"CARROTS FOR CORPORATE SUSTAINABILITY": IMPACTS OF INCENTIVE INCLUSIVENESS AND VARIETY ON ENVIRONMENTAL PERFORMANCE

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Abstract

In this paper we explore the role that managerial incentives play in improving corporate environmental performance finding that greater inclusiveness of incentive beneficiaries and greater variety of incentive types are important factors in firms' incentive schemes. Drawing on a large dataset of multinational enterprises our results suggest that generally including more beneficiaries from different levels within the corporate hierarchy and offering both monetary and non-monetary rewards are more likely to lead to reductions in corporate greenhouse gas emissions. Developing two principles of incentive design, *inclusiveness* and *variety*, and the conceptualization of patterns of these in organizations as *configurations of incentives*, our research contributes substantially to normative advice regarding the relative effectiveness of alternative systems of environmental incentives. Such an understanding of the potential of incentives is critical to informing how firms address complex problems such as sustainability in the context of increasingly extended organizational hierarchies and designs.

Keywords:

Corporate Environmental Performance; Incentives; Beneficiaries; Types; Hierarchies; Greenhouse Gas Emissions

"CARROTS FOR CORPORATE SUSTAINABILITY": IMPACTS OF INCENTIVE INCLUSIVENESS AND VARIETY ON ENVIRONMENTAL PERFORMANCE

A growing body of research examines companies' efforts to reduce their environmental impacts in general (Cordano and Frieze, 2000; Delmas and Toffel, 2008; Russo and Harrison, 2005), and specifically their carbon emissions (Jeswani et al., 2008; Kolk and Pinkse, 2005; Misani and Pogutz, 2015; Sprengel and Busch, 2011; Weinhofer and Hoffmann, 2010). Extant research often focuses on conceptualizing the influences on corporate environmental improvements (Vidal et al., 2015; Wassmer et al., 2014), or empirically exploring the role of (extra-)organizational factors, such as pressure from external stakeholders, firm size, industry sector, and corporate governance, in shaping environmental outcomes (Bansal, 2005; Bansal and Roth, 2000; Clarke and Crawford, 2012; Kock et al., 2012). In this context, a newly emerging stream of research addresses the merits of incentivizing the achievement of individual and organizational goals, especially where they relate to the improvement of environmental outcomes (Ioannou et al., 2016; Kolk and Perego, 2014; Maas, 2016; Maas and Rosendaal, 2016). This research draws upon well-established evidence regarding the effectiveness of motivating employees with goal-oriented rewards or performance improvement incentives (e.g., Bruce et al., 2005; Bloom and Milkovich, 1998; Gerhart et al., 2009; Tosi and Greckhamer, 2004).

However, much of the empirical research on the effects of incentives is either focused on the impact of providing incentives exclusively to the upper echelons within organizations (Bruce et al., 2005; Maas, 2016; Mishra and Gobeli, 1998; Tosi and Greckhamer, 2004), or to teams and individuals embedded within middle and lower layers of corporate hierarchies (Bloom and Milkovich, 1998; Knight et al., 2001). Similarly, in the context of corporate sustainability, studies have so far focused on incentives provided either to executives and

senior managers (e.g., Berrone and Gomez-Mejia, 2009; Ioannou et al., 2016; Kock et al., 2012; Kolk and Perego, 2014; Rodrigue et al., 2013) or to plant managers (Russo and Harrison, 2005). As a result, extant research largely investigates the impacts and effectiveness of incentives at distinct organizational levels rather than taking a holistic perspective on the presence, and types, of incentives across the layers of organizations. Thus, there is a lack of empirical research that takes a comprehensive view of the role of incentives in shaping environmental outcomes in organizations, often because of the limitations of the data available (Parisi, 2013; Wageman and Baker, 1997; Wellbourne et al., 1995). Additionally, research on environmental incentives often fails to distinguish between the forms and types of incentives introduced. Hence, while incentives for environmental improvement are increasingly popular in practice and the subject of a growing literature (Bashford, 2008; Fernandez et al. 2003; Renwick et al., 2014), there is to the best of our knowledge no comprehensive study that seeks to evaluate the impacts of environmental incentives on environmental outcomes by reflecting the variety of forms and beneficiaries of incentives being deployed in many contemporary organizations.

Therefore, in this paper we investigate the impact of incentives for improved organizational environmental performance by paying special attention to the observable variation in incentive design schemes across organizations, both in terms of the incentive beneficiaries and the forms that such incentives take. We conceptualize environmental performance incentives as organizational reward systems designed to stimulate and support employees' knowledge-sharing routines, information absorption, and skills transmission (Katsikeas et al., 2016) designed to reduce firms' physical impacts on the natural environment. Specifically, drawing on a large dataset of multinational enterprises we investigate the extent to which greater *inclusiveness of incentive beneficiaries* across different organizational levels and greater *variety of incentive types* help companies to reduce their

corporate carbon footprints, an area of environmental performance coming under increasing pressure from a range of stakeholders (Depoers et al., 2016; Howard-Grenville et al., 2014; Lee, 2012). By investigating the variety of existing incentive design schemes across organizations in which different actors receive incentives for improved environmental performance and distinguishing between financial and non-financial incentives, we characterize the possible *configuration(s) of incentive beneficiaries and incentive types* that arise in our sample, describe their empirical prevalence, and evaluate which configurations are linked to (the biggest) improvements in corporate environmental performance.

In so doing, we make two main contributions to research on the impacts of environmental incentives on environmental outcomes. First, we contribute the most comprehensive and large scale empirical evidence on the impacts of environmental incentives to date. Our analysis is unique in its focus on understanding how both the variety of organizational beneficiaries whose activities are shaped by environmental incentives, and the forms that such incentives take, shape organizational outcomes. Our new evidence is a significant development of research on how intra-organizational processes and practices impact on firms' non-financial performance metrics, such as reducing corporate GHG emissions (Ioannou et al., 2016; Maas, 2016; Parisi, 2013), and contributes substantially to normative advice regarding the relative effectiveness of alternative systems of environmental incentives. Given the growing salience of addressing global sustainability challenges, findings on the benefits of firms' voluntary approaches to tackling their environmental impacts will help to guide practice in this arena. Second, we contribute conceptually to research on the impacts of organizational incentives on performance outcomes through the development of two principles of hierarchical incentive design, *inclusiveness* and *variety*, and the conceptualization of patterns of these in organizations as *configurations of incentives*. We argue that conceptualizing organizational incentives in this way reflects the complexity of

patterns of incentives present in most contemporary organizations and advances theorization of incentive impacts beyond prior research, which has tended to examine specific forms of incentives at the individual level in isolation from the wider patterns of incentives present elsewhere within organizations. Thus, our analysis pays greater attention to the interdependencies in beneficiaries and incentive types that are incumbent in particular configurations of incentives, and on how these affect performance outcomes. Such an understanding of the potential of incentives is critical, we argue, to informing how firms address complex problems such as sustainability (Angus-Leppan et al., 2010; Delmas and Blass, 2010; Hahn et al., 2010; Pinkse and Kolk, 2010), in the context of increasingly extended organizational hierarchies and designs (Groves, 1973; Hrebiniak, 2008; Mookherjee, 2006; Mookherjee and Reichelstein, 2001; Parisi, 2013).

Conceptual Development and Hypotheses

Understanding how firms define and achieve performance improvements has been of long-standing interest to the management community as scholars and practitioners continue to grapple with the intricacies of measuring and motivating employees' behavior. Research in corporate governance, organizational behavior and human resource management literatures have provided frameworks and arguments for explaining and predicting how managers respond to incentives for the achievement of specific targets and objectives in terms of future performance improvements. Our focus lies with the organizational-level phenomena of firms providing incentives to their employees specifically linked to the attainment of corporate GHG emissions reduction targets. We develop a model that conceptualizes how both the existence and inclusiveness of the beneficiaries of environmental performance incentives, and the variety of incentives types offered, shape corporate environmental performance. Additionally, we conceptualize how the possible combinatorial configurations of

environmental performance incentive beneficiaries and types influence changes in corporate GHG emissions (figure 1). Our analysis therefore addresses three related questions: First, how does the inclusiveness of the beneficiaries of environmental incentives within an organization influence subsequent changes in environmental performance? Second, how does the variety of incentive types for environmental performance present in an organization influence subsequent changes in environmental performance? Third, how do configurations of incentive beneficiaries and types combine to influence changes in corporate environmental performance?

In the next section, we summarize extant literature relating to organizational incentives in the context of environmental performance, and specifically GHG emissions, before developing our hypotheses.

<<<Figure 1 about here>>>

Incentives and environmental improvements

Derived from agency theory, organizational research on incentives generally argues that incentives encourage desired outcomes by influencing task prioritization and goal commitment (Knight et al., 2001; Locke and Latham, 1990), and by aligning the interests of individuals with those of the whole organization, i.e. its owners (Berrone and Gomez-Mejia, 2009; Gerhart and Milkovich, 1990; Oyer, 2004; Tosi and Gomez-Mejia, 1989; Tosi et al., 1997). Promising additional financial and/or non-financial benefits in return for the delivery of pre-specified outcomes, incentives are designed to encourage organizational actors to provide additional effort and achieve greater productivity (Cadsby et al., 2007; Stajkovic and Luthans, 2001). A well-established literature has investigated the efficacy of incentive pay on agents' behavior in various organizational contexts by conducting experiments and secondary

data analyses. While agency-based compensation research by and large supports the notion that incentives *may* be useful for aligning the actions of agents with desired organizational outcomes (Baker et al., 1988; Cadsby et al., 2007; Gerhart et al., 2009; Gerhart and Milkovich, 1990; Knight et al., 2001; Stajkovic and Luthans, 2001; Tosi and Gomez-Mejia, 1989; Wageman and Baker, 1997), the principle of incentive pay for executives faces growing criticism: first, on moral grounds because of fairness concerns about the hierarchical difference between executives and employees (Harris, 2009), and second, as a result of opposing research findings challenging their efficacy for improving firm financial performance (e.g., Core et al., 1999; Mishra et al., 2000). Harris (2008), for example, argues that executive incentive pay is linked to financial misrepresentation which has been shown to lead to substantial value destruction. Pay-for-performance has also been criticized as potentially leading to excessive risk-taking, extreme intra-firm competition, the ignoring of performance measures not explicitly targeted, and gaming or manipulation of performance measures covered (Gerhart and Fang, 2015).

Environmental performance has been studied widely both by sustainability and finance scholars (e.g., Kim and Lyon, 2011, 2015; Lee and Lounsbury, 2015; Misani and Pogutz, 2015; Reid and Toffel, 2009). This research follows in the wake of a growing number of companies that are voluntarily beginning to take specific actions in relation to reducing their greenhouse gas emissions as part of wider climate change strategies, which have been characterized along different corporate climate strategy profiles (Kolk and Pinkse, 2005; Lee, 2012). For example, Weinhofer and Hoffmann (2010) found that while some utilities incorporate parallel emission management measures aimed at CO2 compensation, CO2 reduction and carbon independence, others were more selective in their approaches. Generally, these strategic moves tend to be established in response to volatile energy costs, companies' emissions profiles, regulatory exposure, competitive position, stakeholder

pressures, managerial and investor perceptions of the materiality of climate change, and the expectation of possible new policy measures at international and national levels designed to achieve global climate change ambitions (Busch and Hoffmann, 2007, 2011; Clarke and Crawford, 2012; Eccles et al., 2012; Guenther et al., 2012; Matisoff et al., 2013).

It has also been recognized that organizational responses to climate change require firms to develop detailed corporate carbon strategies, complementary capabilities for incremental or more radical innovations, and coping mechanisms for managing uncertainty and trade-offs (Pinkse and Kolk, 2010; Lee, 2012). In this context, prior research recognizes the challenging and complex nature of reducing firms' environmental footprints. For example, while some sustainability practices, such as eco-efficiency drives, might be "no brainers" (Salzmann et al., 2005, p.33), many others tend to be characterized by a need for significant up-front investment and highly uncertain returns and impacts (Marcus et al., 2011). Firms therefore need to decide how to justify and manage potential negative short-term versus positive long-term effects on financial performance from proactive climate change strategies, both for the benefit of their investors and their employees (Slawinski and Bansal, 2012; 2015; Slawinski et al., 2017; Delmas et al., 2015). Incentives may provide one means of overcoming the conflicting influence of a range of barriers in relation to achieving environmental outcomes (Norton et al., 2015). Consistent with the wider literature on the role of performance incentives, environmental performance incentives are argued to help reduce firms' corporate greenhouse gas emissions by stimulating the search for and implementation of operational and behavioral changes through dedicated and additional efforts across an organization (Alt et al., 2015). Providing incentives as part of a proactive environmental strategy (e.g., Buysse and Verbeke, 2003; Delgado-Ceballos et al., 2012; Delmas and Toffel, 2008) signals a long-term commitment to the specific outcome of environmental performance

improvement to all stakeholders (Jones, 1995), and thus legitimizes prioritization of decisions directly contributing to this goal.

Inclusiveness of environmental incentives and environmental performance

Having considered the effects of providing environmental performance incentives to reduce corporate carbon footprints, we now turn our attention to their particular implementation within organizations. We begin by examining the role and impact of different incentive beneficiaries across an organization to performance outcomes, given their potentially varied effects in circumstances requiring broad organizational collaboration and support. We define the *inclusiveness* of environmental incentives in an organization as the degree to which more, rather than fewer, levels of the organizational hierarchy face incentives for improved environmental performance. Specifically, the inclusiveness of a system of environmental incentives relates to how widespread environmental incentives are within an organization, and what range of organizational actors have their behavior potentially influenced by incentives. We propose that greater inclusiveness of incentive beneficiaries leads to greater alignment across different hierarchical levels that strengthen organizational decision-making and operational coordination processes.

From a theoretical perspective, agency theory, or perhaps more appropriately 'double-agency theory' (Child and Rodrigues 2003; Deutsch et al., 2010), suggests that incentives should not only apply to the key agents at the top of an organization, but to all levels within a given hierarchy to provide the greatest possible form of alignment with the interests of the principal. One counterargument to the possible benefits of greater inclusiveness of incentive beneficiaries comes from research highlighting the potentially distracting and distorting impacts caused by tournament effects and perceptions of status differentials that reduce efficient information processing and coordination of effort (Baker et al., 1988*;* Rubenfeld and

David, 2006; Siegel and Hambrick, 2005). Another key issue is whether organizational performance improvements can be attributed to the actions and behaviors of individual employees benefiting from incentives (Gerhart et al., 2009; Siemsen et al., 2007). For example, beyond the challenges of monitoring and enforcing agents' behavior, employee incentive schemes across (particularly large) organizations are argued to lead to free-riding when employees can potentially share the rewards from improvements in joint output without necessarily having to make greater efforts themselves (Alchian and Demsetz, 1972; Wageman and Baker, 1997). Knez and Simester's (2001) findings at Continental Airlines suggest that mutual monitoring among employees within work groups may help with mitigating such effects. Broadly speaking, however, greater inclusiveness of incentive beneficiaries across different hierarchical levels is argued to increase the likelihood of achieving specific goals that are consistent across the organization (Groves, 1973; Mookherjee, 2006; Mookherjee and Reichelstein, 2001; Wellbourne et al., 1995).

This view acknowledges the role that all employees play in successfully affecting and executing the strategy formulated by top executives (Hrebiniak, 2008) and resonates with discussions in the 'strategy-as-practice' literature, which argue that particularly middle managers and frontline employees are embedded in micro-contexts that interact with wider macro-level influences (Godkin, 2015; Jarzabkowski, 2004). Consequently, employees' responses to environmental challenges may be significantly shaped by factors outside the organization such as interactions with the local community (Rothenberg, 2003). This provides opportunities for adaptive practice, dialogue and learning. Particularly in pluralistic contexts such as climate change characterized by divergent goals, strategizing and organizing practices and processes within organizations requires approaches that draw on the multiplicity of knowledge and interactions from all employees (Jarzabkowski and Fenton, 2006). In this case, including a wider range of incentive beneficiaries across the

organizational hierarchy creates a consistent and fair framework while providing sufficient flexibility for a multitude of potential responses.

Turning to the specific case of firms' GHG emissions, there is a recognition that performance improvements (i.e., emissions reductions) require significant efforts across a company's different sites, processes, supply chains, product design teams and individual behaviors (Gulati et al., 2005; Russo and Harrison, 2005). Consequently, improving the distributed and plural nature and causes of corporate environmental performance can only be achieved through collaborative efforts and involvement of all employees (Gittell et al., 2010; Ramus and Steger, 2000; Siemsen et al., 2007), requiring efforts such as knowledge sharing, cross-functional innovation and other forms of team production (Bartol and Srivastava, 2002; Denton, 1999; Ramus, 2001). This argument acknowledges that a wide range of employee actions play a role in promoting sustainable outcomes (Ones and Dilchert, 2012). Reducing a firm's carbon footprint necessitates behavioral changes among all employees as well as key decision taken by managers and executives with functional and strategic responsibility. As a result, incentives are unlikely to achieve their intended outcomes unless they are applied broadly by including the goals and efforts of all those both directly and indirectly affected by the decision-making and innovation processes (Baker, 1988; Wageman and Baker, 1997). Incentive inclusiveness then relates to the broadening of the number of beneficiaries at different levels within the corporate hierarchy by coherently incentivizing the reduction of corporate GHG emissions through greater task interdependence and team production (Kathuria et al., 2007; Parisi, 2013). We therefore hypothesize that the more firms provide incentives to a wider, more inclusive set of beneficiaries, the more likely they are to witness environmental performance improvements:

Hypothesis 1 (H1): Firms with more inclusive environmental performance incentives will exhibit greater improvements in corporate environmental performance than firms with less inclusive environmental performance incentives.

Variety of environmental incentives and environmental performance

Having considered the inclusiveness of environmental performance incentives, in the next step we examine how the variety of types of incentives offered has any bearing on environmental performance improvement. Specifically, we distinguish between monetary and non-monetary incentives and argue that employees' underlying motivations, and the way in which these are incentivized and rewarded, are likely to affect organizational outcomes.

Existing research on environmental performance incentives is concerned with rewards in return for specified pro-environmental outcomes (e.g., Ioannou et al., 2016; Kolk and Perego, 2014; Maas, 2016; Maas and Rosendaal, 2016; Rodrigue et al., 2013; Russo and Harrison 2005; Theyel, 2000) which tend to be designed either around executive remuneration (e.g., bonus payments, stock options, etc.) or increasingly innovative managerial and employee incentive schemes (e.g., recognition awards, pay raises, promotions, rewards, prizes, position performance appraisals, tax exemptions, access to low-carbon corporate car fleet, paid vacations, time off, gift certificates, opportunities to attend sustainability events/rallies, daily praise) (Renwick et al., 2013). The literature around the effects of environmental reward and incentive schemes and environmental performance has been repeatedly summarized in various reviews (Bashford, 2008; Fernandez et al. 2003; Renwick et al., 2014) but to date provides predominantly empirical evidence at the executive level. Here, Berrone and Gomez-Mejia (2009) showed that long-term pay has a positive and highly significant impact on subsequent pollution prevention performance and is greater for firms operating in the highest-pollution sectors. Meanwhile, Kock et al. (2012) found that

firms providing greater market-based compensation to their CEOs show a superior level of environmental performance. They argue that equity-based incentives geared towards maximizing long-term value create these effects by aligning managers' interests closer to those of stakeholders and by providing stakeholders with a greater ability to enforce their environmental preferences through activism, for example, through media reporting of environmental news. Rodrigue et al. (2013) also identified environmental incentives in executive compensation as having some positive impact on subsequent pollution prevention performance. Studying the inverse relationship, Cordeiro and Sarkis (2008) showed that CEO compensation is only affected by corporate environmental performance in firms with an explicit linkage between environmental performance and executive contracts. Ioannou et al. (2016) found that in the context of achieving carbon emission reduction projects, the provision of monetary incentives to top and middle managers may undermine the positive effect of target difficulty on performance. Below the upper echelons, research into the effectiveness of financial incentives is mainly concerned with establishing their existence (Theyel, 2000). Russo and Harrison's (2005) research remains the most prominent exception, finding a link between plant manager compensation and reduced emissions, and arguing that "incentives help shifting managerial attention to environmental issues" (p.590). Yet Katsikeas et al.'s (2016) survey with UK senior managers could not find a significant impact of environmental performance incentives on eco-friendly product development strategies.

In terms of non-financial performance incentives, the human resource management literature, both academic and non-academic, has written extensively about the characteristics, advantages and disadvantages of employing such schemes (e.g., Luthans and Stajkovic, 1999; McKinsey, 2009; Monitor, 2014), highlighting in particular the importance of strong employee-supervisor relationships: "It is ironic, that many non-financial recognition schemes are often simply concerned with attempting to remind managers that there are things they

should be doing as part of good management practice anyway, regardless of any scheme" (IES, 2004, p.14). Yet benefits of employing non-financial performance incentives include encouraging strategic behaviors; cost efficiency; immediacy of impact; employer branding; retention; and high street credibility. Disadvantages meanwhile may pertain to the value of the scheme; the need for a credible assessment process; cultural fit; tax and small print; fraudulent nominations; maintaining momentum; and potentially negative impacts from wider economic conditions (IES, 2004).

Regarding the effects of non-monetary environmental performance incentives extant literature focuses on their existence and the identification of the multitude of forms they exhibit (Renwick et al., 2013). Non-financial incentives also tend to be covered as part of a wider debate on the elements of proactive environmental management strategies in general (Buysse and Verbeke, 2003; Delgado-Ceballos et al., 2012; Delmas and Toffel, 2008; Lucas, 2010). Research insights again suggest that key to the effectiveness of these schemes is the degree to which they are widely supported by the organization, and whether they encourage communications across different levels within the organizational hierarchy and stimulate innovation, creativity and learning (Ramus, 2001; Ramus and Steger, 2000; Temminck et al., 2015).

Theoretically, research on incentives is heavily underpinned by insights into the role played by individual motivations for engaging in specific activities and making extra effort available. Important in this context is the difference between extrinsic and intrinsic motivations whereby "[i]ntrinsic motivation is the motivation to do something for its own sake, for the sheer enjoyment of a task. Extrinsic motivation is the motivation to do something in order to attain some external goal or meet some externally imposed constraint" (Hennessey et al., 2015, p.1). Prior literature, for example, has distinguished between "required" or "task-based" sustainability behaviors (Norton et al., 2015; Bissing-Olson et al.,

2012), such as complying with organizational policies, changing work practices to select more sustainable alternatives, and creating sustainable products, services, and processes, and "voluntary" aspects of employee sustainability behavior, such as prioritizing environmental interests, initiating environmental programs and policies, lobbying and activism, and encouraging others to behave more sustainably. One important question is whether the attainment of corporate carbon targets can be achieved through "voluntary" aspects of employee behavior only, or whether they necessitate corporate demands for "required" behaviors as well.

In this context, research on motivating "pro-social" (doing good) employee behavior suggests that monetary incentives (i.e. extrinsic rewards) are more likely to be counterproductive because they crowd out individuals' desire to create a positive image among their peers (Ariely et al., 2007; Gneezy et al., 2011). Particularly when behaviors and rewards are made public, monetary incentives can undermine the effectiveness of employees' intrinsic motivations to be seen as doing something good, e.g., reducing carbon emissions. For example, investigations into pro-environmental behaviors suggest that employees' attitude towards food waste or pollution prevention depend on their intrinsic (even altruistic and private) motivations (Cecere et al., 2014) as well as their attitudes, knowledge, beliefs and other preferences (Cordano and Frieze, 2000; Kollmuss and Agyeman, 2002). Findings from a literature review on pro-environmental behavior in the workplace therefore corroborate the mostly significant effects of non-monetary incentives (Inoue and Alfaro-Barrantes, 2015).

By contrast, decoupling organizational growth from underlying carbon emissions in almost all industries requires major strategic adjustments (Howard-Grenville et al., 2014; Slawinski and Bansal, 2012; 2015) that will unlikely be achieved by relying on employees' voluntary commitments only. There is therefore a strong need to institutionalize "required" or

"task-based" sustainability behaviors if the organization is serious about its carbon target commitments (Ioannou et al., 2016; Maas, 2016; Maas and Rosendaal, 2016). Moreover, not all individuals may be intrinsically motivated to be pro-environmental, particularly when there might be countervailing pressures and imperatives, or a lack of supervisory support (Kollmuss and Agyeman, 2002; Ramus and Steger, 2000). Given that in many companies environmental salience remains generally lower than other core functional objectives (Gabel and Desgagné, 1993), achieving environmental progress requires people to change how they do things and "go the extra mile" (Lothe et al., 1999; Ramus, 2001). It is for these reasons that monetary incentives are more likely to increase the general strategic salience of achieving carbon targets, create organizational cultures and conditions conducive to overcoming organizational barriers, and encourage extrinsically motivated types of behaviors.

We therefore argue that the best outcomes are more likely to be expected in organizational contexts characterized by a wider provision of a variety of incentive types. In other words, while both monetary and non-monetary incentives are likely to affect organizational outcomes separately, firms providing both types of incentives should additively benefit from the biggest performance effects (Peterson and Luthans, 2006). As in H1, we argue that the challenges involved in reducing corporate carbon footprints require a wide range of actors and activities and so we would expect that both financial and non-financial incentive types are needed to promote pro-environmental behaviors from employees that are motivated by either extrinsic or intrinsic motivations (Ramus, 2001). In that sense, by offering a variety of complementary incentive types firms account for the multitude of task environments within which significant individual decisions need to be made.

Hypothesis 2 (H2): *Firms with more varied environmental incentives will exhibit greater improvements in corporate environmental performance than firms with less varied environmental incentives*

Configurations of environmental incentives and environmental performance

Finally, having considered the respective benefits of incentive beneficiaries and incentive types, we turn our attention to the question of which combination(s) of these elements most likely have the biggest impacts. To that end, we consider the possibility of firms configuring specific combinations of incentive beneficiaries and incentive types, characterize differences and similarities in their approaches, and hypothesize their respective effectiveness. Given our hypotheses 1 and 2, the most logical extension is a configuration characterized by the greatest possible degree of *inclusiveness* in terms of incentive beneficiaries and the presence of the biggest *variety* of incentive types. Yet while greater inclusion of incentive beneficiaries and a greater variety of incentive types may be conceptually superior when treated in isolation, it is also important to recognize potential trade-offs when both elements are considered simultaneously.

For example, in the case of specifying inter-hierarchical incentives, mixing monetary and non-monetary incentives across different beneficiaries may create perceptions of unfairness and incoherence (Harris, 2009) and can lead to incentive conflict and other undesired effects on behavior (Gneezy et al., 2011; Gulati et al., 2005). There may thus be a need for incentive alignment (Tosi et al., 1997) and the strengthening of reward interdependence across different beneficiaries in a manner that is not perceived as symbolic (Wageman and Baker, 1997). For instance, it should not matter whether all beneficiaries are being offered monetary incentives, non-monetary incentives, or both, provided the same type

of incentive applies to all hierarchies. Doing so would ensure that the incentive scheme is both inclusive and consistent.

A key counterargument, however, is that people in different hierarchical positions may be motivated differently, e.g., executives may be driven more by extrinsic motivations and rewards to achieve carbon reduction targets, than perhaps employees at lower levels, who might perceive of pro-environmental behaviors as intrinsically worth doing and where thus non-financial rewards may be more appropriate. This is effectively an argument for ensuring incentive types offered fit the respective underlying motivations of employees at different organizational levels and in different task environments without necessarily crowding out particularly intrinsic motivations (Baker et al., 1988; Ariely et al., 2007; Gneezy et al., 2011; IES, 2004). Given our assertion that addressing corporate carbon targets entails significantly challenging and complex strategic adjustments that cannot simply be addressed through voluntary extra-efforts, we argue that some degree of inconsistency from providing intrinsic, non-monetary rewards while offering extrinsic, monetary rewards to other beneficiaries, will be unavoidable, and indeed necessary. Firms that include incentives for the broadest number of beneficiaries, and do so by offering a wide choice of incentive types to each and all of these beneficiaries, should theoretically see the biggest benefits in terms of environmental performance improvements. We therefore hypothesize:

Hypothesis 3 (H3): *Firms with greater inclusiveness of environmental incentive beneficiaries and with a greater variety in terms of the types of incentives offered to these beneficiaries will exhibit the biggest improvements in corporate environmental performance.*

Methods

Sample

For our sample we draw on data provided by the CDP, formerly known as the Carbon Disclosure Project. The CDP initiative, led by a consortium of over 822 institutional investors with cumulatively over US$95 trillion of assets under investment, seeks improvements into the transparency and management of environmental issues through the largest collection globally of self-reported climate change, water and forest-risk data among leading global companies (CDP, 2015). Since 2002 the CDP has invited the largest companies in the world to provide data and details through its annual survey on companies' greenhouse gas emissions, climate change risks and opportunities, and management strategies in relation to environmental performance. By providing summary reports of firms' responses to the questionnaire on the CDP website the initiative is seeking to drive transparency and disclosure in relation to environmental management and performance with the aim to shape investor and buyer decision-making. Despite the voluntary nature of the CDP's annual survey the levels of participation (by both firms and institutional investors), information disclosure, and the depth of information requested by the CDP have all grown substantially over time. In 2014, the latest year for which data were available to us, 82% of the FT Global 500, the largest companies by market capitalization included in the FTSE Global Equity Index Series, participated in the CDP, and in total over 4,500 companies from around 50 different countries disclosed detailed information regarding their environmental management and performance.

As a result, CDP data are increasingly gathering attention in existing research. Examples include studies aimed at determining the effect of shareholder resolutions and other stakeholder pressures on firms responding to the CDP survey in the first place (and thus disclosing corporate GHG emission levels) (Guenther et al., 2012; Reid and Toffel, 2009), examinations of the development of the CDP reporting mechanism from governance and

standardization perspectives (Kolk et al., 2008; Matisoff et al., 2013), analyses of multinational corporations' political strategies with respect to climate change (Kolk and Pinkse, 2007, 2008), a study on the relationship between firms' carbon intensity and financial performance (Misani and Pogutz, 2015) and assessments of stock market reactions to disclosing climate change strategies (Kim and Lyon, 2011). Other studies use the CDP data to classify different types of greenhouse gas emissions strategies on the basis of cluster analyses (Kolk and Pinkse, 2005; Weinhofer and Hoffmann, 2010).

We sample from the overall CDP data by including a total of 3,117 firm-year observations between 2011 and 2014. Our sample is restricted by the following considerations. First, we concentrate our attention on those companies that have actively provided information in their survey response about the presence or absence of climate change incentives within their firms. We do so first because not all survey respondent firms disclose information at this level of detail; many that do provide this information, however, are willing to admit they do not have incentives in place. By choosing this sampling frame we seek to ensure that only active disclosure of incentive information is included in our sample rather than indirectly inferred. Second, 2011 survey data provide the first set of responses that include incentive data in a format which has since then remained consistent. This provides some assurance that a more standardized definition of emissions incentives has been applied. It also enables us to test the impact of incentive presence on subsequent emissions performance. We marry this sample of incentives data with CDP data on corporate GHG emissions as well as with financial control data from Thomson Reuters Datastream.

Dependent Variable and Modelling Approach

Measurement of firms' carbon footprints is a complex and information-intensive process characterized by the presence of multiple approaches and competing evaluation methodologies. A primary distinction is made in most research on firms' greenhouse gas emissions between direct (or "Scope 1" emissions) and indirect emissions (or "Scope 2" emissions). Direct emissions stem from activities immediately controlled or owned by the reporting firm (for example, from on-site production processes, direct use of fossil fuels in boilers and furnaces, and in-house power generation), and indirect emissions arise from the firms' use of purchased energy, normally electricity. A third category of emissions (Scope 3 emissions) encompasses emissions deriving chiefly from a firm's supply chain (i.e. carbon and other greenhouse gases embodied in procured goods and services), from business travel, and that associated with external distribution (WBSCD/WRI, 2011). Since Scope 3 emissions are harder to evaluate and measure accurately, and because their disclosure is non-mandatory within the CDP, these data are more patchy and less reliable (Huang et al., 2009). Therefore, consistent with earlier studies that have drawn upon CDP data, we use the total sum of scope 1 and scope 2 emissions to capture a firm's carbon footprint in a given year.

In common with many studies of corporate environmental performance, we calculate the annual percentage of change in firms' absolute GHG emissions for our measure of corporate environmental performance. We focus on an absolute rather than intensity based measure because in our international sample this would, for example, require the inclusion of financial performance metrics such as turnover or profits which are typically accounted for in national currencies. To complete intensity calculations, we would need to incorporate exchange rate data, but given their fluctuation over time this would introduce variability not caused by the underlying core data but by varying exchange rates. Alternative suggestions for intensity-based measures include using operational factors, such as forms of output (e.g., kWh, revenue-passenger-kilometers, or square meters) and number of employees. Given the

large variety of industries covered in our sample, however, such sector-specific or at least sector-biased approaches towards measuring performance on an intensity basis are highly skewed making comparison unreliable. Finally, we also argue that climate change is in the end a global problem whereby the eventual climatic pathways will be driven by total absolute emissions added to the atmosphere over time. Therefore, for firms to make substantial performance improvements in the context of climate change their emissions need to decouple from operational growth and thus decline in absolute terms (Figge et al., 2014; Slawinski et al., 2017; Young and Tilley, 2006).

We also focus on the percentage improvement in firms' GHG emissions, rather than a comparison of levels, to help strengthening the causal logic of our modelling and to overcome sample selection issues. Sample selection issues are endemic in studies of environmental reporting, performance, and disclosure because firm characteristics (including size, industry and, most importantly, prior environmental footprint) shape firms' decisions to participate in environmental initiatives as well as their performance in relation to environmental pollutants. Prior research has demonstrated that typically the best (in the sense of least environmentally impactful) and worst (in the sense of most environmentally impactful) firms are more prone to engage with environmental issues since these companies have either good news to celebrate or legitimacy concerns to address. These selection effects mean that associations between the levels of firms' environmental impacts and characteristics that are at least somewhat stable over time are biased and potentially misleading. For example, one might identify a strong positive association between the presence of environmental incentives and the level of firms' emissions (and even their subsequent emissions); this seems somewhat paradoxical until one controls for the greater tendency for firms with larger emissions to allocate specific responsibility to overseeing the firms' improvements in this arena (Russo and Harrison, 2005). Evaluating the influences on the

changes in firms' environmental performance is one way of eliminating possible selection effects. To further strengthening the causal inferences we make, we introduce a one year lag into our model – so, for example, percentage emissions changes over the period 2011-2012 are assumed to relate to a firm's presence of emissions incentives reported in 2011.

Due to the presence of a number of outliers, we Winsorize our dependent variable (the % change in firms' total GHG emissions) at the top and bottom 5% (Le and O'Brien, 2010). Rather than eliminating significant outliers Winsorizing involves the substitution of the values for the largest and smallest 5% of the sample (in terms of environmental performance) with the value of the last observation at the 95^{th} % and 5^{th} % limits, respectively. This process thus has the benefit of retaining the complete set of sample data and removing the effects of potentially distractive outliers. The downside to the process is that it somewhat mutes the effects of very large and small observations in subsequent analyses and also introduces new data that are themselves derived from the sample, thus introducing a degree of circularity into the dataset. For the purposes of this research, however, we are satisfied that this process provides an adequate way to overcome the distortion of extreme values.

Independent Variables

One fascinating aspect of the annual CDP research stems from the survey's exploration of how firms manage, strategize, organize, and incentivize their climate change efforts. Consequently, we draw on a key section of the CDP questionnaire to investigate whether climate change incentives effectively improve environmental performance or not. We use these data to construct a series of dichotomous variables that capture significant aspects of the presence of incentives across firm-year observations. We begin with firms that have implemented any kind of incentive for climate change management including the attainment

of emissions reduction targets; these are coded one for the incentive implementation, and zero otherwise (*Any Incentive*).

Incentive Inclusiveness. Furthermore, the CDP survey asks respondents to disclose the beneficiary of their firms' incentives. These beneficiaries are pre-coded into a series of 16 groups of beneficiaries plus an open-ended category for "other". We summarize these data by recoding them into a series of binary variables by differentiating between incentives for the top team; for middle management; and for all employees. Since companies can provide incentives to more than one level at the same time, we develop seven dichotomous variables designed to accurately classify the degree of inclusiveness of incentive beneficiaries at the firm-year level. These mutually-exclusive variables illustrate the increasing inclusiveness of beneficiaries provided with incentives across the sample (*TopLevelOnly*; *MiddleLevelOnly*; *AllEmployeesOnly*; *TopAndMiddle*; *TopAndAllEmployees*; *MiddleAndAllEmployees*; and *All3Levels*). For example, the variable *All3Levels* accounts for firms providing environmental performance incentives to all levels within the corporate hierarchy. For each variable, 1 indicates the presence of incentives for the named category of beneficiaries, and 0 its absence.

Incentive Type. In addition to the incentive beneficiary, CDP respondents are also asked to provide information on the type of incentive offered. These responses again come in three original forms plus an "other" category. We simplify these responses by re-recoding them into monetary and non-monetary incentives. To account for the possibility of firms offering both or either types of incentives, we create three mutually-exclusive binary variables of incentive types (*MonetaryOnly*; *NonMonetaryOnly*; *BothTypes*).

Combinatorial configurations. Recognizing that firms employ a variety of incentive schemes, we calculate a further set of binary variables which accurately assign a particular configuration of incentive beneficiaries and incentive types to every firm year. In other

words, we seek to classify every firm by one mutually-exclusive configuration which uniquely describes the complete incentive scheme it operates. To achieve this, we create binary variables for the 63 possible combinatorial configurations, each taking the value of 1 where this configuration applies and 0 where it does not (see details below).

Control Variables

In addition to our variables of interest, we control for a number of firm characteristics that have been hypothesized to influence firm environmental responsiveness (Berrone and Gomez-Mejia, 2009; Cordeiro and Sarkis, 2008; Delmas et al., 2015). These include country (captured here through the inclusion of a series of country fixed effects variables); industry sector (captured through the inclusion of a series of 2-digit SIC fixed effects variables); year (captured through the inclusion of a series of year fixed effects variables); firm size (captured by the natural logarithm of the number of employees); prior financial performance ROTA (captured by the ratio of pre-tax profits to total assets); leverage (captured by the ratio of total debt to total assets); and R&D intensity (captured by the ratio of R&D expenses to total assets). To assess whether our sample suffers from problems related to multi-collinearity we calculate the variance inflation factor (VIF) for each variable as part of our analysis. We found that no variable had a VIF greater than 3.3, which is below the threshold of 10 suggested as indicative of multi-collinearity problems (Belsley et al., 1980). Tables 1 and 2, below, provides an overview of the descriptive statistics of our sample and a correlation matrix.

<<<Tables 1 and 2 about here>>>

From visual inspection it becomes obvious that the seven variations of incentive beneficiaries are roughly equally distributed across the sample in terms of their frequencies, and that most firms either rely on monetary incentives only or on a combination of monetary and non-monetary incentives. Finally, not all of the 63 possible configurations are represented in our sample; the combinations "Top and Middle only – Money only" (n=274) and "Middle only – Money only" (n=260) are the two most widely employed configurations of incentive beneficiaries and types. By contrast, the combination "All3Levels – Both", i.e. a configuration whereby all three levels within the corporate hierarchy are provided with both monetary and non-monetary incentives is present only in 14 firm-years.

Model Estimation

Tests of our hypotheses 1-3 were conducted using OLS regression based on the model in Expression (1), whereby we first began with a base model which only includes control variables (model 1) (table 3), then a non-hypothesized regression testing the general effectiveness of incentives (*AnyIncentive*) (model 2), followed by two separate successive regressions that include different forms of incentive inclusiveness *TopLevelOnly; MiddleLevelOnly; AllEmployeesOnly; TopAndMiddle; TopAndAllEmployees; MiddleAndAllEmployees; and All3Levels* (model 3); and incentive types *MonetaryOnly*; *NonMonetaryOnly*; *BothTypes* (model 4). Next, model 5 (table 4) first combines all forms of incentive inclusiveness and types, before we add all 63 possible combinatorial configurations (model 6). Finally, model 7 only includes the ten statistically significant combinatorial configurations identified from results in model 6 (details in the next section).

(I) Change in environmental performance = b0 + b1(*Incentive specifications*) + b2(*Firm Size*) + b3(*R&D Intensity*) + b4(*Leverage*) + b5(*ROTA*) + b6(*Country*) + b7(*Industry*) + b8(*Year*) + error

Findings

In the following section we describe the results of our regression analyses as detailed in tables 3 and 4 below. Model 1 illustrates our base model which includes industry, country and year fixed effects as well as our four financial control variables. It suggests that firms with greater returns on assets (ROTA) are significantly, though only marginally, associated with increases in subsequent corporate GHG emissions, reflecting the difficulties of decoupling economic growth from environmental performance. We then introduce an independent variable, the presence of incentives for corporate GHG emissions reductions (model 2) and find that firms with incentives in place are weakly associated with reductions in emissions, though this effect appears not be statistically significant.

Next, we turn our attention to the inclusiveness of incentives provided across organizational hierarchies. To do so we enter seven independent binary variables characterizing the presence of incentives for different beneficiaries and combinations thereof within the organization (model 3). The results suggest that almost all incentives offered to different levels and combinations within the corporate hierarchy are broadly negatively associated with subsequent GHG emissions changes, but only when incentives are provided to all beneficiaries in the organization do these negative effects become significant ($p<0.05$). Moreover, the negative coefficient for the independent variable distinguishing between firms with incentives for all hierarchical levels and those without any incentives (-2.665) is the largest of all the seven possible forms of inclusiveness, and larger also than the negative coefficient for the general incentive effect only (-0.75). These findings therefore lend support to our first hypothesis (H1) predicting that greater inclusiveness in environmental performance incentives, that is, a larger number of hierarchical levels incentivized, affects improvements in environmental performance.

In the next step, we differentiate our analysis by including only the type of incentive offered as our independent variables (model 4). Results again suggest that all three possible forms of incentive type are associated with reductions in GHG emissions, but that only broad inclusiveness, i.e. the simultaneous provision, of both monetary and non-monetary incentives yields the biggest and significant improvements in environmental performance ($p<0.05$). This lends support to our second hypothesis (H2) arguing that firms offering a broader variety of incentive types are associated with improvements in environmental performance.

<<<Table 3 about here>>>

Finally, we investigate the extent to which specific configurations combining both incentive beneficiaries and incentive types affect environmental performance. To do so, we first calculate a model which includes all previous seven forms of incentive beneficiaries plus the three variations of incentive types. Combining these independent variables we find that none of them are statistically significant (model 5). In other words, the simultaneous, but disaggregated analysis of incentive inclusiveness and variety leads to effects that appear to cancel each other out. We therefore decide to drill deeper into the combinations and effects of incentive beneficiaries and types.

To do so, we enter all 63 mutually-exclusive incentive configurations to this model. For the sake of clarity, we report only the results from incentive configurations that are statistically significant (model 6) finding ten such configurations are associated with reductions in GHG emissions. We also observe r-square increasing from 0.085 (model 5) to 0.101 (model 6), suggesting an increase in explanatory power of our model 6 with all incentive configurations included, yet as the F-test results indicate, this change in r-square between models 5 and 6 is not statistically significant.

We therefore re-run a similar model 7 as a robustness test; this time, however, we include only the ten configurations that were identified in model 6 as being significant (rather than all possible 63 permutations). Results are largely identical in direction and strength, even if slightly less, or in two cases no longer ("TopMoneyMiddleNonMoney" and "MiddleMoneyAllEmplBoth"), statistically significant. Crucially, however, comparing our models 5 and 7, we still observe an increase in r-square from 0.085 to 0.094 and a statistically significant F change (2.856; p=0.002). This lends strength to our third hypothesis arguing that understanding configurations of incentive inclusiveness and type is important in the context of environmental performance improvements. The ten significant combinations of incentive configurations identified in model 6 are, sorted alphabetically:

- "All Employees Only – Both" (-13.550; p<0.01) (n=120)
- "All Employees Only – Money Only" (-10.386; p<0.01) (n=200)
- "All Employees Only – Non Money Only" (-13.946; p<0.01) (n=144)
- "Middle – Both, All Employees – Non Money" (-20.529; p<0.05) (n=17)
- "Middle – Money, All Employees – Both" (-14.666; p<0.01) (n=24)
- "Middle – Non Money, All Employees – Money" (-21.568; p<0.05) (n=8)
- "Middle Only – Non Money Only" (-11.843; p<0.05) (n=64)
- "Top – Money, Middle – Non Money" (-14.295; p<0.01) (n=11)
- "Top – Non Money, Middle – Money" (-20.591; p<0.01) (n=19)
- "Top And Middle Only – Non Money Only" (-16.198; p<0.05) (n=21)

Based on the prevalence of different configurations of incentive beneficiaries and types across these results listed above, we broadly identify four patterns: First, a group of incentive configurations designed for all employees within the organization, whereby incentive types can be financial, non-financial, or both. In all three cases, however, the types are consistently

the same for all employees within the organization. In the second group, we find incentives provided to middle management in combination with all employees. Here the types of incentives vary displaying heterogeneity with regard to financial and non-financial rewards. A third, single configuration provides only middle management with non-financial rewards. Finally, the fourth configurational group provides incentives to both top and middle management levels in the organizational hierarchy. Again we find interesting variation in terms of incentive types with only the last configuration providing consistently non-financial rewards to both hierarchical levels. We discuss the implications of our results in the next section.

<<<Table 4 about here>>>

Discussion

In this paper, we investigated the role that organizational incentive schemes play in improving corporate environmental performance. Drawing on a large dataset of multinational enterprises we explored the extent to which incentives help companies with reducing their corporate carbon footprints, an area of environmental performance facing significant attention (Howard-Grenville et al., 2014). Specifically, we explored whether inclusiveness of incentive beneficiaries at different organizational levels and variety of incentive types play a role in terms of their effects on promoting organizational outcomes.

Empirically, our results provide support for our hypotheses, suggesting that greater inclusiveness of incentive beneficiaries and offering a greater variety of incentive types are associated with significant environmental performance improvements. Particularly firms that include a wide range of incentive beneficiaries from different hierarchical levels, and those that include both monetary and non-monetary incentive types, witness subsequent short-term

reductions in GHG emissions. Further combining these analyses by studying the combinatorial effects of unique configurations, we find that ten specific incentive schemes are associated with significant improvements in environmental performance. All of these ten configurations include at least two beneficiaries from different levels in the corporate hierarchy within their schemes underlining the importance of inter-hierarchical inclusiveness. This is achieved by providing incentives either to all employees, or to two distinct hierarchical levels. We also find that incentives specifically for middle managers are central to seven of these configurations confirming the pivotal, boundary-spanning role (Rothenberg, 2003; 2007) these managers play in transmitting and responding to corporate carbon targets.

Finally, our third hypothesis stressed the need for inclusiveness and variety in incentive arrangements. We find that five of the ten significant configurations mix and match both financial and non-financial incentives across at least two different levels of beneficiaries included, thus lending support to our hypothesis 3. This suggests that concerns about unfairness and incoherence (Harris, 2009), incentive conflict and other undesired effects on behavior (Gneezy et al., 2011; Gulati et al., 2005) appear to be unfounded in this context; rather our results appear to strengthen arguments for ensuring incentive types offered fit a variety of underlying motivations and contexts at different organizational levels (Ariely et al., 2007; Baker et al., 1988; Gerhart et al., 2009; Gneezy et al., 2011; IES, 2004). This is particularly supported by the fact that non-monetary incentives implicitly appear to play an important role in nine of these configurations, thus providing support for the need to recognize and reward intrinsic motivations as well. Three combinations also offer both types of incentives to their beneficiaries simultaneously suggesting that crowding out effects may not necessarily be a concern when it comes to stimulating the search for ways to reduce corporate carbon emissions. As such, our findings encourage practitioners tasked with improving their firms' environmental performance to go beyond mechanistic, organizational

processes such as environmental management systems and implement far-reaching incentive systems that encourage all employees to search for and execute more environmentally-sensitive operational models.

Theoretically, our research also contributes to recent reflections on the value of a 'double-agency theory' (Child and Rodrigues 2003; Deutsch et al., 2010) suggesting that incentives should not only apply to the key agents at the top of an organization, but essentially to all levels within the corporate hierarchy to provide the greatest possible form of alignment with the interests of the principal. In our case, there is thus an implicit assumption that executives implement and disseminate incentives across the organization because firstly they believe in the importance of reducing GHG emissions, ultimately to the benefit of the owners/principal. Secondly, this view also acknowledges the role that all employees play in successfully executing the strategy formulated by top executives (Hrebiniak, 2008; Temminck et al., 2015) and therefore that rewards for the achievement of specific goals need to include all levels within the corporate hierarchy to be successful (Groves, 1973; Mookherjee, 2006; Mookherjee and Reichelstein, 2001). Particularly when faced with complex organizational challenges such as reducing corporate carbon footprints, our findings add to the literature emphasizing the need for knowledge sharing, collaboration and other forms of team production among all employees (Bartol and Srivastava, 2002; Denton, 1999; Gittell et al., 2010; Ramus and Steger, 2000; Ramus, 2001; Siemsen et al., 2007). Greater inclusiveness of incentive beneficiaries provided to all levels within the corporate hierarchy therefore sends a powerful signal that efforts need to be made across the entire organization and that they cannot merely be imposed "top-down" or compartmentalized in special organizational functions.

In our analyses, we were interested in the positive effects of incentives and as such we only found results in support of our hypothesized effects in terms of environmental

performance improvements. None of the results showed statistically significant increases in emissions following specific incentive configurations suggesting that incentives generally work. Our data, however, did not allow us to examine any potential side-effects caused by the presence of incentives, for example, whether they increased internal rivalry or led to the neglect of other performance measures. We also focused our studies on the effects of corporate carbon footprints and therefore cannot assess whether other forms of environmental performance improvement might not be better served by other managerial practices (cf., Katsikeas et al., 2016). In that sense, our research was shaped by the overall complexity involved in decarbonizing organizational processes and the role that effective team production and individual motivations play. Our research was also naturally limited by data availability and selection bias inherent in the voluntary nature of the data collection process and the slowly-emerging standardization. At the same, this particular data source enabled us to test specific hypotheses regarding the efficacy of incentives across an organization, data which otherwise tend to be difficult to be obtained. Our hope is that with growing plans to make non-financial data reporting mandatary more and better data will become available and assist in retesting our hypotheses. Finally, owing to the slowly growing data availability our measurement of firm environmental performance was significantly limited to short-term, i.e. one-year, impacts. In order to ascertain longevity of the effects identified in our research future studies would benefit from investigating their persistency in medium-term time frames.

Conclusion

In this paper we explored the role that managerial incentives play in improving corporate environmental performance finding that greater inclusiveness of incentive beneficiaries and greater variety incentive types are important factors in firms' incentive schemes. Drawing on a large dataset of multinational enterprises our results suggest that generally including more

beneficiaries from different levels within the corporate hierarchy and offering both monetary and non-monetary rewards are more likely to lead to reductions in corporate greenhouse gas emissions. Our findings thus pave the way for future research delving deeper into firms' underlying motivations and justifications for specific incentive configurations. They also call for a better understanding of how exactly incentives interact with beneficiaries at different levels, taking into account their respective types. Are there differences depending on industry, country or type of firm ownership? What actual behaviors and actions do incentives encourage? Are these effects enduring or do they diminish? How do employees perceive and act on environmental performance incentives compared to other organizational priorities? Are there any internal conflicts of interest emerging? What other (sustainability) contexts might benefit from incentives? Pursuing some or all of these questions should provide both scholars and practitioners with valuable insights that extend the well-established body of literature on the role of incentives in organizations.

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Appendix

Table 1: Means for firm level control variables, incentives and environmental performance

	N	Min	Max	Mean	Std Dev.	Count 0	Count 1
Environmental Performance	3117	-30.56	71.97	0.10	15.86		
Firm size	3101	12.27	21.75	16.51	1.67		
R&D Intensity	3117	0.00	33.99	1.56	3.28		
Leverage	3100	0.00	114.19	19.16	14.25		
ROTA	3101	-121.61	94.97	6.47	8.82		
Any Incentive	3117	0	1	0.688	0.463	972	2145
TopLevelOnly	3117	0	1	0.06	0.236	2932	185
MiddleLevelOnly	3117	0	1	0.12	0.321	2753	364
AllEmployeesOnly	3117	0	1	0.15	0.36	2640	477
TopAndMiddle	3117	0	1	0.13	0.333	2722	395
TopAndAllEmpl	3117	0	1	0.03	0.182	3010	107
MiddleAndAllEmpl	3117	0	1	0.07	0.25	2909	208
All3Levels	3117	0	1	0.09	0.289	2830	287
MonetaryOnly	3117	0	1	0.33	0.471	2079	1038
NonMonetaryOnly	3117	0	1	0.09	0.285	2839	278
BothTypes	3117	0	1	0.25	0.435	2329	788
TopOnlyMoney	3117	0	1	0.05	0.213	2969	148
TopOnlyNonMoney	3117	0	1	0.01	0.087	3093	24
TopOnlyBoth	3117	0	1	0	0.054	3108	9
MiddleOnlyMoney	3117	0	1	0.08	0.277	2857	260
MiddleOnlyNonMoney	3117	0	1	0.02	0.142	3053	64
MiddleOnlyBoth	3117	0	1	0.01	0.104	3083	34
AllEmployeesOnlyMoney	3117	0	1	0.06	0.245	2917	200
AllEmployeesOnlyNonMoney	3117	0	1	0.05	0.21	2973	144
AllEmployeesOnlyBoth	3117	0	1	0.04	0.192	2997	120
TopAndMiddleOnlyMoney	3117	0	1	0.09	0.283	2843	274
TopAndMiddleOnlyNonMoney	3117	0	1	0.01	0.082	3096	21
TopAndMiddleOnlyBoth	3117	0	1	0	0.067	3103	14
TopAndAllEmployeesOnlyMoney	3117	0	1	0.01	0.099	3086	31
TopAndAllEmployeesOnlyNonMoney	3117	0	1	0	0.031	3114	3
TopAndAllEmployeesOnlyBoth	3117	0	1	0	0.031	3114	3
MiddleAndAllEmployeesOnlyMoney	3117	0	1	0.01	0.089	3092	25
MiddleAndAllEmployeesOnlyNonMoney	3117	0	1	0.01	0.091	3091	26
MiddleAndAllEmployeesOnlyBoth	3117	0	1	0	0.044	3111	6
All3LevelsMoney	3117	0	1	0.02	0.129	3064	53
All3LevelsNonMoney	3117	0	1	0	0.059	3106	11
All3LevelsBoth	3117	0	1	0	0.067	3103	14
TopMoneyMiddleNonMoney	3117	0	1	0	0.059	3106	11
TopNonMoneyMiddleMoney	3117	0	1	0.01	0.078	3098	19
TopBothMiddleNonMoney	3117	0	1	0	0.036	3113	4
TopBothMiddleMoney	3117	0	1	0	0.057	3107	10
TopMoneyMiddleBoth	3117	0	1	0.01	0.093	3090	27
TopNonMoneyMiddleBoth	3117	0	1	0	0.057	3107	10
MiddleMoneyAllEmployeesNonMoney	3117	0	1	0.03	0.163	3032	85
MiddleNonMoneyAllEmployeesMoney	3117	0	1	0	0.051	3109	8
MiddleBothAllEmployeesNonMoney	3117	0	1	0.01	0.074	3100	17
MiddleBothAllEmployeesMoney	3117	0	1	0	0.054	3108	9
MiddleMoneyAllEmployeesBoth	3117	0	1	0.01	0.087	3093	24
MiddleNonMoneyAllEmployeesBoth	3117	0	1	0	0.04	3112	5
TopMoneyAllEmployeesNonMoney	3117	0	1	0.01	0.101	3085	32
TopNonMoneyAllEmployeesMoney	3117	0	1	0	0.036	3113	4
TopBothAllEmployeesNonMoney	3117	0	1	0	0.018	3116	1
TopBothAllEmployeesMoney	3117	0	1	0	0.018	3116	1
TopMoneyAllEmployeesBoth	3117	0	1	0.01	0.094	3089	28
TopNonMoneyAllEmployeesBoth	3117	0	1	0	0.025	3115	2
TopMoneyMiddleMoneyAllEmployeesNonMoney	3117	0	1	0.03	0.17	3024	93
TopMoneyMiddleMoneyAllEmployeesBoth	3117	0	1	0.01	0.111	3078	39
TopMoneyMiddleNonMoneyAllEmployeesMoney	3117	0	1	0	0.018	3116	1
TopMoneyMiddleNonMoneyAllEmployeesNonMoney	3117	0	1	0	0.031	3114	3
TopMoneyMiddleNonMoneyAllEmployeesBoth	3117	0	1	0	0.025	3115	2
TopMoneyMiddleBothAllEmployeesMoney	3117	0	1	0	0.025	3115	2
TopMoneyMiddleBothAllEmployeesNonMoney	3117	0	1	0	0.059	3106	11
TopMoneyMiddleBothAllEmployeesBoth	3117	0	1	0	0.04	3112	5
TopNonMoneyMiddleMoneyAllEmployeesMoney	3117	0	1	0	0.025	3115	2
TopNonMoneyMiddleMoneyAllEmployeesNonMoney	3117	0	1	0	0.025	3115	2
TopNonMoneyMiddleMoneyAllEmployeesBoth	3117	0	0	0	0	3117	0
TopNonMoneyMiddleNonMoneyAllEmployeesMoney	3117	0	1	0	0.025	3115	2
TopNonMoneyMiddleNonMoneyAllEmployeesBoth	3117	0	0	0	0	3117	0
TopNonMoneyMiddleBothAllEmployeesMoney	3117	0	1	0	0.031	3114	3
TopNonMoneyMiddleBothAllEmployeesNonMoney	3117	0	1	0	0.036	3113	4
TopNonMoneyMiddleBothAllEmployeesBoth	3117	0	0	0	0	3117	0
TopBothMiddleMoneyAllEmployeesMoney	3117	0	1	0	0.036	3113	4
TopBothMiddleMoneyAllEmployeesNonMoney	3117	0	1	0	0.062	3105	12
TopBothMiddleMoneyAllEmployeesBoth	3117	0	1	0	0.018	3116	1
TopBothMiddleNonMoneyAllEmployeesMoney	3117	0	1	0	0.018	3116	1
TopBothMiddleNonMoneyAllEmployeesNonMoney	3117	0	0	0	0	3117	0
TopBothMiddleNonMoneyAllEmployeesBoth	3117	0	0	0	0	3117	0
TopBothMiddleBothAllEmployeesMoney	3117	0	1	0	0.018	3116	1
TopBothMiddleBothAllEmployeesNonMoney	3117	0	1	0	0.059	3106	11

Table 2: Correlations among key variables

Pearson Correlations	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Environmental Performance	1												
2 Firm size	-.036*	1											
3 R&D Intensity	0.026	-.100**	1										
4 Leverage	-.050**	-0.017	-.158**	1									
5 ROTA	.070**	-.164**	.078**	-.145**	1								
6 Any Incentive	-0.025	.148**	.063**	.073**	-0.003	1							
7 TopLevelOnly	0.018	-0.028	-0.004	-0.006	-0.009	.185**	1						
8 MiddleLevelOnly	-0.008	.039*	-0.032	.065**	-0.018	.267**	-.091**	1					
9 AllEmployeesOnly	0.018	0.009	.092**	-0.026	-0.028	.313**	-.107**	-.155**	1				
10 TopAndMiddle	-0.023	.047**	-0.018	.041*	.051**	.280**	-.096**	-.139**	-.162**	1			
11 TopAndAllEmployees	-0.001	.038*	0.003	0.019	-0.035	.139**	-.047**	-.069**	-.080**	-.072**	1		
12 MiddleAndAllEmployees	0.006	.061**	.051**	-.039*	0.023	.197**	-.067**	-.097**	-.114**	-.102**	-.050**	1	
13 All3Levels	-.047**	.082**	0.003	.061**	0.002	.234**	-.080**	-.116**	-.135**	-.121**	-.060**	-.085**	1
14 MonetaryOnly	-0.01	.039*	-0.002	.051**	-0.012	.387**	.237**	.260**	.059**	.261**	-0.017	-.126**	-.098**
15 NonMonetaryOnly	0.009	-0.032	.045*	0.006	-0.01	.197**	0.031	.089**	.245**	-.048**	-.040*	0.034	-.053**
16 BothTypes	-0.032	.159**	0.031	0.026	0.014	.405**	-.115**	-.090**	.058**	0.027	.186**	.312**	.371**
17 TopAndMiddleOnlyMoney	-0.015	.049**	-0.019	.047**	.044*	.228**	-.078**	-.113**	-.132**	.805**	-.059**	-.083**	-.087**
18 MiddleOnlyMoney	0.008	0.032	-0.022	.063**	-0.008	.222**	-.076**	.822**	-.128**	-.108**	-.057**	-.081**	-.096**
19 AllEmployeesOnlyMoney	0.007	-0.014	0.028	-.040*	-.040*	.193**	-.066**	-.095**	.616**	-.100**	-.049**	-.070**	-.083**
20 TopOnlyMoney	0.007	-0.019	0.002	0.003	-0.012	.164**	.863**	-.081**	-.095**	-.071**	-.042*	-.060**	-.066**
21 AllEmployeesOnlyNonMoney	0.004	-0.029	.074**	-0.004	0.004	.162**	-.055**	-.080**	.501**	-.084**	-0.033	-.047**	-.065**
22 AllEmployeesOnlyBoth	0	.064**	.045*	-0.004	-0.006	.147**	-.050**	-.073**	.461**	-.076**	-0.029	-.047**	-.064**
23 TopMoneyMiddleMoneyAllEmployeesNonMoney	-0.028	.057**	-0.013	.046*	-0.023	.129**	-.044*	-.064**	-.075**	-.067**	-0.033	-.047**	.551**
24 MiddleMoneyAllEmployeesNonMoney	0.002	.060**	0.008	-.043*	-0.019	.123**	-.042*	-.061**	-.071**	-.064**	-0.032	.618**	-.047**
25 MiddleOnlyNonMoney	-0.029	0.009	-0.025	0.031	-0.033	.106**	-.036*	.391**	-.062**	-.048**	-0.027	-.039*	-.046*
26 All3LevelsMoney	-0.026	0.027	0.023	-0.003	0.019	.097**	-0.033	-.048**	-.056**	-.050**	-0.025	-.035*	.413**

Pearson Correlations	14	15	16	17	18	19	20	21	22	23	24	25	26
14 MonetaryOnly	1												
15 NonMonetaryOnly	-.221**	1											
16 BothTypes	-.411**	-.182**	1										
17 TopAndMiddleOnlyMoney	.398**	-.097**	-.136**	1									
18 MiddleOnlyMoney	.392**	-.094**	-.138**	-.094**	1								
19 AllEmployeesOnlyMoney	.337**	-.082**	-.116**	-.081**	-.079**	1							
20 TopOnlyMoney	.316**	-.070**	-.130**	-.069**	-.067**	-.058**	1						
21 AllEmployeesOnlyNonMoney	-.156**	.601**	-.061**	-.068**	-.066**	-.058**	-.049**	1					
22 AllEmployeesOnlyBoth	-.141**	-.063**	.344**	-.062**	-.060**	-.052**	-.045*	-.044*	1				
23 TopMoneyMiddleMoneyAllEmployeesNonMoney	-.124**	-.055**	.301**	-.054**	-.053**	-.046*	-.039*	-.039*	-0.035	1			
24 MiddleMoneyAllEmployeesNonMoney	-.118**	-.052**	.288**	-.052**	-.051**	-.044*	-.037*	-.037*	-0.034	-0.029	1		
25 MiddleOnlyNonMoney	-.102**	.423**	-.058**	-.045*	-.044*	-.038*	-0.032	-0.032	-0.029	-0.025	-0.024	1	
26 All3LevelsMoney	.170**	-.041*	-.059**	-.041*	-.040*	-0.034	-0.029	-0.029	-0.026	-0.023	-0.022	-0.019	1

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

NB: For simplicity this table only includes the ten most frequent forms of incentive configurations present in the sample

Table 3: Regression analysis results for incentive main effects

DV: Environmental Performance	**1** *Base Model*			**2** *Any Incentives*			**3** *Incentive Hierarchy*			**4** *Incentive Type*		
	B	Sig.	Std. Error	B	Sig.	Std. Error	B	Sig.	Std. Error	B	Sig.	Std. Error
Firm size	-0.072		0.203	0.128		0.280	0.217		0.282	0.208		0.282
R&D Intensity	-0.154		0.110	0.014		0.153	0.022		0.153	0.016		0.153
Leverage	-0.022		0.020	-0.041		0.027	-0.039		0.027	-0.040		0.027
ROTA	0.081	***	0.027	0.111	***	0.039	0.111	***	0.039	0.113	***	0.039
Any Incentives				-0.75		0.695						
TopLevelOnly							1.112		1.302			
MiddleLevelOnly							-0.504		1.027			
AllEmployeesOnly							-0.547		0.954			
TopAndMiddle							-1.288		1.030			
TopAndAllEmployees							-1.469		1.689			
MiddleAndAllEmployees							-0.516		1.285			
All3Levels							-2.665	**	1.163			
MonetaryOnly										-0.908		0.776
NonMonetaryOnly										-0.506		1.129
BothTypes										-1.841	**	0.862
Constant	YES			YES			YES			YES		
Industry	YES			YES			YES			YES		
Country	YES			YES			YES			YES		
Year	YES			YES			YES			YES		
N	3117			3117			3117			3117		
R Square	0.046			0.082			0.084			0.083		

Significance levels: *** p<0.01; **p<0.05; *p<0.1

Table 4: Regression analysis results for incentive configuration effects

DV: Environmental Performance	**5**			**6**			**7**		
	Incentive Hierarchy & Type			*Incentive Configurations*			*Incentive Configurations*		
	B	Sig.	Std. Error	B	Sig.	Std. Error	B	Sig.	Std. Error
Firm size	0.265		0.284	0.224		0.289	0.243		0.284
R&D Intensity	0.023		0.153	0.050		0.155	0.024		0.154
Leverage	-0.038		0.027	-0.041		0.028	-0.038		0.027
ROTA	0.112	***	0.040	0.108	***	0.040	0.108	***	0.039
TopLevelOnly	2.491		1.708	-0.990		4.948	1.682		1.737
MiddleLevelOnly	0.932		1.531	3.849		4.820	1.119		1.617
AllEmployeesOnly	0.913		1.477	9.898	***	3.551	7.894	**	3.256
TopAndMiddle	0.26		1.54	4.126		11.788	0.347		1.614
TopAndAllEmployees	0.237		2.071	10.874		7.638	-1.011		2.100
MiddleAndAllEmployees	1.223		1.795	8.142		5.228	0.778		1.939
All3Levels	-0.922		1.693	5.072		5.684	-2.503		1.751
MonetaryOnly	-1.725		1.377	-0.775		1.653	-1.279		1.438
NonMonetaryOnly	-1.369		1.644	4.135		2.981	2.491		2.121
BothTypes	-2.2		1.539	1.886		2.326	-0.231		1.650
MiddleOnlyNonMoneyOnly				-11.843	**	5.868	-7.553	***	2.761
AllEmplOnlyMoneyOnly				-10.386	***	3.979	-7.878	**	3.546
AllEmplOnlyNonMoneyOnly				-13.946	***	4.628	-10.134	***	3.787
AllEmplOnlyBoth				-13.550	***	4.411	-9.448	**	3.662
TopAndMiddleOnlyNonMoneyOnly				-16.198	**	6.932	-6.911	*	4.096
TopMoneyMiddleNonMoney				-14.295	*	7.493	-4.368		4.995
TopNonMoneyMiddleMoney				-20.591	***	6.775	-10.681	***	3.877
MiddleNonMoneyAllEmplMoney				-21.568	**	9.739	-9.464	**	5.734
MiddleBothAllEmplNonMoney				-20.529	**	8.885	-8.323	**	4.107
MiddleMoneyAllEmplBoth				-14.666	*	8.626	-2.586		3.549
plus 53 other configurations				*not signficant*			*not included*		
Constant	YES			YES			YES		
Industry	YES			YES			YES		
Country	YES			YES			YES		
Year	YES			YES			YES		
N	3117			3117			3117		
R Square	0.085			0.101			0.094		
Change in R Square				(models 5 & 6) 0.017			(models 5 & 7) 0.09		
F Change				0.922			2.856		
Significance in F Change				0.643			0.002		

Significance levels: *** p<0.01; **p<0.05; *p<0.1

Figure 1: Corporate environmental performance incentive framework