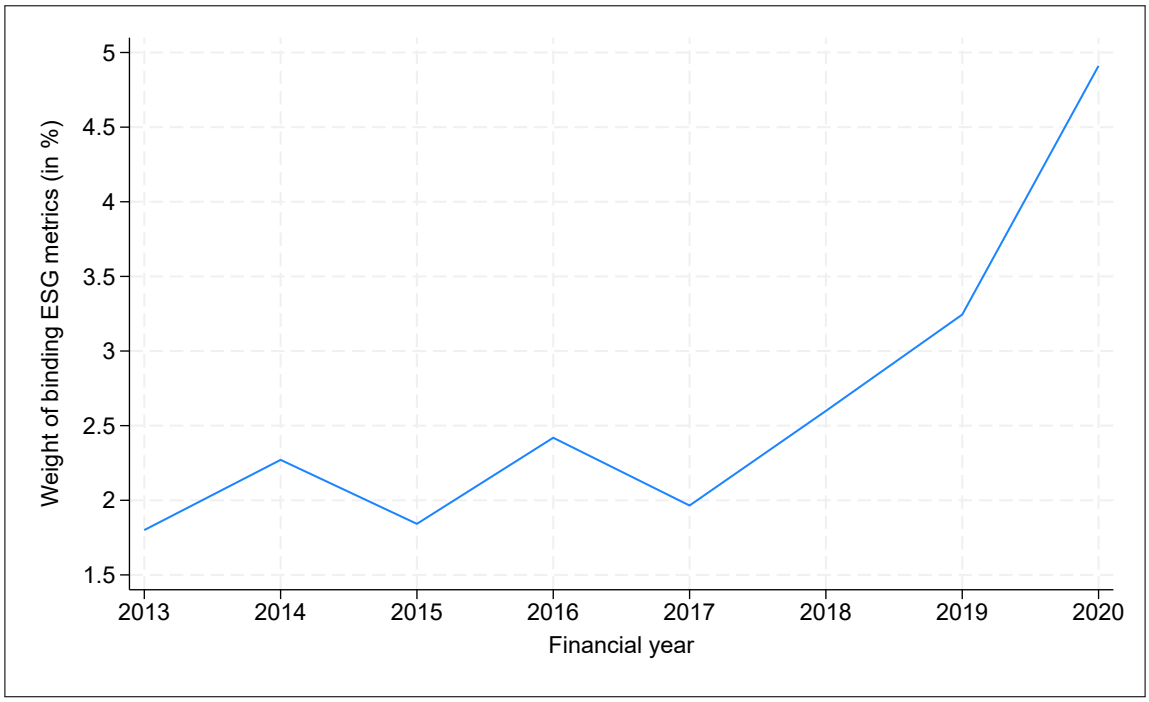


Figure 3. Weight of binding ESG performance metrics in STI
The figure shows the total weight $w_{i,t}^{B,ESG}$ of all binding ESG metrics together in the short-term incentive contract (STI) of the average executive in our sample. For more information about the design of binding performance metrics and their weights, see Section IV.A.

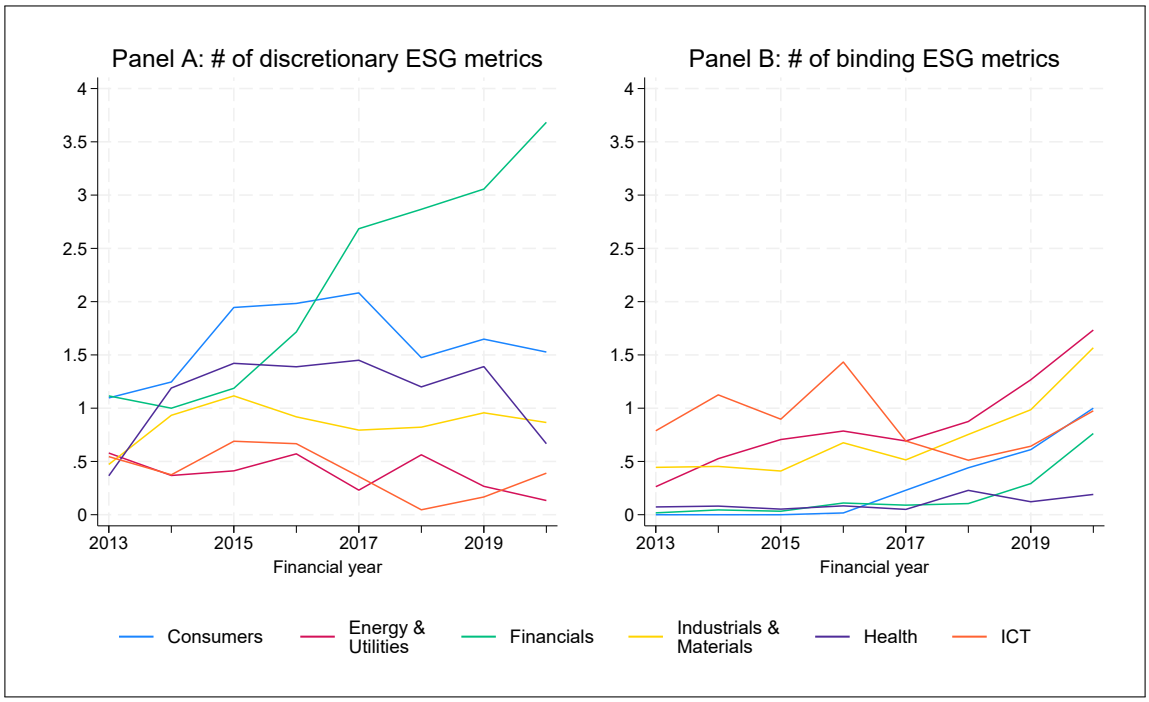


Figure 4. Number of binding and discretionary ESG performance metrics in STI by industry
The figure shows the number of discretionary (Panel A) and binding (Panel B) ESG performance metrics in the short-term incentive contract (STI) of the average executive in a given industry. For more information about the design of discretionary and binding performance metrics, see Section IV.A. Industry classification is based on the primary Global Industry Classification Standard (GICS) sector code, which we aggregate to the six major industry sectors Consumers, Energy & Utilities, Financials, Industrials & Materials, Health, and Information & Communication Technology (ICT).

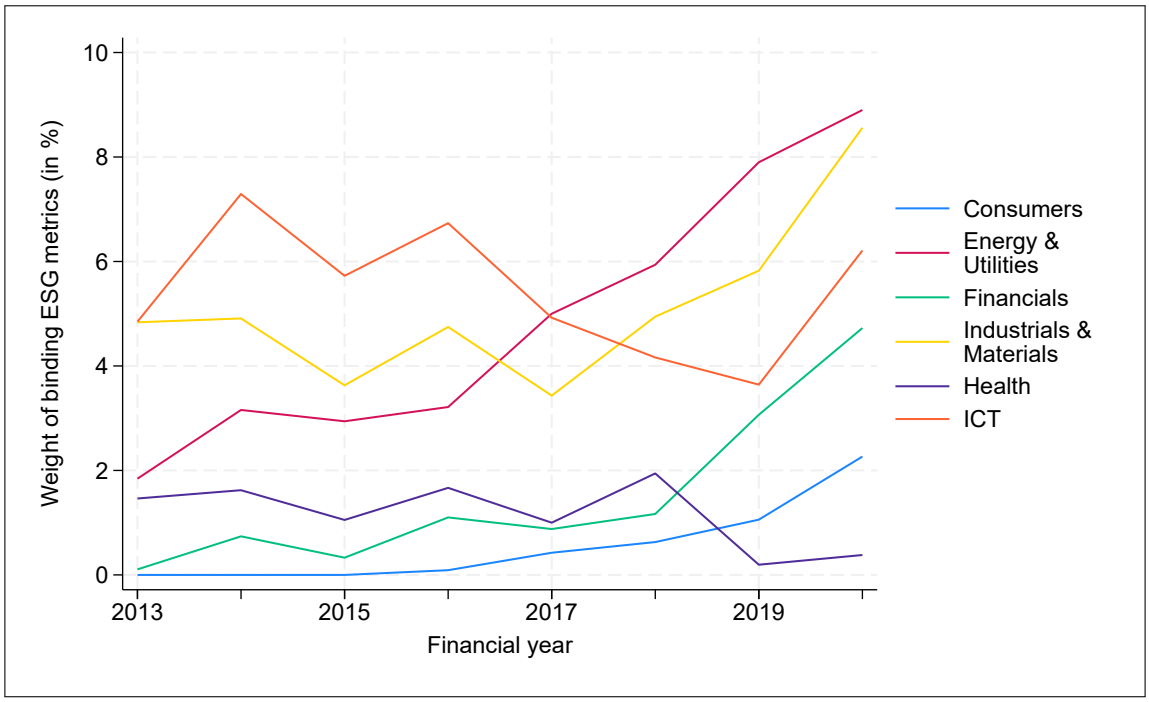


Figure 5. Weight of binding ESG performance metrics in STI by industry
The figure shows the sum of the ex-ante weights of all binding ESG metrics in the short-term incentive contract (STI) of the average executive in a given industry. For more information about the design of binding ESG metrics and their weights, see Section IV.A. Industry sectors are defined as in Figure 4.

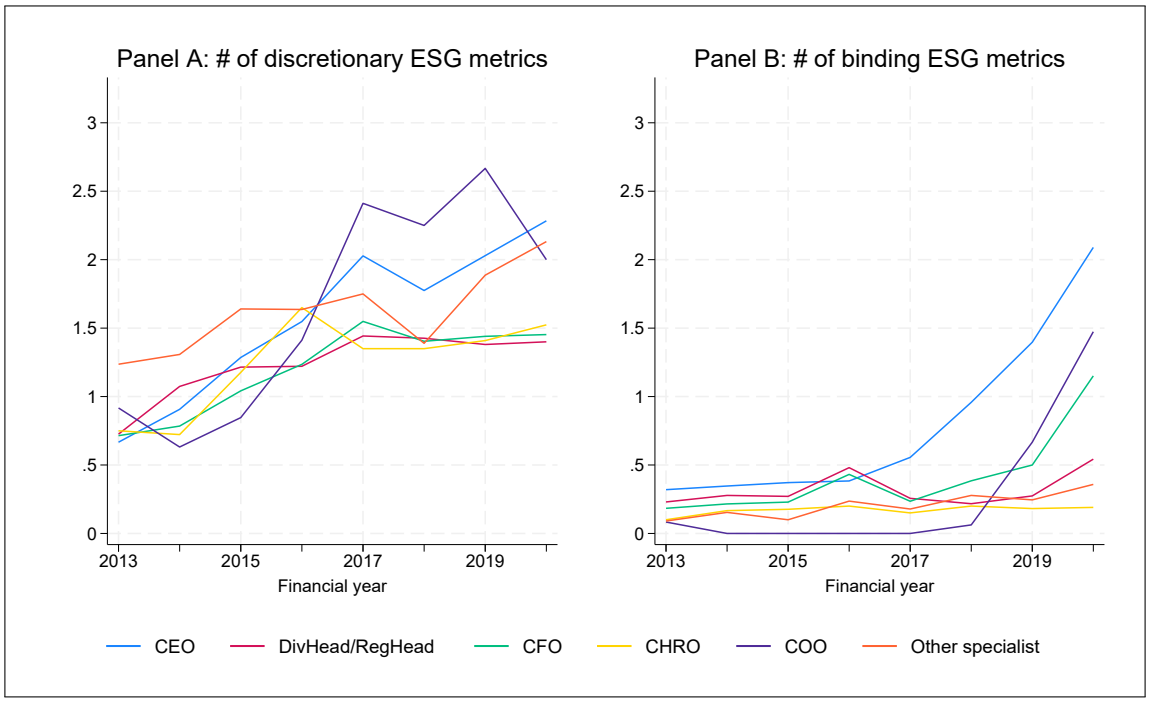


Figure 6. Number of binding and discretionary ESG performance metrics in STI by board position
The figure shows the number of discretionary (Panel A) and binding (Panel B) ESG performance metrics in the short-term incentive contract (STI) of the average executive in a given board position. We differentiate between the chief executive officer (CEO), chief financial officer (CFO), chief human resources officer (CHRO), and chief operating officer (COO). "DivHead/RegHead" denotes executives who are chairing a division, region, or are responsible for a product segment. All other expert C-suite positions (e.g., chief marketing officer, chief sales officer, chief legal officer, etc.) are grouped as "Other specialist".

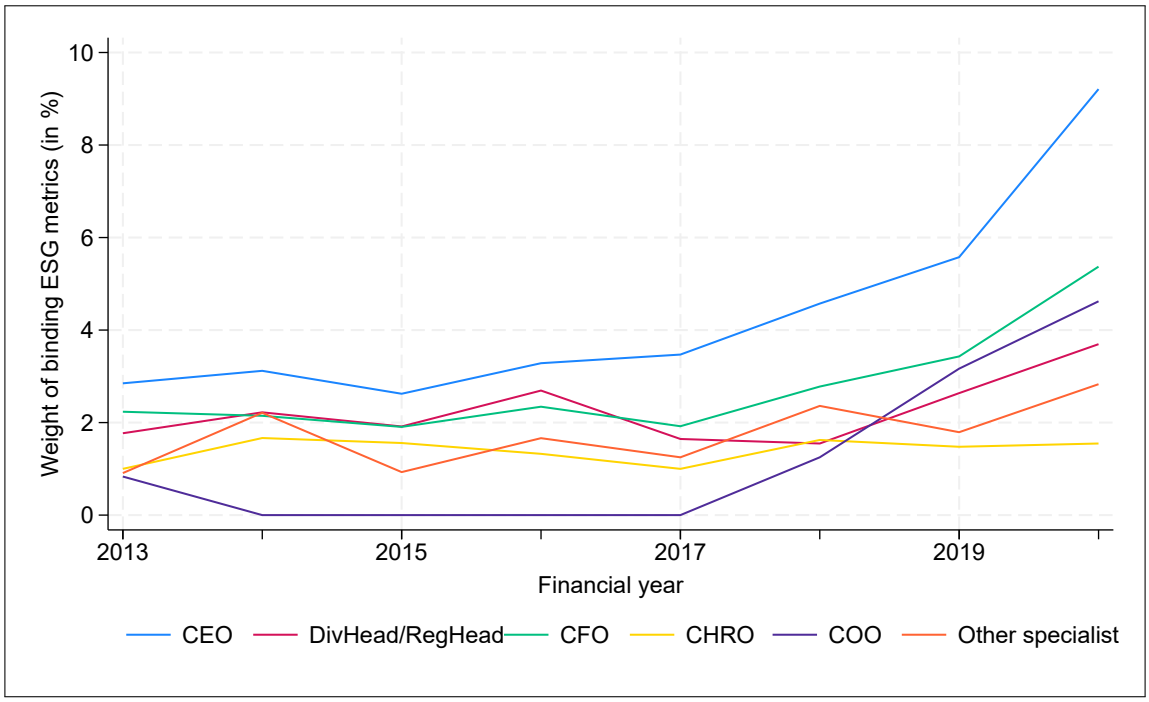


Figure 7. Weight of binding ESG performance metrics in STI by board position
The figure shows the sum of the ex-ante weights of all binding ESG metrics in the short-term incentive contract (STI) of the average executive in a given board position. For more information about the design of binding ESG metrics and their weights, see Section IV.A. For a description of the different executive C-suite positions, see Figure 6.

Table I. Firm sample composition

This table reports the composition of our sample of the largest European listed firms, differentiated by industry sector (Panel A) and headquarter country (Panel B). For industry sector classification, we apply the primary Global Industry Classification Standard (GICS) sector code from LSEG Data & Analytics, made up of 11 industry sectors and aggregate them to six major industry sectors comprising Consumers, Energy & Utilities, Financials, Industrials & Materials, Health, and Information & Communication Technology (ICT).

	Firm-year observations
Panel A: Industry sector	
Consumers (discretionary & staples)	120
Energy & Utilities	48
Financials	176
Industrials & Materials	112
Health	64
Information & Communication Technology (ICT)	64
Total	584
Panel B: Headquarter country	
Australia	16
Denmark	8
Finland	16
France	104
Germany	136
Ireland	8
Italy	24
Netherlands	24
Spain	40
Switzerland	72
United Kingdom	136
Total	584

Table II. Summary statistics for firm-level variables

Reported are summary statistics on firm characteristics (at the firm level) in a given year. We winsorize all balance sheet items at the 1%-level in each tail of the distribution. For variable definitions, see Appendix A.

		Obs (1)	Mean (2)	S.D. (3)	P5 (4)	P10 (5)	P25 (6)	P50 (7)	P75 (8)	P90 (9)	P95 (10)
Number of executives	(#)	584	4	3	1	1	2	3	6	9	11
Number of employees	(#)	584	112,332	105,617	18,914	26,267	45,202	87,850	137,335	222,000	308,000
Market capitalization	(10^6€)	584	59,818	45,431	17,437	20,872	29,022	44,923	73,939	117,582	169,950
Total assets	(10^6€)	584	321,626	477,263	15,090	24,191	39,492	87,278	394,412	954,882	1,421,095
EBITDA	(10^6€)	584	10,367	8,035	1,619	2,526	4,318	8,562	13,932	19,503	26,470
EBIT	(10^6€)	584	7,365	5,721	1,242	1,732	3,040	5,706	10,431	14,940	18,671
Net income	(10^6€)	584	3,121	3,453	-1,494	397	1,369	2,581	4,705	7,316	9,183
Book to market ratio	(%)	584	69.21	54.48	9.21	13.79	28.16	53.02	97.86	146.92	172.12
Book leverage	(%)	584	24.94	13.69	2.80	3.93	15.64	24.63	34.72	43.81	49.22
Net PPE/total assets	(%)	584	19.94	20.16	0.24	0.40	1.31	11.17	29.41	46.79	64.18
ROA	(%)	558	5.37	6.43	-0.22	0.33	0.94	4.22	7.79	11.97	14.83
ROE	(%)	583	15.05	17.99	-5.09	0.79	6.41	11.71	18.39	34.52	55.35
Dividends/earnings	(%)	471	52.30	21.78	10.25	22.22	39.88	52.29	68.18	79.92	86.99
Stock return	(%)	584	8.81	22.70	-31.17	-22.19	-4.68	9.26	23.35	37.04	44.12
Stock-to-accounting vola. (hist.)		568	75.61	138.62	3.46	5.13	8.83	21.18	90.53	176.03	397.27
Board independence	(%)	584	71.75	19.84	38.46	45.45	58.33	75.00	87.50	100.00	100.00
Female board membership	(%)	584	31.23	10.25	14.29	17.65	25.00	30.77	38.46	42.86	45.45
Institutional ownership	(%)	584	50.26	15.85	24.79	31.57	38.93	50.88	59.53	70.82	76.48
Block ownership	(%)	584	7.22	16.04	0.00	0.00	0.00	0.00	10.14	26.52	46.57
Emission pledge Y/N	(1/0)	583	1.00	0.06	1.00	1.00	1.00	1.00	1.00	1.00	1.00
CO_2 (Scope 1)	($10^6 t$)	542	6.19	18.17	0.01	0.02	0.03	0.18	1.50	18.59	24.92
CO_2 (Scope 1) (hist.)	($10^6 t$)	568	7.43	22.08	0.01	0.02	0.05	0.16	2.05	18.21	37.78
Log(total assets)		584	25.50	1.43	23.44	23.91	24.40	25.19	26.70	27.58	27.98
Log(book to market ratio)		580	-0.69	0.87	-2.33	-1.95	-1.26	-0.63	-0.02	0.39	0.56
Log(CO_2)		542	12.56	2.62	9.38	9.71	10.37	12.11	14.22	16.74	17.03

Table III. Executive characteristics and positions

Reported are summary statistics on executive-level variables in a given year. We hand-collect information on an executive's age, gender, tenure, and position within the executive/management board. For the latter, we differentiate between the chief executive officer (CEO), chief financial officer (CFO), chief human resources officer (CHRO), and chief operating officer (COO). All other expert C-suite positions (e.g., chief marketing officer, chief sales officer, chief legal officer, etc.) are grouped as "Other specialists". For executives, who are chairing a division, region, or are responsible for a product segment, we create the job position "Division/regional head". We winsorize age and tenure at the 1%-level in each tail of the distribution.

		Obs	Mean	S.D.	P5	P25	P50	P75	P95
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Executive characteristics									
Age	(years)	2,560	54	5	46	51	54	58	63
Tenure	(years)	2,216	6	5	1	2	4	8	15
Female Y/N	(1/0)	2,560	0.107	0.308	0.000	0.000	0.000	0.000	1.000
Panel B: Executive positions									
CEO		576							
CFO		399							
CHRO		148							
COO		141							
Others		1,264							
Chairman		23							
Divisional Head for Geographic Region or Product Segment		825							
Other specialists		416							
Total		2,528							

Table IV. Summary statistics for short-term incentive pay (STI)

Reported are summary statistics for the main remuneration elements in executives' short-term incentive contracts (STI) at the executive-year level. The superscripts B and D designate *binding* and *discretionary* performance metrics, respectively. The superscripts ESG and $nESG$ designate *ESG* and *non-ESG* metrics. For more information about the design of binding and discretionary performance metrics, see Section IV. For variable definitions, see Appendix A.

		Obs (1)	Mean (2)	S.D. (3)	P5 (4)	P10 (5)	P25 (6)	P50 (7)	P75 (8)	P90 (9)	P95 (10)
Target STI amount:											
$TSTI_{i,t}$	(€)	1,915	988,677	577,729	366,600	420,555	623,583	813,934	1,240,250	1,670,918	2,200,000
$TSTI_{i,t}/Base\ salary_{i,t}$	(%)	1,915	100.614	39.665	50	60	80	100	105	150	173
Number of binding STI metrics:											
$\#_{i,t}^{B,ESG}$	(#)	2,609	0.410	1.566	0	0	0	0	0	1	3
$\#_{i,t}^{B,nESG}$	(#)	2,599	4.167	3.983	0	0	2	3	5	9	12
$\#_{i,t}^{B,ESG} + \#_{i,t}^{B,nESG}$	(#)	2,599	4.578	4.337	0	0	2	4	6	10	13
Weight of binding STI metrics:											
$w_{i,t}^{B,ESG}$	(%)	2,599	2.625	7.228	0	0	0	0	0	15	20
$w_{i,t}^{B,nESG}$	(%)	2,599	73.175	34.605	0	0	60	85	100	100	100
$w_{i,t}^{B,ESG} + w_{i,t}^{B,nESG}$	(%)	2,599	75.800	35.462	0	0	65	100	100	100	100
Number of discretionary STI metrics:											
$\#_{i,t}^{D,ESG}$	(#)	2,609	1.374	2.375	0	0	0	0	2	5	5
$\#_{i,t}^{D,nESG}$	(#)	2,599	3.370	5.787	0	0	0	0	5	11	17
$\#_{i,t}^{D,ESG} + \#_{i,t}^{D,nESG}$	(#)	2,599	4.750	7.473	0	0	0	0	7	16	21
Weight of discretionary STI metrics:											
$w_{i,t}^{D}$	(%)	2,599	24.195	35.460	0	0	0	0	35	100	100
STI hurdle $Y/N_{i,t}$	(1/0)	2,677	0.631	0.483	0	0	0	1	1	1	1
STI cap $Y/N_{i,t}$	(1/0)	2,677	0.959	0.199	1	1	1	1	1	1	1
$STI\ cap_{i,t}/Base\ salary_{i,t}$	(%)	2,243	176.545	70.793	50	98	130	180	200	250	281
STI board discretion allowed $Y/N_{i,t}$	(1/0)	2,666	0.728	0.445	0	0	0	1	1	1	1
STI ex post multiplier (ESG) $Y/N_{i,t}$	(1/0)	2,677	0.040	0.195	0	0	0	0	0	0	0
STI ex post multiplier (nESG) $Y/N_{i,t}$	(1/0)	2,677	0.142	0.349	0	0	0	0	0	1	1

Table V. Summary statistics for long-term incentive pay (LTI)

Reported are summary statistics for the main remuneration elements in executives' long-term incentive contracts (LTI) at the executive-year level. Information on the numbers and weights of metrics in LTI plans always refer to the first year of granting. The superscripts B and D designate *binding* and *discretionary* performance metrics, respectively. The superscripts ESG and $nESG$ designate ESG and *non-ESG* metrics. For more information about the design of binding and discretionary performance metrics, see Section IV. For variable definitions, see Appendix A.

		Obs (1)	Mean (2)	S.D. (3)	P5 (4)	P10 (5)	P25 (6)	P50 (7)	P75 (8)	P90 (9)	P95 (10)
Number of binding LTI metrics:											
$\#_{i,t}^{B,ESG}$	(#)	2,499	0.201	0.716	0	0	0	0	0	0	2
$\#_{i,t}^{B,nESG}$	(#)	2,443	2.574	1.890	0	1	2	2	3	5	5
$\#_{i,t}^{B,ESG} + \#_{i,t}^{B,nESG}$	(#)	2,443	2.780	2.120	0	1	2	2	3	5	6
Weights of binding LTI metrics:											
$w_{i,t}^{B,ESG}$	(%)	2,443	2.479	9.111	0	0	0	0	0	0	20
$w_{i,t}^{B,nESG}$	(%)	2,443	89.169	27.119	0	60	100	100	100	100	100
$w_{i,t}^{B,ESG} + w_{i,t}^{B,nESG}$	(%)	2,443	91.649	26.329	0	70	100	100	100	100	100
Number of discretionary LTI metrics:											
$\#_{i,t}^{D,ESG}$	(#)	2,499	0.188	0.672	0	0	0	0	0	1	1
$\#_{i,t}^{D,nESG}$	(#)	2,443	0.605	2.041	0	0	0	0	0	3	5
$\#_{i,t}^{D,ESG} + \#_{i,t}^{D,nESG}$	(#)	2,443	0.797	2.601	0	0	0	0	0	4	7
Weight of discretionary LTI metrics:											
$w_{i,t}^{D}$	(%)	2,443	8.351	26.329	0	0	0	0	0	30	100
LTI hurdle $Y/N_{i,t}$	(1/0)	2,677	0.759	0.428	0	0	1	1	1	1	1
LTI cap $Y/N_{i,t}$	(1/0)	2,677	0.410	0.492	0	0	0	0	1	1	1
LTI $cap_{i,t}/Base\ salary_{i,t}$	(%)	1,097	292.521	119.171	133	140	200	275	380	438	500
LTI board discretion allowed $Y/N_{i,t}$	(1/0)	2,276	0.753	0.431	0	0	1	1	1	1	1
LTI ex post multiplier (ESG) $Y/N_{i,t}$	(1/0)	2,677	0.000	0.000	0	0	0	0	0	0	0
LTI ex post multiplier (nESG) $Y/N_{i,t}$	(1/0)	2,677	0.016	0.124	0	0	0	0	0	0	0

Table VI. STI and LTI performance metrics by ESG category

Reported are summary statistics for the number of ESG and non-ESG performance metrics by different categories. In the case of ESG metrics, we show the number of metrics for each of the three categories Environmental, Social, and Governance. In the case of non-ESG metrics, we distinguish between financial and non-financial metrics. We do not distinguish between binding and discretionary metrics in this table. Panel A focuses on short-term incentive contracts (STI), whereas Panel B reports numbers for long-term incentive contracts (LTI).

	Obs	Mean	S.D.	P5	P10	P25	P50	P75	P90	P95
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: STI										
Number of ESG metrics:	2,609	1.784	2.762	0	0	0	1	3	5	6
$\#(Environmental)_{i,t}$	2,609	0.141	0.601	0	0	0	0	0	0	1
$\#(Social)_{i,t}$	2,609	1.273	1.988	0	0	0	0	2	4	5
$\#(Governance)_{i,t}$	2,609	0.369	0.772	0	0	0	0	1	1	2
Number of non-ESG metrics:	2,599	7.537	6.552	1	2	3	5	9	16	22
$\#(Financial)_{i,t}$	2,599	3.595	2.880	1	1	2	3	4	6	8
$\#(Non\text{-}financial)_{i,t}$	2,599	3.942	4.722	0	0	1	2	5	10	14
Panel B: LTI										
Number of ESG metrics:	2,514	0.399	0.963	0	0	0	0	0	2	2
$\#(Environmental)_{i,t}$	2,514	0.058	0.360	0	0	0	0	0	0	0
$\#(Social)_{i,t}$	2,514	0.261	0.721	0	0	0	0	0	1	2
$\#(Governance)_{i,t}$	2,514	0.070	0.298	0	0	0	0	0	0	1
Number of non-ESG metrics:	2,443	3.179	2.319	1	1	2	3	4	5	7
$\#(Financial)_{i,t}$	2,443	2.503	1.266	1	1	2	2	3	4	5
$\#(Non\text{-}financial)_{i,t}$	2,443	0.676	1.699	0	0	0	0	0	2	4

Table VII. STI target achievement and realized pay

Panel A shows summary statistics for target fulfillment rates (achievement rates) in short-term incentive pay (STI). Panel B shows summary statistics for realized compensation (base salary, STI, and LTI), board discretion, and deferred pay. For more information about the design of STI and LTI, see Section IV. For variable definitions, see Appendix A.

		Obs (1)	Mean (2)	S.D. (3)	P5 (4)	P10 (5)	P25 (6)	P50 (7)	P75 (8)	P90 (9)	P95 (10)
Panel A: Target fulfillment rates in STI											
Overall target fulfillment rate:											
$f_{i,t}$	(%)	1,860	104	40	36	59	86	102	123	145	166
Fulfillment rate of binding targets:											
$f_{i,t}^{B,ESG}$	(%)	231	103	31	44	69	92	100	121	148	150
$f_{i,t}^{B,nESG}$	(%)	1,324	100	40	34	51	82	100	119	139	159
$f_{i,t}^{B}$	(%)	1,585	101	39	37	54	82	100	120	143	159
Fulfillment rate of discretionary targets:											
$f_{i,t}^{D}$	(%)	714	108	41	27	63	89	104	124	160	180
Panel B: Realized pay (base, STI, LTI)											
$RSTI_{i,t}/Base\ salary_{i,t}$	(%)	2,388	84	54	0	19	47	79	115	149	170
$RSTI_{i,t}$	(€)	2,388	821,716	612,654	0	174,867	424,817	707,572	1,053,200	1,608,147	2,027,285
$Base\ salary_{i,t}$	(€)	2,464	1,093,465	576,840	513,338	600,000	720,000	882,466	1,300,000	1,923,100	2,339,052
$RSTI_{i,t} + Base\ salary_{i,t}$	(€)	2,560	1,819,335	985,311	511,539	841,699	1,207,902	1,622,384	2,349,000	3,053,200	3,621,199
$RLTI_{i,t}$	(€)	2,508	1,726,691	1,334,493	30,000	303,000	855,795	1,423,006	2,229,780	3,627,090	4,412,120
$RSTI_{i,t} + Base\ salary_{i,t} + RLTI_{i,t}$	(€)	2,575	3,515,619	2,026,066	942,000	1,477,724	2,165,905	3,008,665	4,574,020	6,397,592	7,565,600
$Board\ exercised\ discretion\ Y/N_{i,t}$	(1/0)	2,609	0.13	0.34	0.00	0.00	0.00	0.00	0.00	1.00	1.00
$STI\ partly\ deferred\ Y/N_{i,t}$	(1/0)	2,677	0.51	0.50	0.00	0.00	0.00	1.00	1.00	1.00	1.00
$STI\ deferral_{i,t}/RSTI_{i,t}$	(%)	947	53.40	17.43	33.30	33.33	50.00	50.00	60.00	80.00	80.00
$STI\ deferral\ period_{i,t}$	(years)	1,034	3.25	0.82	2.00	2.00	3.00	3.00	4.00	5.00	5.00

Table VIII. STI variance decomposition

This table shows the decomposition of the variance of executives' realized short-term incentive compensation $RSTI_{i,t}$ into its different components. Column 2 shows total STI variance $Var\left(RSTI_{i,t}\right)$. In Panel A, total variance includes both within-executive and between-executive STI variation. Panel B only considers within-executive variation. In each panel, we estimate the variance decomposition in the largest possible sample (*All observations*), in the subsample of observations without board discretion (*No discretion*), and in the subsample of observations with at least one ESG metric (*Min. 1 ESG metric*). The variance shares reported in columns 4, 6, 8, and 9 to 11 correspond to the variance and covariance terms in Equation (5) divided by total STI variance. For example, the variance share of binding ESG metrics in column 4 is defined as $Var(RSTI_{i,t}^{B,ESG})/Var(RSTI_{i,t})$. Columns 3, 5, and 7 report the ex ante weights that firms assign to the different STI performance metrics, and are calculated as the sample averages of $w_{i,t}^{B,ESG}$, $w_{i,t}^{B,nESG}$, and $w_{i,t}^{D}$. As in previous tables, superscripts B and D designate binding and discretionary performance metrics, and superscripts ESG and $nESG$ designate ESG and non-ESG metrics. For more information on the variance decomposition approach, see Section VI.A.2.

			Binding metrics				Discretionary metrics		Covariance terms (2×cov)		
			$RSTI_{i,t}^{B,ESG}$		$RSTI_{i,t}^{B,nESG}$		$RSTI_{i,t}^{D}$		$(RSTI_{i,t}^{B,ESG}, RSTI_{i,t}^{B,nESG})$	$(RSTI_{i,t}^{B,ESG}, RSTI_{i,t}^{D})$	$(RSTI_{i,t}^{B,nESG}, RSTI_{i,t}^{D})$
	obs	$Var(RSTI_{i,t})$ $\times 10^{-6}$	STI weight	Var share	STI weight	Var share	STI weight	Var share	Var share	Var share	Var share
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Panel A: Within- and between-executive STI variance											
All observations	1,076	492,320	0.035	0.019	0.875	0.881	0.090	0.093	0.044	−0.004	−0.034
No discretion	926	505,566	0.031	0.017	0.884	0.898	0.085	0.086	0.043	−0.006	−0.038
Min. 1 ESG metric	443	538,548	0.085	0.035	0.697	0.671	0.219	0.145	0.144	−0.053	0.058
Panel B: Within-executive STI variance											
All observations	1,074	281,694	0.035	0.010	0.875	0.872	0.090	0.077	0.024	−0.004	0.021
No discretion	924	275,669	0.031	0.009	0.884	0.913	0.085	0.069	0.019	−0.007	−0.003
Min. 1 ESG metric	443	261,754	0.085	0.025	0.697	0.649	0.219	0.152	0.064	−0.013	0.123

Table IX. Annual variation in overall target achievement by CEO

We report cross-sectional OLS regressions for the annual variation in target fulfillment of CEOs. We calculate the dependent variable as the standard deviation of $f_{i,t}$ between 2013 and 2020. A high value means that overall performance achievement, measured across all the different performance metrics in the STI plan of CEO i, fluctuates more between 2013 and 2020. The dependent variable is regressed on the numbers and weights of ESG and non-ESG metrics in the STI contract, as well as on various executive and firm characteristics and industry fixed effects. These independent variables are calculated as time-series averages over our sample period. For example, we calculate the *Number of ESG metrics*$_i$ as the average number of ESG metrics of executive i between 2013 and 2020. Robust standard errors are reported in parentheses. $^{*}p < 0.1;^{**}p < 0.05;^{***}p < 0.01$.

	Dependent variable: *SD(Target fulfillment f)*$_i$					
	(1)	(2)	(3)	(4)	(5)	(6)
Number of ESG metrics$_i$ ($\#^{B,ESG} + \#^{D,ESG}$)	-0.959**	-0.933**	-1.143*			
	(0.466)	(0.458)	(0.629)			
Number of non-ESG metrics$_i$ ($\#^{B,nESG} + \#^{D,nESG}$)	-0.089	-0.033	0.143			
	(0.572)	(0.566)	(0.604)			
Weight of binding ESG metrics$_i$ ($w^{B,ESG}$)				-0.622**	-0.748**	-0.519*
				(0.298)	(0.346)	(0.301)
Weight of binding non-ESG metrics$_i$ ($w^{B,nESG}$)				-0.071	-0.135	-0.149
				(0.134)	(0.132)	(0.121)
Log(Base salary)$_i$		-3.409	-9.979		-8.815	-13.045
		(8.205)	(10.534)		(8.492)	(10.539)
Tenure$_i$		-0.613	-0.549		-0.854	-0.796
		(1.104)	(0.881)		(0.992)	(0.829)
Age$_i$		0.397	-0.073		0.0648	0.058
		(0.796)	(0.643)		(0.806)	(0.613)
Female$_i$		-3.596	-18.831		-2.712	-14.700
		(9.608)	(16.993)		(9.359)	(16.074)
Log(total assets)$_i$		-0.926	-0.306		-1.609	-1.388
		(1.954)	(3.282)		(1.941)	(3.112)
Industry F.E.	No	No	Yes	No	No	Yes
Observations	65	65	65	65	65	65
Adjusted R^2	-0.01	-0.08	0.00	0.02	-0.02	0.02

Table X. STI variance decomposition by industry

This table shows the decomposition of the variance of executives' realized short-term incentive compensation $RSTI_{i,t}$ for different industry sectors. Column 2 shows total STI variance $Var\,(RSTI_{i,t})$. In Panel A, total variance includes both within-executive and between-executive STI variation. Panel B only considers within-executive variation. The variance shares reported in columns 4, 6, 8, and 9 to 11 correspond to the variance and covariance terms in Equation (5) divided by total STI variance. For example, the variance share of binding ESG metrics in column 4 is defined as $Var(RSTI_{i,t}^{B,ESG})/Var(RSTI_{i,t})$. Columns 3, 5, and 7 report the ex ante weights that firms assign to the different STI performance metrics, and are calculated as the sample averages of $w_{i,t}^{B,ESG}$, $w_{i,t}^{B,nESG}$, and $w_{i,t}^{D}$. As in previous tables, superscripts B and D designate binding and discretionary performance metrics, and superscripts ESG and $nESG$ designate ESG and non-ESG metrics. For more information on the variance decomposition approach, see Section VI.A.2.

			Binding metrics				Discretionary metrics		Covariance terms (2×cov)		
			$RSTI_{i,t}^{B,ESG}$		$RSTI_{i,t}^{B,nESG}$		$RSTI_{i,t}^{D}$		$(RSTI_{i,t}^{B,ESG}, RSTI_{i,t}^{B,nESG})$	$(RSTI_{i,t}^{B,ESG}, RSTI_{i,t}^{D})$	$(RSTI_{i,t}^{B,nESG}, RSTI_{i,t}^{D})$
	obs	$Var(RSTI_{i,t})$ $\times 10^{-6}$	STI weight	Var share	STI weight	Var share	STI weight	Var share	Var share	Var share	Var share
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Panel A: Within- and between-executive STI variance											
Consumers	215	801,191	0.002	0.000	0.909	1.026	0.090	0.112	−0.001	−0.001	−0.137
Energy & Utilities	74	414,271	0.046	0.061	0.885	0.619	0.069	0.073	0.271	−0.023	−0.001
Financials	217	340,937	0.012	0.009	0.897	0.743	0.091	0.065	0.068	0.014	0.100
Industrials & Materials	288	394,729	0.064	0.023	0.806	0.882	0.130	0.126	−0.017	−0.011	−0.003
Health	116	252,268	0.000	0.000	0.936	1.012	0.064	0.174	0.000	0.000	−0.187
ICT	166	483,301	0.075	0.051	0.877	0.752	0.048	0.031	0.187	−0.008	−0.012
Panel B: Within-executive STI variance											
Consumers	214	622,787	0.002	0.000	0.908	0.955	0.090	0.042	0.003	−0.001	0.001
Energy & Utilities	74	226,577	0.046	0.029	0.885	0.625	0.069	0.086	0.142	0.000	0.119
Financials	216	153,286	0.012	0.005	0.896	0.871	0.091	0.082	0.031	−0.008	0.019
Industrials & Materials	288	277,063	0.064	0.017	0.806	0.769	0.130	0.120	0.036	−0.008	0.066
Health	116	163,679	0.000	0.000	0.936	0.952	0.064	0.157	0.000	0.000	−0.109
ICT	166	131,921	0.075	0.043	0.877	0.864	0.048	0.051	0.032	−0.006	0.017

Table XI. ESG Pay and firm and employee characteristics

We report panel regressions for various measures of ESG adoption in executive STI as function of firm and executive characteristics as well as fixed effects for industry sectors, executive positions, and years. The dependent variables are defined as follows. Column 1: At least 1 $ESG_D = \mathbb{1}(\#_{i,t}^{D,ESG} \geq 1)$; column 2: Log(1+No. ESG_D) $= Ln(1 + \#_{i,t}^{D,ESG})$; column 3: No. ESG_D/No. all metrics $= \#_{i,t}^{D,ESG}/(\#_{i,t}^{D} + \#_{i,t}^{B})$; column 4: Weight All $D = w_{i,t}^{D}$; column 5: At least 1 $ESG_B = \mathbb{1}(\#_{i,t}^{B,ESG} \geq 1)$; column 6: Log(1+No. ESG_B) $= Ln(1 + \#_{i,t}^{B,ESG})$; column 7: No. ESG_B/No. all metrics $= \#_{i,t}^{B,ESG}/(\#_{i,t}^{D} + \#_{i,t}^{B})$; column 8: Weight $ESG_B = w_{i,t}^{B,ESG}$. The independent variables are defined in Appendix A. Robust standard errors are clustered by firm and reported in parentheses. $^{*}p < 0.1;^{**}p < 0.05;^{***}p < 0.01$.

	Discretionary ESG metrics (ESG_D)				Binding ESG metrics (ESG_B)			
	At least 1 ESG_D (1)	Log(1+No. ESG_D) (2)	No. ESG_D / No. all metrics (3)	Weight All D (4)	At least 1 ESG_B (5)	Log(1+No. ESG_B) (6)	No. ESG_B / No. all metrics (7)	Weight ESG_B (8)
Historical Log(Avg. CO_2)	-0.069	-0.132**	-0.027*	-3.619	-0.019	-0.031	-0.003	-0.084
	(0.044)	(0.064)	(0.015)	(2.881)	(0.024)	(0.036)	(0.010)	(0.496)
Historical stock-to-accounting volatility ($\times 10^{-2}$)	0.024	-0.028	0.007	0.878	0.033**	0.039**	0.020***	0.744*
	(0.029)	(0.044)	(0.005)	(1.771)	(0.013)	(0.018)	(0.007)	(0.388)
Log(total assets)	0.118	0.228**	0.049*	12.732**	-0.042	-0.017	-0.011	-1.028
	(0.072)	(0.113)	(0.022)	(5.153)	(0.064)	(0.093)	(0.026)	(1.304)
Log(book to market ratio)	0.124**	0.216**	0.049**	5.930	0.048	0.036	0.009	0.892
	(0.060)	(0.085)	(0.022)	(4.687)	(0.053)	(0.080)	(0.023)	(1.244)
ROA	-0.001	0.002	-0.001	-0.228	-0.000	0.000	0.000	-0.021
	(0.008)	(0.010)	(0.002)	(0.511)	(0.004)	(0.005)	(0.001)	(0.082)
Stock return	0.002*	0.003*	0.001**	0.133	0.001	0.000	0.000	0.018
	(0.001)	(0.002)	(0.000)	(0.086)	(0.001)	(0.001)	(0.000)	(0.014)
Book leverage	0.000	-0.001	-0.000	-0.139	0.005	0.004	0.002	0.058
	(0.004)	(0.005)	(0.001)	(0.236)	(0.003)	(0.005)	(0.001)	(0.070)
Net PPE/total assets	0.006**	0.011**	0.003**	0.267	-0.000	0.002	0.000	0.041
	(0.003)	(0.005)	(0.001)	(0.201)	(0.002)	(0.003)	(0.001)	(0.047)
DPS	-0.000	0.011	-0.002	0.934	0.055**	0.075*	0.024**	1.063*
	(0.035)	(0.045)	(0.010)	(2.344)	(0.024)	(0.038)	(0.011)	(0.544)
Emissions policy	0.735***	0.911***	0.147***	27.800***	0.242***	0.202**	0.060**	3.449***
	(0.210)	(0.254)	(0.044)	(7.996)	(0.070)	(0.087)	(0.024)	(1.262)
ESG rating	0.033	0.070*	0.004	-1.285	0.002	0.021	0.003	0.371
	(0.028)	(0.039)	(0.008)	(1.824)	(0.019)	(0.025)	(0.006)	(0.336)
Institutional ownership	0.006**	0.010***	0.002**	0.182	-0.006**	-0.004*	-0.001*	-0.051*
	(0.003)	(0.003)	(0.001)	(0.188)	(0.002)	(0.002)	(0.000)	(0.029)
Block ownership	-0.008**	-0.009*	-0.002	-0.445	0.003*	0.002	0.000	0.016
	(0.003)	(0.005)	(0.002)	(0.283)	(0.002)	(0.002)	(0.001)	(0.034)
Board independence	0.003*	0.007**	0.001	0.189*	-0.001	-0.003	-0.001	-0.038
	(0.002)	(0.003)	(0.001)	(0.102)	(0.001)	(0.002)	(0.001)	(0.036)
Female board membership	-0.002	0.002	0.001	-0.045	0.002	0.004	0.001	0.037
	(0.005)	(0.007)	(0.001)	(0.379)	(0.003)	(0.004)	(0.001)	(0.051)
Tenure	-0.001	0.000	0.001	0.049	-0.002	-0.000	0.000	-0.016
	(0.005)	(0.008)	(0.002)	(0.402)	(0.003)	(0.003)	(0.001)	(0.055)
Age	0.004	0.003	-0.000	0.102	0.001	0.001	0.001	0.082**
	(0.003)	(0.004)	(0.001)	(0.218)	(0.002)	(0.003)	(0.001)	(0.039)
Female	-0.082**	-0.089*	-0.009	-2.542	-0.007	-0.006	0.004	0.218
	(0.033)	(0.046)	(0.011)	(1.967)	(0.022)	(0.033)	(0.010)	(0.510)
Industry F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Executive position F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,056	2,056	2,055	2,055	2,056	2,056	2,055	2,055
Adjusted R^2	0.23	0.29	0.26	0.17	0.17	0.16	0.16	0.15

Table XII. STI variance decomposition by executive position

This table shows the decomposition of the variance of executives' realized short-term incentive compensation $RSTI_{i,t}$ for different executive positions. Column 2 shows total STI variance $Var\,(RSTI_{i,t})$. In Panel A, total variance includes both within-executive and between-executive STI variation. Panel B only considers within-executive variation. The variance shares reported in columns 4, 6, 8, and 9 to 11 correspond to the variance and covariance terms in Equation (5) divided by total STI variance. For example, the variance share of binding ESG metrics in column 4 is defined as $Var(RSTI_{i,t}^{B,ESG})/Var(RSTI_{i,t})$. Columns 3, 5, and 7 report the ex ante weights that firms assign to the different STI performance metrics, and are calculated as the sample averages of $w_{i,t}^{B,ESG}$, $w_{i,t}^{B,nESG}$, and $w_{i,t}^{D}$. As in previous tables, superscripts B and D designate binding and discretionary performance metrics, and superscripts ESG and $nESG$ designate ESG and non-ESG metrics. For more information on the variance decomposition approach, see Section VI.A.2.

			Binding metrics				Discretionary metrics		Covariance terms (2×cov)		
			$RSTI_{i,t}^{B,ESG}$		$RSTI_{i,t}^{B,nESG}$		$RSTI_{i,t}^{D}$		$(RSTI_{i,t}^{B,ESG}, RSTI_{i,t}^{B,nESG})$	$(RSTI_{i,t}^{B,ESG}, RSTI_{i,t}^{D})$	$(RSTI_{i,t}^{B,nESG}, RSTI_{i,t}^{D})$
	obs	$Var(RSTI_{i,t})$ $\times 10^{-6}$	STI weight	Var share	STI weight	Var share	STI weight	Var share	Var share	Var share	Var share
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Panel A: Within- and between-executive STI variance											
CEO	297	760,444	0.043	0.027	0.846	1.005	0.111	0.107	0.020	−0.014	−0.145
CFO	200	213,585	0.038	0.039	0.870	0.867	0.091	0.183	0.036	−0.009	−0.117
CHRO	69	134,169	0.020	0.008	0.915	1.138	0.065	0.141	−0.042	−0.008	−0.236
COO	55	181,326	0.011	0.029	0.886	0.947	0.103	0.057	0.120	−0.006	−0.148
Division/Region Head	318	160,129	0.031	0.012	0.890	1.002	0.079	0.166	−0.052	−0.012	−0.115
Other specialist	124	159,487	0.037	0.013	0.884	1.059	0.079	0.179	−0.030	−0.013	−0.208
Panel B: Within-executive STI variance											
CEO	296	429,993	0.043	0.014	0.845	0.963	0.112	0.095	−0.003	−0.011	−0.059
CFO	199	166,423	0.038	0.015	0.870	0.867	0.092	0.100	0.057	−0.008	−0.031
CHRO	69	80,902	0.020	0.003	0.915	0.903	0.065	0.120	−0.004	0.001	−0.022
COO	55	111,287	0.011	0.008	0.886	0.854	0.103	0.041	0.037	−0.001	0.061
Division/Region Head	318	85,802	0.031	0.010	0.890	0.822	0.079	0.154	0.003	−0.001	0.012
Other specialist	124	117,325	0.037	0.017	0.884	0.926	0.079	0.088	0.098	0.003	−0.133

Table XIII. Tailoring of ESG metrics to executive positions

Reported are panel regressions for the adoption of different ESG performance metrics in the STI contracts of CTOs, CHROs, and CEOs. The dependent variables are binary indicators that equal one if the STI of executive i in year t is linked to a given type of ESG metric: environmental metrics in general in columns 1 and 2 of Panel A; metrics measuring emissions in columns 3 and 4 of Panel A; social metrics in general in columns 1 and 2 of Panel B; workforce-related metrics in columns 3 and 4 of Panel B. The independent variables *CTO dummy* and *CHRO dummy* are binary indicators that equal one if executive i is a CTO or a CHRO, respectively (and zero otherwise). The omitted base category consists of CEOs. Firm, year, and interacted firm-year fixed effects are included as indicated. Robust standard errors are reported in parentheses. $^{*}p < 0.1;^{**}p < 0.05;^{***}p < 0.01$..

	(1)	(2)	(3)	(4)
Panel A: Environmental metrics				
	Environm. Y/N		Emissions Y/N	
CTO dummy	-0.068***	-0.066**	-0.053***	-0.052**
	(0.023)	(0.026)	(0.020)	(0.024)
CHRO dummy	-0.037*	-0.040**	-0.034*	-0.034**
	(0.020)	(0.017)	(0.018)	(0.016)
Firm F.E. and Year F.E.	Yes	No	Yes	No
Firm-year F.E.	No	Yes	No	Yes
Observations (CEO)	571	209	571	209
Observations (CTO)	92	92	92	92
Observations (CHRO)	158	155	158	155
Adjusted R^2	0.51	0.73	0.53	0.75
Panel B: Social metrics				
	Social Y/N		Workforce Y/N	
CTO dummy	-0.039	-0.065**	-0.050	-0.066**
	(0.039)	(0.028)	(0.039)	(0.027)
CHRO dummy	-0.032	-0.025	-0.004	-0.012
	(0.028)	(0.017)	(0.029)	(0.018)
Firm F.E. and Year F.E.	Yes	No	Yes	No
Firm-year F.E.	No	Yes	No	Yes
Observations (CEO)	571	209	571	209
Observations (CTO)	92	92	92	92
Observations (CHRO)	158	155	158	155
Adjusted R^2	0.61	0.91	0.59	0.89

Internet Appendix

ESG Incentives in Executive Compensation

June 20, 2025

Internet Appendix A. Additional Empirical Results

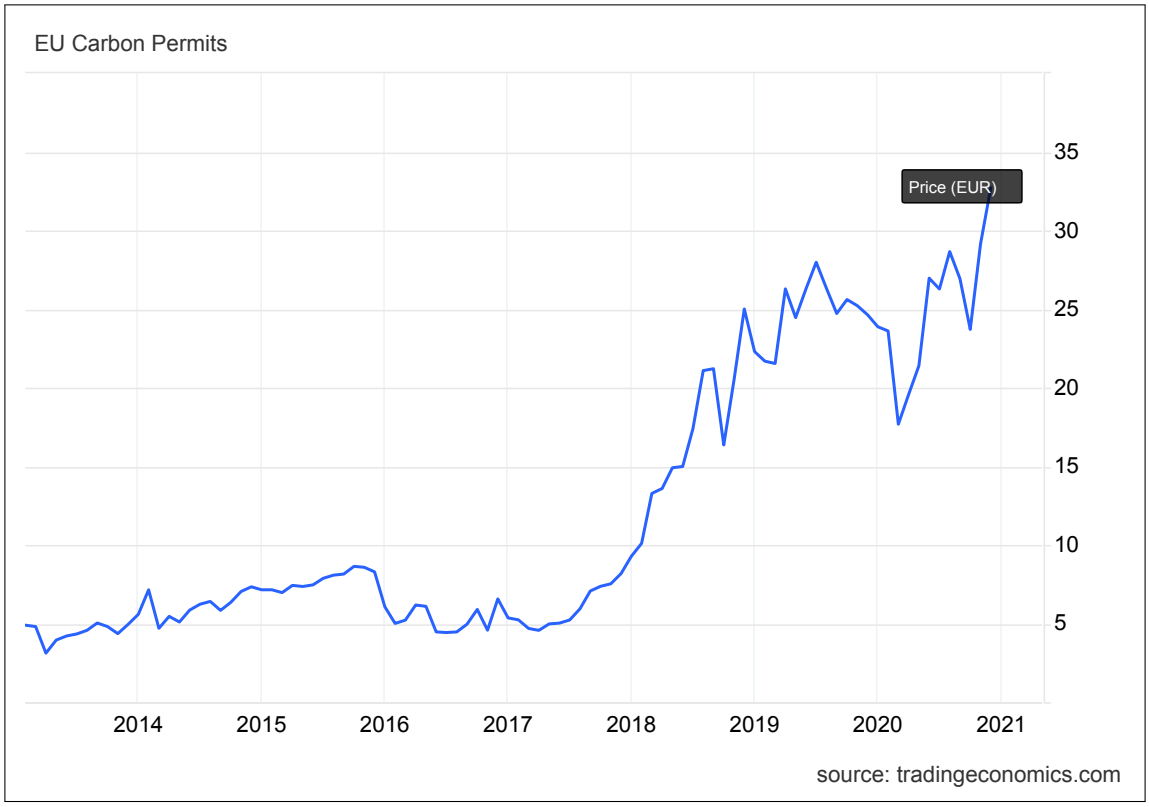


Figure IA.1. Evolution of EU carbon permit prices
The figure illustrates the evolution of EU carbon permit prices (in Euros) from 2013 to 2021. Data were downloaded from https://tradingeconomics.com/commodity/carbon on July 9, 2024.

Internet Appendix B. Overview Firms in Sample - Detailed List

Table IA.1. Sample firms

Firm	Country	Sample period (FY)	STOXX Europe 50	EURO STOXX 50	Comments
ABB	CH	2013-2020	since 09/2008	-	-
Adidas	DE	2013-2020	since 09/2020	since 09/2016	-
Adyen	NL	2018-2020	since 09/2020	since 09/2020	First annual report published in 2018
Ahold Delhaize	NL	2016-2020	-	since 09/2016	Merger in 07/2016 of "Koninklijke Ahold" (NL) and "Delhaize Group" (BE)
Air Liquide	FR	2013-2020	since 09/2011	since 08/1998	-
Airbus	NL	2013-2020	since 09/2017	since 03/2013	-
Allianz	DE	2013-2020	since 08/1998	since 08/1998	-
Amadeus IT	ES	2013-2020	-	since 09/2018	-
Anheuser-Busch InBev	BE	2013-2020	since 09/2010	since 09/2009	-
ASML	NL	2013-2020	since 08/2016	since 06/2012	-
Assicurazioni Generali	IT	2013-2020	-	08/1998-09/2016	-
AstraZeneca	GB	2013-2020	since 09/2000	-	-
AXA	FR	2013-2020	since 09/2013	since 08/1998	-
Banco Santander	ES	2013-2020	09/1999-09/2020	since 09/1999	-
Barclays	GB	2013-2020	04/1999-12/2018	-	-
BASF	DE	2013-2020	since 09/2002	since 09/1999	-
Bayer	DE	2013-2020	since 09/2008	since 08/1998	-
BBVA	ES	2013-2020	08/1998-09/2019	08/1998-09/2020	-
BG Group	GB	2013-2015	04/2009-02/2016	-	Takeover by Royal Dutch Shell in 2016
BHP Group	AU/GB	2013-2020	09/2006-09/2015 & since 07/2020	-	Renamed from "BHP Billiton" to "BHP Group" in 2017/2018
BMW	DE	2013-2020	-	since 09/2010	-
BNP Paribas	FR	2013-2020	since 09/2000	since 09/1999	-
BP	GB	2013-2020	since 08/1998	-	-
British American Tobacco	GB	2013-2020	since 09/2008	-	-
BT Group	GB	2013-2020	09/2014-09/2017	-	-

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Table IA.1 – continued from previous page

Firm	Country	Sample period (FY)	STOXX Europe 50	EURO STOXX 50	Comments
Carrefour	FR	2013-2020	-	08/1998-09/2016	-
Credit Suisse	CH	2013-2020	06/2013-08/2016	-	-
CRH	IE	2013-2020	-	09/2009-09/2014 & since 09/2016	-
Daimler	DE	2013-2020	since 10/1998	since 11/1998	-
Danone	FR	2013-2020	-	since 09/2000	-
Deutsche Bank	DE	2013-2020	08/1998-08/2016	08/1998-09/2018	-
Deutsche Börse	DE	2013-2020	-	since 09/2019	-
Deutsche Post	DE	2013-2020	-	since 09/2013	-
Deutsche Telekom	DE	2013-2020	since 08/1998	since 08/1998	-
Diageo	GB	2013-2020	since 08/1998	-	-
E.ON	DE	2013-2020	08/1998-09/2013	08/1998-09/2018	-
Enel	IT	2013-2020	since 09/2019	since 03/2000	-
ENGIE	FR	2013-2020	07/2008-03/2013	since 07/2008	Renamed from GDF Suez in 2015
Eni	IT	2013-2020	08/1998-07/2020	since 08/1998	-
EssilorLuxottica	FR	2013-2020	-	since 6/2012	Essilor merged in 2018 with Luxottica (IT), Renamed to EssilorLuxottica
Flutter Entertainment	IE	2016-2020	-	since 09/2020	Merged in 2016 from Betfair (GB) and Paddy Power (IE) to Paddy Power Betfair; Renamed to Flutter Entertainment in 2019
Fresenius	DE	2013-2020	-	09/2015-09/2020	-
GlaxoSmithKline	GB	2013-2020	since 08/1998	-	-
Glencore	JE	2013-2020	06/2013-09/2015 & 05/2017-09/2019	-	-
HSBC	GB	2013-2020	since 09/1999	-	-
Iberdrola	ES	2013-2020	since 09/2019	since 09/2003	-
Imperial Brands	GB	2013-2020	12/2011-09/2013 & 09/2015-09/2018	-	2016 Renaming of Imperial Tobacco to Imperial Brands
Inditex	ES	2014-2020	-	since 09/2011	No data available for FY 2013
ING Groep	NL	2013-2020	08/1998-05/2020	since 08/1998	-

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Table IA.1 – continued from previous page

Firm	Country	Sample period (FY)	STOXX Europe 50	EURO STOXX 50	Comments
Intesa Sanpaolo	IT	2013-2020	since 09/2015	since 01/2007	-
Kering	FR	2013-2020	since 05/2020	since 09/2018	-
KONE	FI	2013-2020	-	since 09/2020	-
Linde SE	IE	2018-2020	since 12/2018	since 10/2018	Merger in 10/2018 of "Praxair" (US) and "Linde AG" (DE)
Lloyds Banking	GB	2013-2020	09/2013-09/2020	-	-
L'Oréal	FR	2013-2020	since 02/2016	since 08/1998	-
LVMH	FR	2013-2020	since 09/2011	since 08/1998	-
Münchener Rück	DE	2013-2020	-	since 09/1999	-
National Grid	GB	2013-2020	since 09/2011	-	-
Nestlé	CH	2013-2020	-	since 08/1998	-
Nokia	FI	2013-2020	-	08/1998-03/2013 & since 09/2014	-
Novartis	CH	2013-2020	since 08/1998	-	-
Novo Nordisk	DK	2013-2020	since 06/2015	-	-
Orange	FR	2013-2020	-	08/1998-09/2020	-
Pernod Ricard	FR	2013-2020	-	since 09/2020	-
Philips	NL	2013-2020	-	since 08/1998	-
Prosus	NL	2020	since 11/2020	since 09/2020	Founded in 2019; first annual report for FY 2020
Prudential	GB	2013-2020	since 09/2014	-	-
Reckitt Benckiser	GB	2013-2020	since 06/2012	-	-
RELX Group	GB	2013-2020	since 09/2019	-	-
Repsol	ES	2013-2020	-	08/1998-09/2015	-
Richemont	CH	2013-2020	12/2012-09/2016	-	-
Rio Tinto	AU/GB	2013-2020	since 09/2005	-	-
Roche	CH	2013-2020	since 09/1999	-	-
Royal Dutch Shell	GB	2013-2020	since 12/2005	-	-
RWE	DE	2013-2020	-	08/1998-09/2015	-
Safran	FR	2013-2020	since 09/2018	since 09/2015	-
Saint-Gobain	FR	2013-2020	-	09/2001-09/2018	-

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Table IA.1 – continued from previous page

Firm	Country	Sample period (FY)	STOXX Europe 50	EURO STOXX 50	Comments
Sanofi	FR	2013-2020	since 09/2007	since 09/1999	-
SAP	DE	2013-2020	since 09/2003	since 07/2004	-
Schneider Electric	FR	2013-2020	since 03/2013	since 09/2007	-
Siemens	DE	2013-2020	since 08/1998	since 08/1998	-
Société Générale	FR	2013-2020	-	08/1998-09/2020 -	
Standard Chartered	GB	2013-2020	09/2010-06/2015	-	-
Syngenta	CH	2013-2016	09/2016-05/2017	-	Takeover by ChemChina in 2017
Telefónica	ES	2013-2020	08/1998-09/2019	08/1998-09/2020	-
Total	FR	2013-2020	since 11/1999	since 06/1999	-
UBS	CH	2013-2020	since 11/2014	-	-
Unibail-Rodamco-Westfield	FR	2018-2020	-	02/2010-09/2019	Takeover of "Westfield" (AUS) in 06/2018
UniCredit	IT	2013-2020	-	08/1998-09/2016	-
Unilever Group	GB	2013-2020	since 09/2011	-	-
Vinci	FR	2013-2020	since 08/2016	since 09/2007	-
Vivendi	FR	2013-2020	-	since 08/1998	-
Vodafone	GB	2013-2020	since 09/1999	-	-
Volkswagen	DE	2013-2020	-	since 09/2011	-
Vonovia	DE	2015-2020	-	since 09/2020	Merger in 08/2015 of "Deutsche Annington" (DE) and "GAGFAH" (LU)
Zurich Insurance	CH	2013-2020	since 09/2010	-	-

Notes: Index time specification includes changes up until FY2020