TOWARDS THE NATURAL ENVIRONMENT AGENCY THEORY (NEAT)

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ABSTRACT

Drawing on insights from theories in management, economics, finance, and accounting, we develop the natural environment agency theory (NEAT) to study the agency relation between business and society in the context of natural environment. Based on public property rights to clean air, water, and land, we argue that a business (agent) has an implicit contract with society (principal). Under this contract, it agrees not to impose on society natural environmental agency costs (NEACs) of pollution, depletion, and degradation while producing and selling goods/services in return for its license to operate. Drawing on stakeholder and agency related concepts, we propose and test the effectiveness of NEAC-reducing mechanisms, including monitoring, bonding, and incentives. We find support for NEAT predictions. Our findings open novel directions for future research and inform policy and practice.

Keywords:

agency theory; stakeholder theory; natural environment; corporate social responsibility; environmental performance; environmental disclosures

"There is no future for business as usual – we are reaching irreversible tipping points for nature and climate, and over half of the global GDP, $44 trillion, is potentially threatened by nature loss" (WEF, 2020, p. 8)

INTRODUCTION

The state of the natural environment today poses a key threat as well as an immense opportunity for business. While half of the world's GDP is threatened by nature loss, a people- and nature-positive business scenario has the potential to generate up to $10.1 trillion in annual business value and could create up to 395 million jobs by 2030 (WEF, 2020). Burning of fossil fuels coupled with unbridled use of other natural resources has powered the economic growth that many societies have enjoyed for centuries. However, it has also resulted in immense natural environmental pollution, depletion, and subsequent degradation. Due to such costs not being fully accounted for, the true costs of production and resource consumption have also been grossly underestimated.[1] From a firm's point of view, such hidden environmental costs and consequences have long been considered externalities – the costs of which have rarely been internalized (hence, the "tragedy of the commons"; Burger & Gochfeld, 1998; Hardin, 1968).[2]

While the 'commons' problem stems from absent property rights (Arrow, 1971), or absence of assertion of these rights, societal stakeholders are now increasingly recognizing and exercising their public property rights to clean, healthy, and sustainable natural environment

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[1] For example, while the food, land, and ocean use system represent around $10 trillion of GDP (i.e., 12 percent of global GDP), the enormous strain that this puts on the planetary boundaries, impacting 80 percent of all (near) threatened species, leads to hidden costs of such food, land, and ocean use to be around $12 trillion (WEF, 2020).

[2] This negligence and the resulting problems of natural environmental degradation and depletion are well articulated by Alchian and Demsetz (1972, p. 792): *"When a durable resource is used it will have a marginal product and a depreciation. Its use requires payment to cover at least use-induced depreciation. (…) Careless use is more likely than careful use if one does not pay for the greater depreciation."*

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through environmental regulators like Environmental Protection Agency (EPA) and NGOs, like Greenpeace, Marine Stewardship Council, Rainforest Alliance, and many others. There is also growing impetus around the world for developing environmental reporting standards, e.g., through bodies such as Global Reporting Initiative (GRI), the International Sustainability Standards Board (ISSB), or European Financial Reporting Advisory Group (EFRAG).

Scholars in management, economics, and other fields have studied issues related to natural environment resource use for decades (e.g., Arrow et al., 2004; Dasgupta & Heal, 1974; Hart, 1995; Heal, 1998). However, extant literature suffers from major shortcomings. First, it does not adequately recognize overexploitation of natural resources by businesses and the resultant pollution and degradation of environment as signs of socially inefficient contracting of natural resource use between business and society/stakeholders (e.g., Jones, 1995). Even when this contract is recognized, management literature has tended to refer to it in a generalized manner (e.g., Hill & Jones, 1992), without developing in any specific detail the behavioral implications of this contract for both business and society, including its various stakeholder groups. Second, existing management theories linking business and natural environment are predominantly firm-/manager-centric and tend to consider the natural environment and/or the societal stakeholders to be rather passive recipients of firm/managerial behavior (e.g., Driscoll & Starik, 2004; Hart, 1995; Hörisch, Freeman, & Schaltegger, 2014; Phillips & Reichart, 2000). Third, consistent with the generally normative underpinnings of the various versions of stakeholder theory, many theoretical arguments for firm environmental sustainability management tend to rely heavily on strong normative foundations and assumptions (Hörisch et al., 2014). The natural environment agency theory (NEAT) we develop in this paper addresses all these limitations. First, by articulating the natural environmental contract between business

and society, our theory explicitly considers natural environmental pollution, depletion, and degradation as signs of socially inefficient contracting of natural resource use between business and society, labelling these as natural environment agency costs (NEACs). Second, by formally acknowledging the common ownership of the natural environment by society and the active assertion of its ensuing property rights, NEAT departs from on the firm-centric perspectives currently prevalent in the relevant management literature. Finally, by drawing on the public property rights-based arguments, our theory does not impose assumptions of ethical considerations driving firm behavior.

In developing NEAT, we draw on key insights from the work of Alchian and Demsetz (1972), Arrow (1985), Pratt and Zeckhauser (1985), and Hill and Jones (1992) and adopt a positive theory of agency approach (Jensen, 1983). We argue that when it comes to the production and supply of goods and services that society needs and is willing to pay for, business can be seen as the agent and society as the principal.[3] Based on the agency theoretic nexus of contracts view of the firm (Hill & Jones, 1992; Jensen & Meckling, 1976) and drawing on public property rights to clean air, water, and land, we argue that a business (agent) enters an implicit contract with society whereby it agrees not to pollute or degrade the publicly owned natural environmental resources (commons) in the course of the production and sale of its goods and services. In turn, society implicitly provides business with what we generally call the license to operate. However, in the process of their profit pursuit, businesses can (and often do) violate this environmental contract. Businesses impose negative externalities like air, water, or land pollution, depletion, and degradation (collectively labeled NEACs) upon society. Society may

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[3] This view is consistent with Pratt and Zeckhauser's (1985; p. 2) definition that "[w]*henever one individual* (or party) *depends on the action of another, an agency relationship arises. The individual taking the action is called the agent. The affected party is the principal".*

then demand remedial action, i.e., demand business internalize its NEACs. In the worst case, society can revoke the license to operate, thus jeopardizing the very survival of a business.

We propose three mechanisms that can mitigate NEACs, i.e., bonding, monitoring, and incentives. Bonding works via the firm's (costly) environmental commitment actions, such as responsible environmental behavior (environmental performance) as well the communication of such past, current, and future behavior (i.e., environmental disclosures). Monitoring works via scrutiny by various societal stakeholders (principals) such as media, environmental NGOs, security analysts, and institutional shareholders (whose interests in the context of natural environment may not be aligned with managers). Incentives could be managerial incentives, e.g., compensation tied to the natural environment related performance indicators, or firm incentives, e.g., environmental awards. Based on NEAT we predict that environmental commitment (bonding), although potentially costly for the firm, reduces NEACs, resulting in improved stakeholder relations and cooperation, and consequently improved financial performance and reduced risks. Monitoring and incentives facilitate stronger environmental commitment.

Our study makes several theoretical contributions. First, the natural resource-based view of the firm (NRBV, Hart, 1995; Hart & Dowell, 2011) has been a highly influential theory in explaining how firms can develop *internal* strategies and capabilities in relation to the natural environment (seen as a key strategic challenge) that can lead to competitive advantages. However, NRBV considers both the natural environment and the stakeholders to be rather passive recipients of firm strategy. Today neither are. Not only is the natural environment changing (with increased frequency of hurricanes, storms, heat waves, forest fires, floods, and droughts spurred by climate change), but society (and its specific constituents) is also actively monitoring and shaping firm strategy and behavior and NEAT fully recognizes it.

Second, while environmental externalities (e.g., pollution) have long been recognized in welfare economics, NEAT is the first that identifies these as NEACs and articulates why it is in the rational interest of business to internalize these, and even move beyond pollution abatement and prevention to reverse environmental degradation via measures such as decarbonization, reforestation, and other natural environment replenishment and restoration measures. NEAT proposes an economic rationale for such a result, which does not hinge on ethical assumptions required by other theories (Hörisch, et al., 2014; Laplume, Sonpar, & Litz, 2008).

Third, drawing on the insights of stakeholder agency theory by Hill and Jones (1992), we extend the scope of the agency theory developed in the context of relations between a public firm and its shareholders (Jensen and Meckling, 1976) and adapt it to understand the relation between business and society in the context of the natural environment. By doing so, we also address the call by Zingales (2000) postulating the extension of the remit of theories of the firm to cover various implicit contracts that businesses are subject to.[4] Thus, we extend the remit of agency explanations for corporate sustainability beyond its internal determinants identified by prior literature (Aguinis & Glavas, 2012; Bénabou & Tirole, 2010; Krüger, 2015). We also illustrate that 'doing well by doing good' strategy could be rationalized within an agency-theoretic setting.

Fourth, NEAT demonstrates how governance mechanisms (i.e., bonding, monitoring, and incentives) theorized in a more traditional agency setting could be invoked to tackle NEACs and ensure that the implicit contract between the parties is honored and restored.

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[4] Such a call was also echoed by Boatright (2002; p. 1841) who asks for a "*fully developed contractual theory of the firm* [that] *would provide a complete analysis of the relations of all contractors with a firm and not merely those of shareholders*".

Finally, we also make an empirical contribution as we test the predictions resulting from NEAT for US publicly listed firms employing a structural equation modelling (SEM) framework. Our results provide strong support for NEAT-derived hypotheses.

CONCEPTUAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

Background Literature and Its Limitations

Scholars have long seen the strategic response of business to societal stakeholders' interests, as a potential source of competitive advantage. Freeman (1984) formally developed the stakeholder approach to strategic management, elaborating how effective management of various stakeholder relations could be in the strategic long-term interest of a firm. This led to the development of the stakeholder theory invoked by scholars in a variety of fields to rationalize and explain different types of responsibilities of business/managers to its various stakeholders.

Within strategic management literature, stakeholder theory has often been combined with other theories, including agency theory, to acknowledge the contractual relations and understand expectational conflicts that may exist between business managers and various stakeholders including shareholders, employees, suppliers, customers, and environmentalists, among others (e.g., Asher, Mahoney, & Mahoney, 2005; Barney, 2018; Hill & Jones, 1992). It has also been invoked to argue that the natural environment is itself a stakeholder (Driscoll & Starik, 2004; Phillips & Reichart, 2000) and more recently has been applied to identify challenges for managing stakeholder relationships for business sustainability, defined in all three of economic, social, and environmental terms (Hörisch, et al., 2014). To sum up, while stakeholder theory has often been invoked in the context of social and environmental business responsibility, this is

largely done within the broader concept of CSR, with its focus being predominantly on ethics-based firm/managerial behavior.

. In the specific context of the strategic approach to natural environment, the commonly invoked theory is the adaptation of the resource-based theory that Hart (1995) developed in the context of natural environment. This natural resource-based view (NRBV) explains how a firm can attain sustainable competitive advantage by developing natural environment related firm capabilities focusing on three strategies, i.e., pollution prevention, product stewardship, and sustainable development. The NRBV has been influential in guiding research on the link between business and environment in a variety of fields, including strategic management (e.g., Dowell, Hart, & Yeung, 2000; Hart, 1995; Russo & Fouts, 1997; Waddock & Graves, 1997) and accounting (e.g., Al-Tuwaijri, Christensen, & Hughes, 2004; Clarkson, Li, Richardson, & Vasvari, 2011; Qiu, Shaukat, & Tharyan, 2016). However, NRBV focuses primarily on the firm's internal capabilities related to natural environment (Hart, 1995; Hart and Dowell, 2011), thus regarding only the firm as an active player in the environmental arena. With unprecedented rise in flooding, hurricanes, droughts, storms as well as unprecedented land, air, and water pollution, depletion, and consequent degradation (e.g., in the form of biodiversity loss, eco-system imbalances deforestation, desertification, and ocean acidification), society is becoming increasingly aware of its common ownership of air, water, and land, and is taking concrete actions to hold businesses accountable for its use. There is thus a need for a theory like ours that formally acknowledges this common ownership of the natural environment and its economics-based contractual implications for both business and societal behavior.

Moreover, while NRBV recognizes resource constraints posed by natural environment (Hart, 1995), it fails to acknowledge adverse changes to natural environment caused by business

activities. Specifically, physical environmental resource constraints can no longer be considered fixed. They need to be viewed in a dynamic manner as physical risks to business operations (e.g., water scarcity) continue to rise with the progressing level of environmental depletion and degradation.

Scholars have also theorized about determinants of companies' (voluntary) environmental disclosures. These are argued to be either attempts by firms to gain investor confidence and approval (as per voluntary disclosure theory, e.g., Clarkson, Li, Richardson, & Vasvari, 2008) or to gain societal approval and license to operate, i.e., social legitimacy (e.g., Cho & Patten, 2007; Patten, 1992, 2002). While the former explanation is aligned with arguments of instrumental stakeholder theory, the latter view is more consistent with arguments of normative stakeholder theory. However, both voluntary disclosure and legitimacy theoretical views again focus mainly on the supply side of business environmental responsibility, i.e., explain why a firm should undertake the provision of environmental reporting while failing to clearly identify and articulate the demand-side factors including the expectations of societal stakeholders – a gap we address in this paper.

Finally, prior literature often explains and/or presents empirical evidence for determinants and/or consequences of environmental performance (e.g., Dowell et al., 2000; Russo & Fouts, 1997; Shaukat, Qiu, & Trojanowski, 2016) or of environmental disclosure (Cho & Patten, 2007; Clarkson et al., 2008; Patten 2002; Qiu et al., 2016), but not both. In contrast, we adopt a more holistic view of firm environmental commitments which encompasses both.

The Natural Environment Agency Theory (NEAT): Motivation and Outline

Agency theory and the implications of the contractual relationship between agent and principal have been studied in a variety of disciplines including business studies, economics, political science, and law, among others (e.g., Arrow, 1985; Eisenhardt, 1989; Jensen, 1983; Jensen and Meckling, 1976; Fama, 1980; Fama & Jensen, 1983). In the field of business studies, this relation has largely been examined within the context of the firm and the providers of financial capital particularly the shareholders (Fama, 1980; Fama & Jensen, 1983; Jensen & Meckling, 1976). While Jensen and Meckling (1976) view the firm as "*a nexus of contracts*" between the firm and "*the owners of labor, material, and capital inputs and the consumers of output*" (*ibidem*), they as well as most of the others to date, focus on the relation between the firm (agent) and financial capital providers (principals), in particular shareholders. In this tradition, CSR (including environmental responsibility) is usually seen simply as a manifestation of managerial agency problems inside the firm and, hence, problematic (e.g., Bénabou & Tirole, 2010; Krüger, 2015). In other words, socially responsible firms are seen as suffering from agency problems, whereby managers engage in CSR activities that benefit managers themselves (what we may call the 'green glow') at the expense of shareholders.

More recently scholars in business studies have noted the need to extend and examine the implications of the agency theory and of the nexus of contracts view of the firm (both implicit and explicit) beyond the shareholder-firm relation (Hill & Jones, 1992; Zingales, 2000). We respond to this call. Specifically, we draw on the elements of the agency theory (i.e., principals, agents, agency conflicts, agency costs, information asymmetry, bonding, incentives, and monitoring mechanisms); economic theory (i.e., property rights, market failure, and negative

externalities); and accounting theory (i.e., proprietary information, public interest, corporate disclosure, signaling, and accountability) to develop and study the agency relation between the firm (and its managers, the corporate board and its owners/shareholders, all of whom we collectively regard as agents, as they share the common interest of maximizing firm profits on behalf of shareholders) and society. Our view of agents is consistent with that taken by Arrow (1985), Pratt and Zeckhauser (1985), and Sjåfjell (2018) who consider managers, board, and shareholders as 'agents' who make decisions on behalf of principals, i.e., other stakeholders of a corporation, including the people and the natural environment. In the words of Arrow (1984, p. 4): "[a]*lthough it may seem an odd use of language, one has to consider the damager as the agent and the damaged as the principal. Again, in pollution control, society may be regarded as the principal, and the polluter, whose actions cannot be fully monitored, as the agent.*"

We consider society and its various constituents, such as environmental regulators, consumers, environmental activists, as principals (as they depend on actions of businesses for provision of goods/services) and as the owners of publicly shared natural resources, like clean air, water, and land. Like Hill and Jones (1992), we do not explicitly model (partly) divergent interests of various societal stakeholders and hence do not develop a multi-principal model. Instead, in the interest of tractability, we focus on "aggregate" societal preferences, which could reasonably be expected to be nature positive.

We argue that there exists an implicit and incomplete 'natural environmental contract' between the business and society: the business (agent) in its pursuit of profits shall keep intact/not violate the fundamental public natural property rights of society to clean air, water, land, biodiversity, and other natural public resources that are essential for society's survival and environmental welfare. In return, society gives the business license to operate and use these

natural resources to produce goods and services that society depends on the business to provide, in return for profit.

In our theorizing we do not impose assumptions about ethical considerations driving parties' behavior, in contrast with normative stakeholder theory (Laplume et al., 2008). We follow agency theory literature (e.g., Jensen & Meckling, 1976) and assume both parties to the contract to be rational and utility-maximizing. Specifically, the firm's utility increases with its profits (and/or firm value), while society's utility also improves with natural environmental welfare. This divergence of preferences is the root of the agency problem discussed here. If the costs of natural resource usage are not required to be fully internalized by the business, it incentivizes it to behave opportunistically and try to impose these costs (NEACs) on society. For some societal stakeholders who are also shareholders, these costs are compensated, to some extent, by dividends or a rise in share value. However, rising societal as well as economic pressures (e.g., reputational threats, regulation of emissions, environmental taxes, costly permits, fines, and damage claims) suggest that this compensation may not be enough. More likely, marginal actual or opportunity costs of environmental pollution, depletion, and resulting degradation are now vastly higher than the marginal returns to shareholders.

While the divergence of preferences (and the resulting conflict of interests) is the root of the agency problems discussed here, traditional agency literature (e.g., Arrow, 1985) also highlights relevance of other factors affecting the severity of moral-hazard type of agency problems. These are the information asymmetries between the agent and the principal and the principal's limited ability to influence the agent's behavior (e.g., due to co-ordination challenges of collective action). In the context of NEAT, both are paramount. The full extent of true environmental costs of business activities are only becoming clearer now (partly due to

advancements in data collection and dissemination technologies), eroding informational advantages enjoyed by firms for decades.

Moreover, not all the stakeholders impacted by NEACs have powerful enough levers to influence the actions of businesses imposing these NEACs. Nevertheless, if NEACs (e.g., pollution, depletion, over-exploitation of natural resources, degradation of natural environment and biodiversity, and socio-economic impacts of environmental injustices) are sufficiently large, visible, and perceived as materially impacting the environmental welfare of society, society through its specific constituent groups including regulators, consumers, and local communities can and does retaliate. For example, regulators often impose heavy regulatory fines, increase costs of some activities (e.g., by mandating costly permits, like carbon emission credits, or imposing carbon taxes), or constrain some of the firm's operations (e.g., by banning the use of substances harmful to environment, as done, e.g., for CFCs or leaded petrol). Other societal stakeholders key to firm's operating success could and do withdraw their cooperation vital for firm's operating success (e.g., product boycotts or preference for 'greener' substitutes, as, e.g., in leather industry where leather substitute product market is now highly developed), costly litigation by consumers, inability to attract or retain high-quality employees and/or suppliers. Hence efforts by many firms to improve their performance in these areas. In extreme cases, society could even revoke business' license to operate. The revoking of license to operate could be operationalized via legal action, such as regulation, economic factors, or a combination of both (as illustrated, e.g., by the retrenchment of the coal industry globally). Hence, we argue that stakeholder monitoring and pressure, as well as firm and managerial incentives are likely to result in (at least, partial) aligning of the firm and societal interests, forcing the firm to make environmental commitments (bonding) to internalize NEACs, and make it in the economic

interest of the firm (and its investors) to honor its implicit environmental contract. Like in a traditional agency theory, the imperfect alignment of principal's and agent's interests results in residual losses (which in the context of NEAT include unaddressed degradation and depletion of natural environment). In the following section, we elaborate on the mechanisms (i.e., monitoring and incentives) facilitating such an alignment of interests.

NEAT Predictions and Hypothesis Development

Determinants of bonding

In today's world of severe environmental threats related to climate change, global warming and the growing awareness and experience of its socio-economic and natural environmental consequences, societal stakeholders (including environmental regulators, activist organizations, consumer, employee, and supplier representative groups) are becoming increasingly vigilant and are monitoring corporate activities closely (Lyon & Maxwell, 2008). The intensity of such monitoring is likely to be the highest among the most polluting firms or firms mired in recent environmental controversies – a conclusion that is supported by empirical studies testing the links between environmental performance and disclosures (e.g., Al-Tuwaijri et al., 2005; Cho & Patten, 2005; Clarkson et al., 2008; 2011; Patten, 1992).

Monitoring of environmental impact of business activities and associated risks is no longer an exclusive domain of traditional monitors such as government and its regulatory agencies. While global regulation around environmental standards and targets such as net-zero or low-carbon emissions continue to grow, non-State players are becoming increasingly active in this space. These include capital providers (in particular, large financial institutions) and investment support service providers (e.g., financial analysts). Investors globally now demand

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and rely on environmental performance and disclosure indicators to assist in their investment decision making. This is evident by the supply of several environmental performance/disclosure indices, e.g., by MSCI, Refinitiv, Sustainalytics, or Bloomberg. The rising number of institutional investors signing up to abide by the UN Principles of Responsible Investment is also consistent with such trend.

We argue that the aforementioned monitoring of firms' environmental activities is likely to reveal firm's attempts to impose NEACs on society (rather than internalize them) and, consequently, result in stakeholders putting pressure on the firm (cf. Lyon & Maxwell, 2008), with credible threats of retaliation in case of continued irresponsible business behavior, imposition of costly regulation (e.g., fuel efficiency and emission standards for car manufacturers), and, in extreme cases, even withdrawing the firm's license to operate (as for coal industry in many countries). The firm could attempt to proactively preempt such actions by bonding, i.e., making credible commitments regarding its own environmental performance (Heal, 2005). Importantly, some of the actions that improve the firm's environmental performance and, consequently, reduce NEACs, could bring about cost savings (e.g., due to increased natural resource use efficiency). However, both pollution mitigation and other environmental efforts, particularly those aimed at reversing effects of degradation (e.g., re-foresting, decarbonizing, or environmental conservation) could have non-negligible costs for the firm, at least in the short run. Yet, firms may choose to commit to such (potentially) costly actions to preempt even costlier stakeholder backlash, e.g., litigation threats (Kassinis & Vafeas, 2002; Koh et al., 2014), product boycotts and/or switch to greener choices, or future pricing threat by government (e.g., potential carbon emissions tax). While general CSR activities have been argued and shown to allow firms to gain stakeholders cooperation via goodwill building (Godfrey, 2005; Godfrey,

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Merrill, & Hansen, 2009), NEAC-reducing and impact-reversing activities can not only help gain stakeholder goodwill, but in the current severely threatened natural environment, help sustain markets for business.

Bonding commitments are not just reflected in improved environmental performance of the firm. As the firm (agent) improves its environmental performance, i.e., reduces its NEACs, it is also in its strategic interest to convey this information to society (Hart, 1995). By making objective, relevant, and reliable disclosures, businesses can reduce environmental information asymmetry and gain societal cooperation and trust (particularly among its financiers, consumers, and regulators). Increasingly firm behavior is becoming consistent with these expectations (Clarkson et al., 2008, 2011). Many firms are now voluntarily producing substantial environmental/sustainability reports targeted largely towards societal stakeholders. Firms are also seeking independent audits and assurances of these reports (e.g., Fan, Tang, & Pan, 2021). There are also global efforts to standardize the contents and assurance of these reports via development of sustainability reporting and assurance standards like those promoted by GRI, ISSB, or EFRAG. Within NEAT, such disclosures are seen as a strategic bonding mechanism through which the firm can build trust with societal stakeholders (including key operational stakeholders like customers, employees, local communities), gain their cooperation, and reduce transaction costs, ultimately sustaining and positively leveraging its license to operate.

However, high quality environmental disclosures that reveal firm's current environmental performance and its future strategic environmental plans, are also costly. While societal stakeholders not holding pecuniary interest in the firm are likely to unequivocally welcome these, a firm's shareholders (and other financial capital providers) who hold such interest may view such strategic high-quality disclosures as a risky revelation of costly proprietary

information (Dye, 1985), with uncertain benefits. Such disclosures can increase a firm's vulnerability vis-à-vis its competitors (potentially adversely affecting its future competitiveness and competitive advantage) and the threat of adverse regulatory action (Carroll & Shabana, 2010). Despite these risks, we argue that extensive environmental disclosures reduce information asymmetries, build trust between the business and society, and prevent stakeholder backlash.

To conclude, we posit that increased monitoring of environmental actions of firms by shareholders and societal stakeholders reveals the extent of NEACs and increases the likelihood of retaliatory action against the firm. This is likely to incentivize the firm to bond itself by making environmental commitment that encompasses both the actions (environmental performance) and its reporting (environmental disclosures):

Hypothesis 1. There is a positive relationship between the extent of monitoring and pressure of corporate stakeholders, and firm environmental commitments (bonding).

Bonding and monitoring are not the only mechanisms that could mitigate agency problems. Extant agency literature also recognizes the role that incentives could play in aligning the interests of an agent and a principal. A vast body of academic literature has documented how managerial remuneration incentives (in particular, performance-related pay) could reduce standard shareholder-manager agency problems (Edmans & Gabaix, 2016). Aligning the interests of managers and shareholders through appropriate remuneration incentives has also been seen as best practice promoted by regulators (e.g., FRC, 2018).

However, the integration of CSR criteria in executive compensation, as a way of mitigating NEACs, is a relatively recent yet increasingly prevalent practice in corporate governance (Flammer et al., 2019). Numerous recent studies document that providing executives with direct incentives for CSR is an effective tool to foster an increase in firm CSR performance (in particular, by reducing environmental CSR concerns and increasing environmental strengths),

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an increase in social and environmental initiatives, a reduction in emissions, and an increase in green innovations (Derchi, Zoni, & Dossi, 2021; Flammer, Hong, & Minor, 2019; Galletta, Mazzù, & Naciti, 2021). In other words, linking executive compensation to CSR/sustainability targets by helping align managerial and societal interests towards the natural environment, could be expected to be positively associated with firm environmental commitments. A similar effect could be observed for other environment-related incentives: Hassan, Roberts, and Atkins (2020) document a relationship between the level of biodiversity/extinction disclosures and firms' environmental awards. Hence, we posit:

> *Hypothesis 2. There is a positive relationship between firm/managerial environment-related incentives and firm environmental commitments.*

Effects of bonding

Extant literature provides empirical evidence of a positive link between firm environmental performance and its future financial performance and/or valuation (e.g., van Beurden & Gössling, 2008; Clarkson et al., 2011). Hang, Geyer-Klingeberg, and Rathgeber (2018) argue that such benefits of superior environmental performance manifest only in the longer term. Numerous studies also document that it is not just environmental performance indicators, but also the content and extent of environmental disclosures that are value-relevant (e.g., Matsumura, Prakash, & Vera-Muñoz, 2014).

Importantly, the effects of firm environmental commitments on firm value could emerge via two channels, i.e., cashflow channel and/or discount rate channel. For instance, while Qiu et al. (2016) find the effects of environmental and social disclosures on firm value to emerge via cash flow effects, Dhaliwal, Li, Tsang, and Yang (2011) document that environmental

disclosures lower firms' cost of capital, i.e., the discount rate channel effect. Below we argue that both the cashflow and the discount rate channel effects could be rationalized by NEAT.

Superior environmental performance can not only be seen as superior managerial stewardship of firm resources (Clarkson et al., 2008; Hart, 1995; Waddock & Graves, 1997), but also as a step towards reducing NEACs and, in doing so, reducing costs, improving stakeholder relations, and reducing the risk of retaliatory actions by societal stakeholders. With unprecedented nature loss and degradation, and tightening regulatory climate, there is a very real threat of 'dirty' products and technologies becoming very costly to operate (e.g., due to the need to buy costly carbon credits or imposition of carbon taxes). This would undoubtedly raise the costs of production and decrease competitiveness of poor environmental performers. Moreover, unsustainable or environmentally irresponsible business practices could also result in substantial environmental fines, costly conflicts with affected local communities, and could trigger considerable reputation damage. These could lead to decreased competitiveness due to inability to attract or retain high-quality employees and/or suppliers, or unfavorable regulatory actions, consumer backlash, or product boycotts (Greening & Turban, 2000; Heal, 2005; Lyon & Maxwell, 2008; Turban & Greening, 1997; Zhou, Zhang, Ling, Zeng, & Chen, 2020). All these factors are likely to adversely affect firm cashflows and thus profitability and firm value. Realizing such threats, proactive firms, particularly those in environmentally sensitive industries, are already expending considerable financial resources (both as current and capital expenditures) as a key part of their natural environmental competitive strategy.

Companies making environmental commitments enjoy lower cost of capital and better access to finance. Sharfman and Fernando (2008) find a negative relation between responsible environmental performance and cost of capital while Cheng, Ioannou, and Serafeim (2014) argue

and find that responsible social and environmental performance as well as its transparency reduces traditional agency costs (due to enhanced stakeholder engagement) as well as information asymmetry, thus improving a firm's access to finance. Dhaliwal et al. (2011) document that firm CSR disclosures are negatively associated with its subsequent cost of equity capital, consistent with the proposed discount rate effects. Jung, Herbohn, and Clarkson (2018) evidence that prior carbon emissions reflect firm carbon risk and are therefore negatively related to the cost of corporate debt. However, this penalty can be effectively negated for firms exhibiting carbon risk awareness and taking a pro-active approach in this domain, i.e., by committing to carbon emission reduction plans and making information available about it, e.g., by responding to Carbon Disclosure Project (CDP) survey (*ibidem*).

To conclude, we expect the effects of environmental commitments to be reflected in the operating performance and as well as market-based performance measures:

> *Hypothesis 3. The stronger the environmental commitment of a firm, the higher its subsequent financial performance.*

While prior literature tends to agree that firm environmental commitments and firm riskiness are negatively related, there is some debate as to which measures of riskiness are most likely to be affected and why. Reber, Gold, and Gold (2022) document that voluntary ESG disclosure reduces idiosyncratic volatility and downside tail risk. Benlemlih, Shaukat, Qiu, and Trojanowski (2018) find a negative relationship between firm environmental disclosures and total and idiosyncratic risk (but not systematic risk). They argue that firms which make extensive and objective environmental disclosures promote corporate transparency that can help them build a positive reputation, trust, and thus stable contractual relations with their stakeholders, which in turn can help mitigate the variability of firm's cashflows and thus firms' operational risk. On the other hand, Zeng, Zhang, Zhou, Zhao, and Chen (2020) document a significant negative

relationship, but only between environmental disclosures and systematic risk. Salama, Anderson, and Toms (2011) and Oikonomou, Brooks, and Pavelin (2012) also find a negative relation between firm environmental and/or social performance and systematic risk, while Orlitzky and Benjamin (2001) find a negative link with both accounting (i.e., idiosyncratic) and market-based measures of firm risk, although the relation is stronger for accounting-based measures.

Again, we argue that both effects (idiosyncratic and systematic) can be explained by NEAT. On one hand, environmental commitments by the firm reduce NEACs (and related operational threats of regulation and worsening relations with stakeholders), and thus build trust and improve cooperation by stakeholders such as customers, employees, or suppliers (Godfrey, 2005; Godfrey et al., 2009). It ultimately leads to a reduction in firm operating risk (and translating into lower idiosyncratic risk). On the other hand, environmental commitments by reducing NEACs also make firms less exposed to more systematic risk factors, such as environmental policy and regulation uncertainty (which are influenced by a very powerful and important societal stakeholder, i.e., the State and its regulatory agencies). Therefore, we expect the effects of environmental commitments to be reflected in both the operating risk measures as well as market-based risk measures:

Hypothesis 4. The stronger the environmental commitment of a firm, the lower its subsequent riskiness.

DATA AND METHODOLOGY

Data Sources and Variable Measurement

We consider US publicly listed firms for the period 2005-2019 and develop our data set from the intersection of several databases. Specifically, we start with all firms that were ever listed on

either NYSE, AMEX, or NASDAQ during the period we consider and for which data on

environmental disclosure scores is available from Bloomberg. We merge this dataset with

financial variables from Compustat/CRSP(CCM), environmental performance scores from

Refinitiv (formerly Asset4), data on environmental controversies from Reprisk, analyst coverage

from I/B/E/S, and institutional ownership data from Thomson Reuters Stock Ownership

database. After accounting for missing observations for variables that are required for computing

our latent variables and for testing of all our hypotheses, we have a usable sample of 6309 firm-

year observations (although the number shrinks to 2894 for the analyses requiring the accounting

variables). Table 1 describes the variables and identifies their sources. Table 2 shows the sample

distribution across the years and across the 17 Fama and French (1997) industry groups based on

the 4-digit SIC code for each firm. Tables 3 reports sample descriptive statistics and the

correlation matrix.

Insert Tables 1-3 and Figure 1 about here

Modelling Framework

We use the Lavaan package in R to implement a structural equation modelling (SEM) analysis to

test our model depicted in Figure 1. We implement SEM using the maximum likelihood

estimation method, and we calculate robust standard errors in all our estimations. We use SEM

to test the NEAT hypotheses and model the interconnections between the latent constructs and

exogenous variables simultaneously. SEM is well suited to testing theory and accounts for both

simultaneity and measurement issues (Bollen, 1989).

As shown in Figure 1, our model has three latent constructs that are central to any agency setting, namely *Commitment*, *Monitoring*, and *Incentives*. In the context of NEAT, to capture the *Incentives* latent construct we employ two indicators: sustainability compensation incentives in the senior executive's compensation (*Sust. incentive pay*) and the indicator of whether the company received an award for its social, ethical, community, or environmental activities (*CSR Award*). For the *Monitoring* latent construct, we use Reprisk environmental news count (*Env. News Count*), number of estimates by analysts (*Analyst Coverage*), and *Institutional Ownership* variables as indicators. Finally, for the *Commitment* latent construct we use Bloomberg environmental disclosure score (*Env. Disc.*) and Refinitiv environmental performance score (*Env. Perf.*) as indicators. The structural relationships between the three latent constructs are modelled following the predictions of NEAT formalized as Hypotheses 1-4 above.

To assess model fit, we follow Kline (2015) and report several fit indices, i.e., the goodness-of-fit index (GFI), the comparative fit index (CFI), the normed fit index (NFI), the root mean squared error of approximation (RMSEA), and the standardized root mean square residual (SRMR). In assessing model fit we use the cut-off values recommended by prior studies and deem the fit of a model to be acceptable if GFI, CFI, NFI index values exceed 90 percent, the RMSEA is smaller than .07 (Steiger, 2007), and the SRMR is less than .08 (Hu & Bentler, 1998).

Importantly, to assure the robustness of our conclusions we estimate two alternative versions of the model. The first employs market-based measures of financial performance and risk: here we use two alternative measures of performance, i.e., 3-year ahead Tobin's Q (*Tobin's Q 3yr post*) or the 3-year ahead buy and hold abnormal returns (*BHAR 3yr post)*, and 3-year ahead volatility (*Volatility 3yr post*) as the measure of risk. The second version employs

accounting-based measures of financial performance and risk (i.e., 3-year ahead ROA, *ROA 3yr post*, and volatility of ROA over a 3-year period, *ROA Volatility 3yr post*, respectively).

RESULTS

We start with a confirmatory factor analysis, as per the measurement model which relates the indicators to our latent constructs, i.e., *Commitment*, *Monitoring*, and *Incentives*. The results (available upon request) document that the indicators capture the latent constructs well. All the coefficients have the expected (positive) sign with very low p-values (all p-values < .001). The measurement model fits well, as can be seen by the fit statistics (SRMR = .03, RMSEA = .07, GFI = .98, CFI = .98, NFI = .98), which are all within the acceptable ranges.

Next, the key relationships between these latent constructs (central to NEAT theorizing) are examined in the structural models reported in Tables 4, 5, and 6. Table 4 presents the estimation results of the model employing accounting-based measures of financial performance and risk while Table 5 and Table 6 report its counterparts employing market-based measures of financial performance and risk. Importantly, the qualitative conclusions drawn are largely consistent across different versions of the model and all the specifications offer strong support for predictions of NEAT hypothesized above.

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                Insert Tables 4-6 about here
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In Tables 4, 5, and 6 *Monitoring* and *Incentives* load on *Commitment* with the expected signs and are statistically significant. In Table 4 these estimates are $\beta = 0.38$ (p-value < .001) and $\beta = 1.50$ (p-value < .001), respectively. In Table 5 these are $\beta = 0.39$ (p-value < .001) and $\beta = 1.52$ (p-

value < .001), respectively, and in Table 6 these are $\beta = 0.43$ (p-value < .001) and $\beta = 2.01$ (p-value < .001). These results support Hypotheses 1 and 2, respectively, i.e., firm environmental commitments are positively influenced by both the extent of stakeholder monitoring/pressure and firm/managerial environment-related incentives. The effects are also economically meaningful: for instance, the results of Table 6 imply that one standard deviation increases in *Monitoring* or *Incentives* lead to 0.43 or 2.01 standard deviation increases in *Commitment*, respectively.

We next examine whether firm environmental commitments translate into improved profitability and valuation in the medium run, i.e., 3 years, in line with the predictions of Hypothesis 3. In two specifications our results provide support for Hypothesis 3: we find that *Commitment* loads on performance with the expected signs (i.e., positive). In Table 4 the estimate of *Commitment*'s effect on ROA is $\beta = 0.01$ (with p-value < .001) and in Table 6 the estimate of *Commitment*'s effect on BHAR is $\beta = 0.02$ (with p-value < .001), respectively. Given that the latent *Commitment* variable is standardized, the coefficient estimates have a direct economic interpretation. For instance, Table 4 results imply that one standard deviation increase in firm environmental commitments improves industry-year-adjusted ROA 3 years down the line by one percentage point, which is a substantial effect. Taken together, the set of results pertaining to Hypothesis 3 suggests that equity markets are relatively slow in recognizing the benefits of firm environmental commitments. Specifically, while they translate into improved profitability (cf. Table 4) and are accompanied by higher stock returns (cf. Table 6), the positive effects of *Commitment* are not yet reflected by our proxy for firm valuation (Tobin's Q) in Table 5: the corresponding coefficient estimate is $\beta = 0.001$ (with p-value = .92).

Finally, firm environmental commitments allow firms to reduce their riskiness in the subsequent (medium term) period, as postulated by Hypothesis 4. The results are fully consistent

across alternative specifications. *Commitment* loads on our measures of risk with the expected sign (negative) and this effect is statistically significant. In Table 6 the corresponding estimate is $\beta = -0.002$ (with p-value < .001). In Tables 5 and 6 these estimates are $\beta = -0.004$ (with p-value < .01) and $\beta = -0.01$ (with p-value < .001), respectively.

Taken together, the results pertaining to Hypotheses 3 and 4 corroborate the key insights of NEAT: improving their environmental performance and related reporting (environmental commitment, i.e., bonding) leads to subsequent improvement in firm operating and market performance, and reduction in operating and market risk.

DISCUSSION, CONCLUSIONS, AND IMPLICATIONS

In this paper, drawing on insights from economics, accounting, and traditional financial economics-based agency theory, we develop and test the predictions of the natural environment agency theory (NEAT). Adopting the firm as a nexus of contracts view, we articulate the implicit contract between the firm (agent) and society (principal) in the context of natural environment. We posit that a business (in the process of production and sale of its' goods and services) enters an implicit contract with society that in the pursuit of its profits, it will not violate the inalienable societal property rights to continued and sustainable access to clean air, water, and land. In return, society extends to the firm the license to operate. If the firm breaches this contract and imposes costs of environmental pollution, depletion, and resulting degradation (what we collectively term as natural environment agency costs, NEACs) on society, society has a right to monitor and to take remedial action, in worst case withdrawing the license to operate.

Our paper makes several important theoretical contributions to management literature. First, by formulating the natural environment relation as agency relation, we answer the calls to

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study relations and contracts of the firm (including implicit) beyond those with shareholders. Second, while welfare economics has long regarded negative environmental externalities as a form of market failure, by positing these as agency problems, we offer a variety of market-driven solutions for addressing these. Third, while prior theories in strategic management, particularly RBV, have often been drawn upon to explain how businesses can develop strategic advantages in the context of natural environment (Hart, 1995; Hart & Dowell, 2011), these theories tend to treat societal stakeholders as passive recipients of firm strategies. We highlight that both firms and their stakeholders are now becoming increasingly aware and active regarding their natural environment related roles and responsibilities. By positing it as a two-way agency relation, NEAT articulates the behavioral implications of NEACs for both parties to the contract. While aspects of these behaviors (e.g., environmental disclosures) have been examined in prior literature from various theoretical perspectives (e.g., RBV, VDT, legitimacy theory), NEAT pulls together diverse theoretical strands to weave a complete systemic picture of the behavioral implications of the implicit contract between business and society in the context of natural environment. It identifies key sources of goal conflict (profit vs. planet) and the resultant agency problems. It then articulates how bonding, incentives, and monitoring can help to align business and societal goals in the environmental arena.

Consistent with Hypothesis 1, we find that monitoring by societal stakeholders leads to firms undertaking costly environmental commitments (bonding), i.e., improvements in environmental performance and disclosures. Our results also support Hypothesis 2: we find a positive link between firms' environmental commitments and environmental incentives (reflecting environmental performance related managerial pay and environmental awards).

NEAT predicts that the costs of environmental negligence to the business (tangible ones such as environmental risks and cash outlays, as well as intangible ones such as reputation loss) now exceed the benefits of overexploiting environmental commons. Consequently, firms should find it efficient to internalize NEACs and reap the benefits of such a responsible environmental behavior and preempt costly interventions by stakeholders (e.g., environmental performance and reporting regulation, taxes, penalties, financing costs, product boycotts, etc.). By doing so, a firm can also build its reputation, a key resource for sustained competitive advantage (Barney, 1991). Consistent with our prediction, we find a positive link of environmental commitments with both operating and market measures of performance in line with Hypothesis 3. However, equity markets are slow to fully reflect the benefits of bonding in firm valuations. Finally, we also find a negative link of bonding with both measures of firm risk (Hypothesis 4).

Our theory illustrates that the prominence of a particular environmental problem serves as a catalyst for societal stakeholders recognizing the associated NEACs and demanding remedial action. We highlight that society and its various constituents, especially the State and non-State regulators/monitors, are playing a key monitoring role in aligning business and societal goals towards the natural environment. Regulation, a key monitoring mechanism, is being tightened and expanded around the world to make businesses more environmentally responsible and accountable. While traditionally the State (by which we mean the entire set of its institutions) as a part of society (principal) has been expected to monitor and control NEACs, other non-State regulators such as reporting standard setting bodies (e.g., ISSB or EFRAG) are designing standards for sustainability disclosures. Underpinned by NEAT, properly designed reporting standards could be truly informative about NEACs imposed by business, prevent greenwashing, and galvanize societal stakeholders to act. Nevertheless, given the severity and profound threats

related to NEACs, the question remains whether such regulatory efforts have gone far enough. The rising global threat of climate change and related risks clearly suggests the answer so far is a firm "no". Globally, both the State and other regulatory bodies have clearly proved to be inadequate monitors. According to WWF (2020), until 1970, humanity's ecological footprint was smaller than the Earth's rate of regeneration. Now, to feed and fuel our 21st century lifestyles, we are overusing the Earth's biocapacity by at least 56 percent (*ibidem*). Hence, there is an urgent need for both business and society (in the form of its multiple monitors, particularly those critical to firm operations, e.g., financiers, investment support service providers, and consumers) to work together and find (alongside State and regulation) market-driven solutions to the natural environment crisis working to the mutual advantage of both business and society.

NEAT postulates that certain societal stakeholders have effective levers to monitor and influence firm behavior. For instance, customers could actively favor environmentally friendly products in their purchase decisions. Therefore, should firms be encouraged (or even mandated) to provide standardized (and possibly certified) information on environmental footprint of their products and services to enable responsible consumer behavior? Should company's environmental reports be audited just as financial reports to make sure firms are indeed addressing NEACs rather than simply 'green washing'? Research suggests that for gaining credibility, investors demand an external audit of a company's environmental/sustainability report and that such audits are valued highly by investors (Lee & Hutchinson, 2005).

Furthermore, the interconnectedness of environmental issues (e.g., global warming and deforestation, plastic pollution, and marine biodiversity loss) require that both companies and their stakeholders adopt a more systemic approach to recognition and tackling of NEACs as opposed to ad hoc targeting of a specific environmental problem. Technical complexities

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involved in understanding NEACs and their impact raise an important question: should there be a requirement for a technical environmental expert on boards of companies to advise and monitor the firm's environmental performance and its disclosure?

NEAT stresses the importance of environmental commitments in mitigating NEACs. Some leading companies are now committing to improving their environmental performance and reporting, often on a voluntary basis, bearing the associated costs (at least in the short run). For instance, numerous companies have made public pledges to meet net zero targets by a specific date. We argue that there is a room for companies to play an even more active role as a proxy for the regulator (the State in particular) and raise the bar (via soft/self-regulation and voluntary actions) for planet friendly production and consumption practices, in particular in countries where the planet is not yet high on the agenda of the regulators. In the light of NEAT, such a proactive behavior would allow firms to reap the long-term benefits of their environmental commitments and avoid costly compliance with future stringent regulation. It would also minimize the risk of stakeholder backlash once environmental awareness reaches a critical point.

NEAT also highlights the significance of establishing appropriate incentive mechanisms fostering environmental commitments. Is there then scope to boost such incentives? For instance, as our results show that equity markets do not seem to fully appreciate long-term benefits of environmental commitments yet, managerial incentives focusing on share value alone may not sufficiently incentivize managers to operate business in an environmentally sustainable manner. Should targeted environmental KPIs be more extensively adopted in executive compensation packages? Good environmental performance also requires undertaking risky environmental innovations – be it in materials, processes, or products. Do current executive compensation practices sufficiently encourage green innovation?

While development of sustainability reporting standards is well under way, governments and their regulatory bodies are far less active in incentivizing good environmental performance. Firms could also be incentivized to reduce NEACs by the State, through subsidies, guarantees, co-investment, or tax breaks. Careful thought needs to be put as to how these should be designed and targeted. Certainly, there is room for global regulators as monitors to take more decisive and concerted policy action to speed up convergence of societal and business environmental goals. Environmental policy should also be stable and clearly articulated, given that economic policy uncertainty reduces environmental performance (Jiang, Zhou, & Liu, 2019).

NEAT provides a cohesive conceptual framework to rationalize and examine the effects of specific mechanisms addressing NEACs. While we discuss a variety of such mechanisms, with numerous specific examples of monitoring and incentives, future research could conceptualize other means for aligning societal and business interests in the natural environment context and empirically test their effectiveness.

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TABLES AND FIGURES

TABLE 1

Variable definitions and data sources

Variable	Source	Description
Env. Disc.	Bloomberg	**Field RX317:** Companies that do not disclose anything will have a value of 0. Score ranges from 0.1 for companies that disclose a minimum amount of E data to 100 for that disclose every data point collected by Bloomberg. Each data point is weighted in terms of importance, with data such as GHG Gas emission carrying more weight than other disclosures. The measure is a weighted average of disclosure score under Air Quality, Climate change, Ecological and Biodiversity impacts, energy, materials & waste and Supply chain and water. This score measures the amount of E data a company reports publicly and does not measure the company's performance on any data point.
Env. Perf.	Refinitiv/Asset4	**ENSCORE**: The E pillar score is a measure of a company's E performance, commitment and effectiveness based on publicly reported information. E pillar score is a relative sum of category weights which vary per industry. E pillar weights are normalized to percentages ranging between 0 and 100.The E pillar score is a measure over resource use, emissions, and innovation categories.
Env. News Count	Reprisk	**News_count_for_issue**: The mean of the daily news count for issues relating to the environment involving a particular company. We consider: Animal mistreatment, Climate change, GHG emissions and global pollution, Impacts on landscapes, ecosystems and biodiversity, Local pollution, Other environmental issues, Overuse and wasting of resources, Waste issues and compute the average of the daily news count for each firm – year in our sample.
Institutional Ownership	Refinitiv Thomson Reuters via WRDS	**Total Institutional Ownership:** WRDS Thomson Reuters Institutional (13f) Holdings - Stock Ownership
Analyst Coverage	IBES	**NUMEST**: Number of estimates, set to zero if missing
CSR Award	Refinitiv/Asset4	**SOCODP074:** Corporate Responsibility Awards: Has the company received an award for its social, ethical, community, or environmental activities or performance? - external award for reporting fiscal year for its social, ethical, community, or environmental activities/performance - includes an external award for CSR programs and initiatives relating to health and safety, human rights, training and development, diversity and opportunity, good citizenship/community/philanthropy, environmental, environmental product award, etc. Set to zero if missing.
Sust. incentive pay	Refinitiv/Asset 4	**CGCPO09V:** Sustainability Compensation Incentives: Is the senior executive's compensation linked to CSR/H&S/Sustainability targets. Set to zero if missing.
Tobin's Q	Own calculations and Compustat	**TQ:** Book value of assets (AT) minus the book value of equity (CEQ) plus the market value of equity (CSHO*PRCC), all divided by book value of assets (AT). For any year, a firm's TQ is industry-year adjusted by subtracting the average TQ for the industry to which the firms belongs, for that that year.
Tobin's Q 3yr post	Own Calculation	Three-year forward Tobin's Q computed as TQ_{t+3}.
BHAR 3 yr post	Own Calculations, CRSP, and Kenneth French Data Library at http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/f-f_factors.html	The buy and hold return (BHAR) is calculated over a three-year period as: $\prod_{\tau1}^{\tau2}(1+R_{i\tau})$ - $\prod_{\tau1}^{\tau2}(1+R_{f\tau})$ where $R_{i\tau}$ is the return for the firm for month τ from CRSP and $R_{f\tau}$ is the return of the one-month US treasury bill from the Kenneth French Data library. For any year, a firm's BHAR is industry-year adjusted by subtracting the average BHAR for the industry to which the firms belongs, for that that year.
Volatility	Own calculations and CRSP	Measured as the standard deviation of the returns from obtained from CRSP.
Volatility 3 yr post	Own Calculation/CRSP	Total stock volatility over 36 months. For any year, a firm's volatility is industry-year adjusted by subtracting the average volatility for the industry to which the firms belongs, for that that year.
ROA	Compustat	Computed as ib_t/at_{t-1}. For any year, a firm's ROA is industry-year adjusted by subtracting the average ROA for the industry to which the firms belongs, for that that year.
ROA 3yr post	Own Calculation	Three-year forward ROA computed as ROA_{t+3}
Industry	Compustat and Kenneth French Data Library at http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/f-f_factors.html	17 industry groups formed from the 4-digit Standard Industry Classification (SIC) Code based on the industry definitions from the Kenneth French Data library.

TABLE 2

Sample distribution across the years and industries

Panel A			Panel B		
Year	Freq	Percent	FF17 Industry Groups	Freq	Percent
2005	4	0.14	Food	124	4.28
2006	39	1.35	Mining and Minerals	48	1.66
2007	71	2.45	Oil and Petroleum Products	137	4.73
2008	141	4.87	Textiles, Apparel & Footwear	40	1.38
2009	200	6.91	Consumer Durables	63	2.18
2010	241	8.33	Chemicals	71	2.45
2011	284	9.81	Drugs, Soap, Parfums, Tobacco	153	5.29
2012	293	10.12	Construction and Construction Materials	89	3.08
2013	305	10.54	Steel Works Etc.	20	0.69
2014	313	10.82	Fabricated Products	23	0.79
2015	395	13.65	Machinery and Business Equipment	530	18.31
2016	608	21.01	Automobiles	57	1.97
Total	2894	100	Transportation	174	6.01
			Utilities	267	9.23
			Retail Stores	72	2.49
			Banks, Insurance Companies, and Other Financials	386	13.34
			Other	640	22.11
			Total	2,894	100

FF17 industry groups are the 17 Fama-French industry groups constructed from the 4-digit SIC code based on the industry definitions from the Kenneth French Data library at

http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/f-f_factors.html
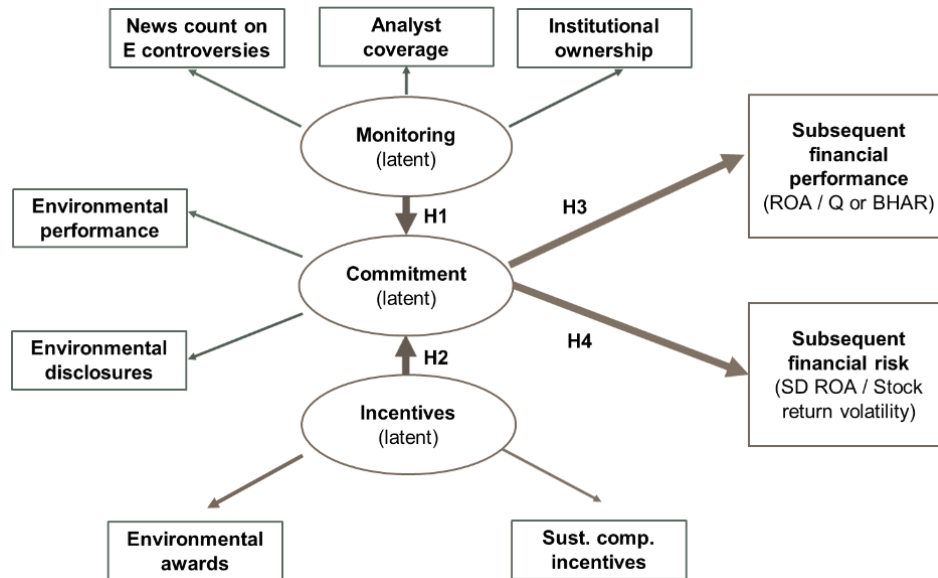
TABLE 3

Descriptive statistics and correlation matrix

Variable	Mean	Median	S.D.	Correlations											
				(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Env. Disc.	22.44	17.83	17.89	**1.00**											
(2) Env. Perf.	47.61	49.32	25.86	**.69**	**1.00**										
(3) Env. News Count	0.04	0.00	0.15	**.22**	**.20**	**1.00**									
(4) Institutional Ownership	19.06	19.03	1.25	**.45**	**.51**	**.25**	**1.00**								
(5) No of Analysts	16.08	16.00	8.30	**.34**	**.32**	**.09**	**.59**	**1.00**							
(6) CSR Award	0.58	1.00	0.49	**.44**	**.53**	**.12**	**.37**	**.23**	**1.00**						
(7) Sust. incentive pay	0.41	0.00	0.49	**.22**	**.21**	**.19**	**.21**	**.07**	**.22**	**1.00**					
(8) ROA 3 Yr post	0.04	0.03	0.07	**.12**	**.11**	-.01	**.17**	**.21**	**.07**	-.01	**1.00**				
(9) ROA Volatility 3 Yr post	-0.02	-0.02	0.03	**-.09**	**-.07**	-.02	**-.08**	.00	**-.12**	-.01	**-.30**	**1.00**			
(10) Tobin's Q 3 Yr post	0.08	-0.17	0.95	.00	.01	**-.04**	.03	**.21**	-.03	**-.06**	**.49**	.07	**1.00**		
(11) BHAR 3 Yr post	0.04	0.00	0.50	**.04**	**.04**	.00	**.05**	**.07**	.02	.00	**.34**	**-.08**	**.42**	**1.00**	
(12) Volatility 3yr post	-0.03	-0.04	0.03	**-.19**	**-.21**	**-.08**	**-.28**	**-.19**	**-.17**	**-.04**	**-.51**	**.51**	**-.17**	**-.20**	**1.00**

All the variables are defined in Table 1. Variables (8)-(12) are industry adjusted. For any year, the measure is industry adjusted by subtracting the mean of the variable for the industry to which the firm belongs, for that year. The figures in bold represent correlations with p-value < .05.

FIGURE 1

The model

H1, H2, H3 and H4 are the testable hypotheses. The ellipses represent latent constructs.

TABLE 5

Model employing accounting-based measures of financial performance and risk

	Coefficient	SE	z-value	p-value	Overall model fit	
Latent Variables:						
Commitment:						
Env. Disc.	6.92	0.65	10.62	0.00		
Env. Perf.	11.39	1.08	10.57	0.00	SRMR	0.04
Monitoring:					RMSEA	0.07
Env. News Count	0.04	0.00	10.51	0.00	GFI	0.97
Institutional Ownership	1.20	0.03	44.92	0.00	CFI	0.95
No of Analysts	5.13	0.17	30.68	0.00	NFI	0.94
Incentives:					N	2894
CSR Award	0.34	0.01	24.86	0.00		
Sust. incentive pay	0.15	0.01	14.97	0.00		
Regressions:						
Commitment						
Monitoring	0.38	0.08	4.89	0.00		
Incentives	1.50	0.25	5.97	0.00		
ROA 3 Yr post						
Commitment	0.01	0.00	5.76	0.00		
SD 3 Yr post						
Commitment	-0.002	0.00	-4.70	0.00		

All the variables and latent constructs are defined in Table 1 and Figure 1, respectively. SE are robust standard errors.

N is the number of observations.

TABLE 6

Model employing market-based measures of financial performance and risk

	Coefficient	SE	z-value	p-value	Overall model fit	
Latent Variables:						
Commitment:						
Env. Disc.	6.82	0.66	10.36	0.00		
Env. Perf.	11.18	1.08	10.33	0.00	SRMR	0.05
Monitoring:					RMSEA	0.08
Env. News Count	0.04	0.00	10.48	0.00	GFI	0.96
Institutional Ownership	1.20	0.03	45.30	0.00	CFI	0.93
No of Analysts	5.12	0.17	30.79	0.00	NFI	0.93
Incentives:					N	2894
CSR Award	0.34	0.01	24.88	0.00		
Sust. incentive pay	0.15	0.01	14.97	0.00		
Regressions:						
Commitment						
Monitoring	0.39	0.08	5.14	0.00		
Incentives	1.52	0.26	5.90	0.00		
TQ 3 yr post						
Commitment	0.00	0.01	0.10	0.92		
SD 3 Yr post						
Commitment	-0.004	0.00	-8.13	0.00		

All the variables and latent constructs are defined in Table 1 and Figure 1, respectively. SE are robust standard errors. N is the number of observations.

TABLE 7

Alternative model employing market-based measures of financial performance and risk

	Coefficient	SE	z-value	p-value	Overall model fit	
Latent Variables:						
Commitment:						
Env. Disc.	5.94	0.48	12.28	0.00		
Env. Perf.	10.55	0.87	12.18	0.00	SRMR	0.035
Monitoring:					RMSEA	0.057
Env. News Count	0.04	0.00	15.23	0.00	GFI	0.98
Institutional Ownership	1.48	0.02	77.36	0.00	CFI	0.98
No of Analysts	6.80	0.09	72.48	0.00	NFI	0.97
Incentives:					N	6309
CSR Award	0.36	0.01	49.52	0.00		
Sust. incentive pay	0.18	0.01	27.11	0.00		
Regressions:						
Commitment						
Monitoring	0.43	0.09	5.02	0.00		
Incentives	2.01	0.28	7.29	0.00		
BHAR 3 Yr post						
Commitment	0.02	0.00	5.21	0.00		
SD 3 Yr post						
Commitment	-0.01	0.00	-10.88	0.00		

All the variables and latent constructs are defined in Table 1 and Figure 1, respectively. SE are robust standard errors. N is the number of observations.